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THE SPECIFICATION OF TRIP PLANNING SYSTEMS: REPORT OF THE 1993 QUESTIONNAIRE SURVEY

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ABSTRACT

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This report describes a survey carried out as part of a research project undertaken by the Institute for Transport Studies and the School of Computer Studies at the University of Leeds, funded by the Science and Engineering Research Council. The project was concerned with the specification of trip planning systems, which are systems which provide information to travellers and potential travellers about all aspects of their journey, but in this case principally route and timetable information for public transport users and route information for car travellers, before the journey is made.

Previous evidence had suggested that travellers may make sub-optimal travel decisions, meaning that they may make longer, slower or more expensive journeys than necessary because of imperfect information. Other parts of the project addressed sub-optimality in the choice of mode and time of travel but a main objective of the survey described in this report was to examine sub-optimality of route choice separately for journeys with which respondents were familiar and journeys with which they were unfamiliar. Other objectives were concerned with the travel information currently used, or desired by, the respondents, who were randomly-selected travellers from the West Yorkshire town of Mirfield.

Maps were widely used by car drivers - about one in five used them for familiar trips and about three quarters used them for unfamiliar trips. For public transport trips, timetables were used by about half of the travellers making familiar trips and 95 per cent making unfamiliar trips. Information on delays would have been welcomed by both private and public transport travellers: nearly three-quarters of familiar and unfamiliar car trips would have liked congestion information as would a significant minority of bus users. Most of all, public transport users would have welcomed information on service delays and cancellations. It would seem that real-time information on delays would be a key feature of a successful trip planning system.

The sub-optimality for car journeys averaged at 2.6 minutes per trip for familiar trips and 6 minutes per trip for unfamiliar trips. Sub-optimality was directly related to trip distance for familiar trips but not for unfamiliar trips. This indicates a modest but significant reduction in car journey times could be brought about by trip planning systems. Public transport trip sample sizes were too small to permit reliable estimates to be made of their sub-optimality.

KEY-WORDS:

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CONTENTS

THE SPECIFICATION OF TRIP PLANNING SYSTEMS: REPORT OF THE 1993 QUESTIONNAIRE SURVEY

1. INTRODUCTION

This report describes a survey carried out as part of a research project into the Specification of Trip Planning Systems. The project was carried out in 1993 and 1994 jointly by the Institute for Transport Studies and the School of Computer Studies at the University of Leeds and was funded by the Science and Engineering Research Council (SERC) under its Information Technology in Engineering Initiative. The project grantholders in Leeds were Prof. Tony May and Dr. John Preston of the Institute for Transport Studies and Dr. Stuart Roberts of the School of Computer Studies.

Trip planning systems are systems which provide information to assist travellers and potential travellers with all aspects of their journey. Although they can be used in-vehicle, while a journey is being made, the project focused particularly on systems which provide information before a journey is made. Such systems can aid travellers' decisions on whether and how often to travel, where to travel to and which mode or route to use.

A major impetus for the research was the results of a review commissioned by the Department of Transport and carried out by ITS (Hopkinson and May, 1992) which suggested that travellers may make sub-optimal travel decisions, meaning that they may make longer, slower or more expensive journeys than necessary, mainly because of imperfect information on alternatives. The review hypothesised that it might be possible, by providing information on alternatives, to encourage people to make shorter journeys, travel at less congested times or to use less congested (and congesting) modes of transport, and so reduce this sub-optimality.

The overall project had the following objectives:

(i) to identify the potential for a reduction in the sub-optimality of travellers' decisions, and hence for a reduction in transport costs;

(ii) to assess the potential for trip planning systems to contribute to (i) by improving information to travellers;

(iii) to develop appropriate decision support structures for provision of such information to users;

(iv) to test the structures developed in (iii) through a low-cost trial of information provision and the parallel development of a prototype.

The survey described in this report contributes mainly to objective (i), and to a small extent to (ii) and (iii).

The degree of sub-optimality was investigated by interviewing a sample of travellers living in the urban area of Mirfield in West Yorkshire. The area was chosen because of its compactness, the range of alternative nearby destinations (Dewsbury, Huddersfield, Leeds and Bradford), the availability of a range of bus and rail services and alternative routes to several of the main nearby destinations. The first set of data from Mirfield was obtained from 358 self-completion questionnaires and 138 household interviews administered in April and August 1992. The conduct of this survey is described in Tizani (1992a) and the results in Tizani (1992b). The objectives were to establish travel patterns in the area and respondents' attitudes towards, and use of, information and thus to assess both the sub-optimality of current trips and the information needs of travellers. In the 1992 survey and its subsequent analysis the main sub-optimality issues addressed were choice of mode of travel and choice of time of travel and evidence of sub-optimality of both these kinds was found; however, the 1992 surveys did not assess sub-optimality of route choice.

A brokerage trial was carried out in April and May 1993 to compare actual with perceived information requirements and to examine further the question of sub-optimality of route choice. This is described in Aldridge and Marler (1994). The poor response to this trial was a further reason for carrying out the additional questionnaire survey described in this report.

2. THE 1993 SURVEY

2.1 SURVEY OBJECTIVES

The survey described in this report is a follow-up to the 1992 surveys, as envisaged in the case for support made to SERC. A subset of the original sample was contacted again with a further self-completion questionnaire in the autumn of 1993. The main objective of this questionnaire was to focus on the issue of sub-optimality of route choice, as the previous results had indicated that respondents (particularly car users) saw a particular need for additional information to help them choose routes and especially to avoid congestion. Other objectives were to assess the respondents' awareness of alternative modes, to acquire information on trip durations and costs and to provide additional data on the methods currently used to plan journeys and on the additional information that respondents did not have but would have liked.

2.2 SURVEY IMPLEMENTATION AND RESPONSE RATE

The survey was carried out by means of self-completion questionnaires, mailed to the selected sample of individual household members. A copy of the questionnaire is shown in Appendix A.

A total of 111 questionnaires were mailed to those individuals contacted during the telephone enquiries following the brokerage trial (Aldridge and Marler, 1994) who indicated their willingness to complete a further questionnaire. These 111 were a subset of the 358 households who had completed the earlier questionnaire in 1992. Eighty-four of these questionnaires were returned: giving a good response rate of 76% per cent.

2.3 DESIGN OF THE QUESTIONNAIRE

As can be seem from the questionnaire form shown in Appendix A, the questionnaire was divided into two sections: the first asked for information about the last familiar trip made by the respondent and the second for similar information about the last unfamiliar trip made by the respondent. "Familiar trips" were described as those made "on a regular basis and [known] reasonably well" and "unfamiliar trips" as those which "have not [been] made before or [made] infrequently". This familiar/unfamiliar split was in response to the results of the 1992 survey, which indicated that almost all respondents thought that they would use trip planning systems for unfamiliar journeys compared to only 35 per cent who thought they would use them for familiar journeys. The importance of familiarity of the journey in a traveller's choice of route is also selfevident and has emerged as a key issue in research on route guidance systems in the Institute for Transport Studies. No instructions were given to the respondents about mode: they simply reported their most recent trip of each type according to the actual mode they used.

2.4 THE INDIVIDUAL QUESTIONS

Individual questions were similar for familiar and unfamiliar trips. They were as follows:

- Destination: respondents were asked to name the destination town or city. If a city, the area within it was requested: many did not supply this information however.
- Main mode, including (for familiar trips only) an opportunity to specify all modes of multi-modal trips.
- Route: either bus route number or, for car journeys, road names and numbers. While bus routes were usually given, many respondents did not specify their car route completely and very few indicated where they had to change between rail services.
- Purpose of journey
- Frequency with which this trip is made (for familiar journeys) or whether or not the trip had been made before(and how long ago) (for unfamiliar journeys).
- Whether it was a single or a return trip
- Time of departure from home
- Time of arrival at final destination
- The amount of time spent in-vehicle
- The amount of time spent walking to the vehicle (and waiting for it: public transport)
- The amount of time spent walking from the vehicle to the final destination
- Whether or not the journey took longer than expected and the reason for any delay
- The cost of the one-way journey (petrol plus parking for cars or fare and ticket type for public transport)
- All information sources used in planning the journey
- All types of information that respondents would have liked but did not have
- Whether or not the trip would have been made if the usual mode of transport had not been available (familiar trips only).
- What alternative mode might have been used and whether the respondent felt he or she would have had enough information about this alternative (familiar trips only).

3. SUMMARY OF RESPONSES TO INDIVIDUAL QUESTIONS

3.1 GENERAL

In Section 3, the responses to individual questions are summarised, disaggregated by mode where appropriate. Summaries are also given of items deduced from the responses, eg trip distance.

Summaries are always given for familiar and unfamiliar journeys separately: because these are from different populations of journeys it would be misleading to combine them.

The total number of reported trips was 168 (one familiar and one unfamiliar for each of the 84 respondents). However, as respondents sometimes failed to answer individual questions, totals given in the various tables often do not equal this. Percentages given are always of the number of respondents who answered a particular question (or relevant combination of questions) unless otherwise stated.

3.2 DESTINATIONS AND DISTANCES TO DESTINATIONS

Distance to destination for all modes was taken to be, the shortest road distance between Mirfield and the named destination, as estimated by Autoroute (see Section 4.2 below). It is not necessarily the distance of the trip itself.

Table 3.2.1 shows the distances to destinations by mode for familiar trips and Table 3.2.2 for unfamiliar trips.

Table 3.2.1: Number of journeys by distance and main mode: familiar journeys

Distance (miles)	All fam.		Car trips		Public transport trips					
					All		Rail		Bus	
0-10	42	(46)	27	(51)	15	(68)	1	(20)	14	(82)
>10-20	14	(19)	8	(15)	6	(27)	3	(40)	3	(18)
>20-30	7	(9)	7	(13)	0	(0)	0	(0)	0	(0)
>30-40	5	(7)	4	(7)	1	(0)	1	(20)	0	(0)
>40-50	3	(4)	3	(6)	0	(0)	0	(0)	0	(0)
>50-100	3	(4)	3	(6)	0	(0)	0	(0)	0	(0)
over 100	1	(1)	1	(2)	0	(0)	0	(0)	0	(0)
Total	75		53		22		5		17	
Missing	9		8		1		0		1	
Mean dist. (miles)	17.0		20.6		8.5		16.6		6.1	

Note: Column percentages in brackets

Table 3.2.2: Number of journeys by distance and main mode: unfamiliar journeys

Distance (miles)	All unfam.		Car trips		Public transport trips							
					All		Rail		Bus		Taxi	
0-10	10	(12)	5	(9)	5	(23)	1	(10)	4	(36)	0	(0)
>10-20	10	(12)	5	(9)	5	(23)	3	(30)	2	(18)	0	(0)
>20-30	7	(9)	3	(5)	4	(18)	2	(20)	2	(18)	0	(0)
>30-40	10	(12)	9	(16)	1	(5)	1	(10)	0	(0)	0	(0)
>40-50	5	(6)	4	(7)	1	(5)	0	(0)	0	(0)	1	(100)
>50-100	20	(25)	18	(31)	2	(9)	1	(10)	1	(9)	0	(0)
over 100	16	(20)	12	(21)	4	(18)	2	(20)	2	(18)	0	(0)
Total	80		58		22		10		11		1	
Missing	4		4		0		0		0		0	
Mean dist. (miles)	76.7		79.6		69.4		81.7		60.7		42.0	

Notes: 1. Column percentages shown in brackets
2. Bus includes coach and one trip to Ireland (main mode = bus/coach)

Table 3.2.3: Number of journeys to the most popular destinations

Destination	Distance (miles)	Number of trips	
		familiar	unfamiliar
Huddersfield	5	21 (26)	2 (2)
Leeds	13	14 (17)	6 (7)
Dewsbury	4	11 (14)	2 (2)
Manchester	32	2 (2)	6 (7)
Wakefield	10	4 (5)	3 (4)
Bradford	11	0 (0)	5 (6)
Other destinations		29 (36)	57 (70)
Total		81 (100)	81 (100)
Missing		3	3

Notes: column percentage in brackets
only destinations attracting 5 or more trips in total are shown

Table 3.2.3 indicates that only Huddersfield, Leeds and Dewsbury can be regarded as "popular" and then only for familiar trips.

3.3 MODE OF TRANSPORT

Table 3.3.1 shows the "main mode" of transport used by respondents, defined as the mode

Table 3.3.1: Number of journeys by main mode of transport

Mode	Familiar trips		Unfamiliar trips	
Bus	17	(20)	12	(15)
Rail	6	(7)	9	(11)
Car	60	(71)	60	(73)
Motorcycle	1	(1)	0	(0)
Taxi	0	(0)	1	(1)
Total	84	(100)	82	(100)
Missing	0		2	

(column percentages shown in brackets)

used for the greatest length of journey. Car predominated for both types of trip and, from Tables 3.2.1 and 3.2.2, for virtually all distance bands. The total number of familiar public transport trips was only 23 (including 6 rail trips) or 27 per cent of the total number of familiar trips whose mode was reported. There were 22 unfamiliar public transport trips (including 9 rail trips and one taxi trip), or 27 per cent of the unfamiliar trips whose mode was reported. The numbers of public transport trips are rather small for meaningful analysis, especially when further disaggregated by public mode. As respondents were asked, for both familiar and unfamiliar trips, for their most recent trip irrespective of mode, it could not be predicted in advance that the number of public transport trips would be this small.

Respondents were given the opportunity to specify other (non-"main") modes used on their familiar journey. Seven respondents reported using more than one mode; five of these used bus or taxi as part of a mainly rail trip, the other two reported that they had walked part of the way.

3.4 NUMBER OF JOURNEYS BY PURPOSE

Table 3.4.1 shows journey purpose, with work journeys accounting for half of all familiar journeys reported. Leisure trips made up two thirds of reported unfamiliar trips, and a quarter of reported familiar trips.

Table 3.4.1: Number of journeys by purpose

Purpose	Familiar journeys			Unfamiliar journeys		
	All	Car	Pub. tr	All	Car	Pub. tr
Work	41 (49)	32 (53)	9 (37)	12 (15)	11 (18)	1 (5)
Education	2 (2)	0 (0)	2 (8)	1 (1)	1 (2)	0 (0)
Leisure	22 (26)	19 (31)	3 (13)	55 (67)	42 (68)	13 (59)
Shopping	19 (23)	9 (15)	10 (42)	7 (9)	2 (3)	5 (23)
Other	0 (0)	0 (0)	0 (0)	7 (9)	4 (7)	3 (14)
Total	84(100)	60 (100)	24 (100)	82 (100)	60 (100)	22 (100)
Missing	0	0	0	2	0	2

(column percentages shown in brackets)

3.5 FREQUENCY OF TRIP MAKING

For familiar journeys, respondents were asked to indicate how often they made their reported trips, using six frequency categories. The responses are summarised in Table 3.5.1. It can be seen that around half made their reported trip at least twice a week.

Table 3.5.1: Frequency of familiar trips

Frequency	Number	Percentage
Less than once a month	9	11
Once a month	7	8
2-3 times a month	12	14
Once a week	13	15
2-4 times a week	11	13
5 times a week or more	32	38
Total	84	100

For unfamiliar journeys, respondents were asked whether they had made their reported trip before and if so, how long ago. The responses are summarised in Table 3.5.2.

Table 3.5.2: Time since last making the reported unfamiliar trip

Time since last making trip	Number	Percentage
0-3 months	16	19
>3-6 months	11	13
>6-12 months	12	14
>1-2 years	9	11
>2-5 years	6	7
over 5 years	4	5
never made trip before	26	31
Total	84	100

About 70 per cent had made the reported unfamiliar trip before and of these, just under half (or about a third overall) had made the trip within the last 6 months. It can be concluded that these trips were, by and large, not entirely unfamiliar.

3.6 SINGLE AND RETURN TRIPS

Table 3.6.1 shows whether the reported trips were single or return, for familiar and for unfamiliar trips.

Table 3.6.1: Number of single and return trips

	Familiar trips		Unfamiliar trips	
single	4	(5)	7	(9)
return	79	(95)	68	(91)
total	83	(100)	75	(100)
missing	1		9	

note: column percentages in brackets

It can be seen that, as expected, most of the trips were return trips. It is likely that the few "single" trips returned to Mirfield via other destinations.

3.7 DEPARTURE TIMES AND JOURNEY DURATION

Journeys are grouped in Table 3.7.1 by time of departure. As all journeys must initially travel through the urban areas around Mirfield, this helps indicate whether the journey duration was affected by peak period urban congestion.

Table 3.7.1: Departure times

	No. of familiar trips						No. of unfamiliar trips					
	All		Car		Pub. tr.		All		Car		Pub.tr.	
>0700-1000	55	(66)	39	(65)	16	(67)	39	(48)	27	(45)	12	(55)
>1000-1300	17	(20)	11	(18)	6	(25)	18	(22)	14	(23)	4	(18)
>1300-1600	5	(6)	4	(7)	1	(4)	11	(13)	8	(13)	3	(14)
>1600-1900	4	(5)	4	(7)	0	(0)	6	(7)	5	(8)	1	(5)
>1900-2200	1	(1)	1	(2)	0	(0)	1	(1)	0	(0)	1	(5)
>2200-0700	2	(2)	1	(2)	1	(4)	7	(9)	6	(10)	1	(5)
Total	84	(100)	60	(100)	24	(100)	82	(100)	60	(100)	22	(100)
Missing	0		0		0		2		0		2	

note: column percentages in brackets

Respondents were asked for the departure time from their home and the arrival time at their final destination, from which door to door journey time can be calculated. But they were also asked to specify separately the time they spent walking to and from the vehicle (private or pubic transport), any waiting time and the time spent in the vehicle. If correctly answered, the sum of these should equal the door-to-door journey time. Table 3.7.2 shows door-to-door time (arrival time minus departure time) as a ratio of the sum of the journey components (walking plus waiting plus in-vehicle time), for all modes combined. If this part of the questionnaire had been answered correctly, the two should be equal and the ratios would be equal to 1.0.

Table 3.7.2: Reported door-to-door time as proportion of sum of reported journey time components

Ratio	No. of familiar trips	No. of unfamiliar trips
≤ 0.6	0	1
> 0.6-0.7	3	3
> 0.7-0.8	3	4
> 0.8-0.9	14	3
> 0.9-1.0	52	45
> 1.0-1.1	3	5
> 1.1-1.2	0	5
> 1.2-1.3	0	3
> 1.3-1.4	0	2
> 1.4	0	5
Total	75	76
Missing	9	8

It can be seen that for familiar trips, for 55 respondents (73 per cent) the two separate estimates were within 10 per cent of each other. For unfamiliar trips, for 50 respondents (66 per cent) the two separate estimates were within 10 per cent of each other.

Table 3.7.3 shows, separately for private and public transport trips, the proportion of time spent in-vehicle compared with total time for the trip, using the sum of walking, waiting and in-vehicle times to be the total trip time. The table is based only on the subset of respondents whose two separate estimates of door-to-door time were within the ratio range of 0.9 to 1.1 (Table 3.7.2) as there is little point in including those whose two estimates were quite different.

Table 3.7.3: In-vehicle time as a proportion of door-to-door time

Proportion of time In-vehicle	No. of familiar trips		No. of unfamiliar trips	
	Car	Public tr.	Car	Public tr.
0.4-0.5	0	1	0	2
>0.5-0.6	0	2	0	1
>0.6-0.7	1	3	0	0
>0.7-0.8	2	1	2	3
>0.8-0.9	8	4	1	2
>0.9-1.0	32	1	37	2
Mean	0.96	0.73	0.96	0.71

Note: door-to-door time taken to be walk + wait + in-vehicle time.

As might be expected, walking and waiting formed a greater proportion of journey time for public transport users, for both familiar and unfamiliar trips.

Respondents were asked whether their journeys took longer than expected. The results are summarised in Table 3.7.4.

Table 3.7.4: Journey time expectations

	No. of familiar trips	No. of unfamiliar trips
As expected	79	62
Longer than expected	5	20
Total	84	82
Missing	0	2

Clearly most respondents didn't underestimate their journey times for familiar trips, but nearly a quarter underestimated the time for unfamiliar trips. Table 3.7.5 shows the reasons for delay for those trips which took longer than expected.

Table 3.7.5: Reasons for delay

Reason for Delay	Number of trips			
	Familiar		Unfamiliar	
	Car	Public transport	Car	Public transport
Roadworks	3	2	8	0
Traffic jam	0	0	5	0
Train delay	0	0	0	1
Stopped for a rest	0	0	1	0
Transfer to another bus	0	0	0	1
Lots of red lights	0	0	1	0
Lost (and asked the way)	0	0	3	0
Total	3	2	18	2

Roadworks was the most common single cause of unexpected delay, for both public transport and car journeys and for both familiar and unfamiliar trips. For unfamiliar trips, meeting traffic jams and getting lost were also causes of delay for car trips. Table 3.7.5 also shows that 18 out of 60 unfamiliar car trips or 30 per cent took longer than expected, compared with 9 percent of public transport trips.

3.8 JOURNEY COST

Car users were asked to estimate the petrol costs of a one-way journey and to give their parking cost. Figure 3.8.1 shows estimated petrol costs (y axis) against distance of the route reportedly taken (x axis), for familiar car trips. This analysis includes the 44 car trips whose route description was "fair" or "full" (see section 4.3 below) and who reported a petrol cost estimate.

Figure 3.8.1: Petrol costs and distance (miles) familiar trips

As expected, the points are scattered, but do show a correct trend. The best-fit straight line is: petrol cost = 18.8 + 7.59 (distance). This has an R^2 of 0.61. The slope coefficient is highly significant but the intercept is not significantly different from zero ($\alpha = 0.05$ and $N = 44$). The slope (7.59) is equivalent to the petrol cost/mile. With petrol at £2.30 per gallon (51p per litre), this gives an overall estimate of about 30 miles to the gallon. Though no information was collected about the type of car used, this value seems realistic.

Figure 3.8.2 shows a similar figure for unfamiliar trips, using car trips based on the same constraints.

Figure 3.8.2: Petrol cost and distance: unfamiliar trips.

As for familiar trips, Figure 3.8.2 shows a correct trend. The best fit straight line is: petrol cost = 105 + 5.78 (distance). This has a R^2 value of 0.76. The slope coefficient is highly significant but the intercept (despite its apparently large value) is not significantly different from zero ($\alpha = 0.05$ and $N = 43$). Using the same petrol costs as for familiar trips, this gives an overall fuel consumption estimate of 40 miles to the gallon. Again, this seems fairly reasonable. Unfamiliar car trips were generally considerably longer than familiar ones and the difference in consumption between the two types of journey reflects the probability of more economical consumption on longer trips.

A number of car users did not report their car parking cost. Of those 30 who did, 24 (75%) reported that they paid nothing; the remaining 6 reported that they paid amounts ranging from 50 pence to £2.50.

The average fares reported by public transport passengers are shown in Table 3.8.1, from which multi-modal trips and taxi trips (three in total) are omitted.

Table 3.8.1: Average public transport fares

Familiar trips			Unfamiliar trips		
All	Bus	Rail	All	Bus	Rail
£0.88 (19)	£0.45 (15)	£2.50 (4)	£3.91 (16)	£3.33 (9)	£4.66 (7)

Note: number of observations shown in brackets

Table 3.8.1 indicates, unsurprisingly, that average fares for unfamiliar trips (which are longer) are higher than for unfamiliar, and average fares for rail trips (which are longer) are higher than for bus trips. Due to the great variation in trip lengths and also in ticket types, the variance about these means was very great.

A variety of types of ticket was reported, as shown in Table 3.8.2.

Table 3.8.2: Public transport ticket types

Ticket type	No. of familiar trips	No. of unfamiliar trips
Saverstrip	2	0
Metrocard	5	3
Ordinary single	9	8
Ordinary return	0	4
Day return	0	2
OAP/concession	6	3
Off-peak	1	0
Season	1	0
Total	24	20

Over both familiar and unfamiliar trips, pre-paid tickets (saverstrip, metrocard and season) accounted for 25 per cent of ticket types, concessionary fares accounted for 20 per cent, tickets offering reduction based on time of travel (day return and off-peak), accounted for 7 per cent and the remainder (ordinary single or return) made up 48 per cent.

3.9 INFORMATION USED IN JOURNEY PLANNING

Table 3.9.1 summarises which sources of information were used by the respondents in planning their trips.

Table 3.9.1: Percentage of respondents using various information sources

Information source	Familiar trips				Unfamiliar trips			
	Car		Public transport		Car		Public transport	
Roadmaps	12	(7)	0	(0)	59	(34)	0	(0)
Timetable	0	(0)	44	(11)	0	(0)	73	(16)
BR or bus telephone line	0	(0)	0	(0)	0	(0)	5	(1)
Other source	16	(9)	21	(10)	17	(10)	27	(6)
Total no of responses	58		24		58		22	
Number missing	2		0		2		2	

Notes :- number of respondents using each source shown in brackets

The "other" sources used for car trips are shown in Table 3.9.2 and for public transport in Table 3.9.3. One respondent reported using an 'other' source for a familiar car trip but did not specify what it was.

Table 3.9.2: Percentage of car travellers using other information sources

Information source	Familiar trips		Unfamiliar trips	
Local knowledge	10	(6)	7	(4)
Road signs	3	(2)	0	(0)
Local TV	2	(1)	0	(0)
Info. from friend	0	(0)	3	(2)
Ceefax, teletext, computer program	0	(0)	7	(4)

note: number of respondents in brackets

Table 3.9.3: Percentage of public transport passengers using other information sources

Information source	Familiar trips		Unfamiliar trips	
Local knowledge	17	(4)	9	(2)
Info. from bus/coach driver	4	(1)	9	(2)
Info. from taxi company	0	(0)	5	(1)
Local paper	0	(0)	5	(1)

note: number of respondents in brackets

It was rare for more than one source of information to be used for a given trip. This occurred on only seven public transport trips: two 'familiar' and five 'unfamiliar'. The reported use of 'local knowledge' in the "other source" category must distort this however, as presumably all trips used this, if only for that part of the trip close to home, but only a few reported doing so. No trip used more than two information sources.

Excluding "local knowledge" as an information source or, in other words, treating a true information source as being one which has actively to be sought or looked at, the proportions of journeys using an information source were as follows:

- familiar car trips: 18 per cent
- familiar public transport trips: 48 per cent
- unfamiliar car trips: 69 per cent
- unfamiliar public transport trips: 96 per cent

As might be expected, information sources were used more frequently for unfamiliar trips. They were also used more frequently for public transport trips. This reflects the fact that two basic sources of information are needed for public transport trips which are route and time, against only one (route) for car trips. Timetables in particular were widely used even for familiar public transport trips, presumably usually to check bus and rail times rather than routes. The proportion of unfamiliar car trips not using any information source (31 per cent) was surprising: this may be because 'road signs' were not specified on the list of standard information sources and respondents may have forgotten to specify them under "other sources". The proportion of familiar car journeys using an information source was perhaps at first sight larger than expected at 18 per cent (excluding "local knowledge"). This can be explained through the definition of a "familiar" journey which was defined for respondents as one made "on a regular basis and [known] *reasonably* well" (authors' italics). Use of maps or other advice was therefore to be expected in some cases.

Overall, of all the trips of all types reported by the respondents, 49 per cent used travel information of some sort (beyond the traveller's own local knowledge). This indicates the considerable potential for the use of trip planning systems. However, the poor results of the brokerage trial (Aldridge and Marler, 1994) indicate that such systems must be well-publicised, be readily available and deliver the information in a more convenient way than the currently available sources. They must presumably also be competitively priced.

It is also clear that the information needs of public and private transport users are quite different. This suggests that if travellers decide in advance what mode of transport they will make use then a combined trip planning system incorporating both public and private travel information would only be needed for the minority of trips which combine public and private modes. The limited evidence from the brokerage trial suggests that most travellers do decide their mode in advance, and this is supported by the results from the 1992 Mirfield surveys (Tizani, 1992b) in which only 13 per cent of respondents believed they needed information on all modes.

3.10 RESPONSE TO UNAVAILABILITY OF USUAL MODE

Respondents were asked what they would have done if their usual mode of transport for their reported familiar trips had not been available. Table 3.10.1 summarises the response.

Table 3.10.1: Response to unavailability of usual mode for familiar trips (per cent)

Response	Car trips		Public transport trips	
Use an alternative mode	65	(39)	62	(15)
Not make the trip	35	(21)	38	(9)

note: number of respondents in brackets

Just under two-thirds would have continued to make the trip using another mode, with little difference in this proportion between those who usually used public transport and those who usually used car.

Of those who said they would continue to make the trip, the alternative other mode they would have used is shown in Table 3.10.2.

Table 3.10.2: Alternative mode chosen for familiar trips (per cent)

Alternative mode	Car trips		Public transport trips	
Bus	51	(19)	38	(5)
Rail	32	(12)	38	(5)
Car	14	(5)	23	(3)
Motorcycle	3	(1)	0	(0)

Note: number of respondents in brackets

Most of those making familiar car trips reported that they would switch to bus or rail while a few would switch to another (presumably someone else's) car. Those making familiar public transport trips would either change to a new public transport mode (usually rail to bus) or change bus routes, but some would use a car as an alternative. The numbers of respondents involved is however small thus limiting the value of these results.

Of those who said they would still make the journey but using an alternative mode, 21 respondents (or 54 per cent of those answering this question) said they already knew enough information about the alternative mode, while 18 (or 46 per cent) said they did not.

3.11 USEFUL BUT UNAVAILABLE INFORMATION

All respondents were asked, separately for their reported familiar and unfamiliar trips, what information they did not have about that trip which they would have liked to have had. The responses are summarised in Table 3.11.1.

Table 3.11.1: Useful but unavailable information (per cent)

Information required	Familiar trips				Unfamiliar trips			
	Car		Public transport		Car		Public transport	
Congestion	69	(40)	37	(9)	73	(44)	18	(4)
Route recommendations	24	(14)	8	(2)	42	(25)	14	(3)
Bus or rail timetable information	0	(0)	4	(1)	0	(0)	0	(0)
Bus or rail delays or cancellations	2	(1)	46	(11)	2	(1)	73	(16)
Fare or cost	0	(0)	0	(0)	5	(3)	5	(1)
Travel time information	5	(3)	4	(1)	17	(10)	14	(3)
Parking information	12	(7)	0	(0)	16	(9)	0	(0)
Other information	5	(3)	0	(0)	3	(2)	5	(1)

Note: number of respondents in brackets

Overall, information on congestion was the most frequently mentioned useful but unavailable information. Though given mostly by car users this was also important for public transport trips, (especially for familiar public transport trips which were more often by bus rather than by rail). Route recommendations were also important for about a quarter of familiar car trips and 40 per cent of unfamiliar car trips. Car parking information was considered useful for a reasonable minority of car trips. For public transport trips the key item was information on delays or cancellations, both for familiar trips (46 per cent wanted it) and especially for unfamiliar trips (73 per cent wanted it). Travel time information was wanted by a reasonable minority of car users making unfamiliar trips. Information on fare or cost was almost never asked for, presumably because public transport users already knew it and because car users didn't realise this question applied to them too. Bus and rail timetable information was virtually never asked for, no doubt partly because this was already available to many public transport users, from printed timetables (see Table 3.9.1).

4. ANALYSIS OF SUB-OPTIMALITY

4.1 GENERAL

Sub-optimality could be evaluated in terms of either surplus distance, time or cost. In this report, it is measured in terms of time. The analysis of sub-optimality in the reported trips has four components:

1. For both car and public transport trips, sub-optimality is defined as the difference between time taken on the exact route reported by the respondent (the "exact route time") and the "minimum time" defined as the time for the quickest route between the same origin and destination. The use of exact route times and minimum times based on timetables (for public transport) and on speed assumptions (for private transport) avoids problems resulting from inaccurate reporting of journey time or from travel time variation between the same O-D pair at different times of the day. It has the further advantages of comparing like-with-like by using the same set of speed assumptions for both exact-route

time and for minimum time and it overcomes the potential problem of uncertainty over exact origin and destination (see below) as it assumes these are the same for both the exact route and the minimum time route. The exact-route time used was not (because of suspected inaccuracies of reporting, see Table 3.7.2 above) the time reported by the respondent.

The software package "Autoroute Express" was used to make the estimates of both "exact-route time" and "minimum time" for car journeys (see section 4.2). For the exact-route time, Autoroute was made to replicate the respondent's reported route and to output the time it would take to make that journey. Autoroute's quickest path algorithm was used to estimate the quickest time between the O-D pair reported by the respondent for the journey.

2. Sub-optimality can also be assessed in a different way, by examining the variation in reported time between trips by the same mode which have the same reported origin and destination. (In practice this means looking at trips which are to a few very popular destinations mostly quite near Mirfield, such as Dewsbury, Huddersfield and Leeds see table 3.2.3). It can be argued that large variation would indicate a high degree of sub-optimality and small variation a low degree of sub-optimality. Sub-optimality can be quantified by comparing reported time with the fastest (or close to fastest) reported time. There are difficulties in this approach:

    - inaccurate reporting of journey time: this has been addressed in Section 3.7 above. It can partly be overcome by using that subset of respondents whose journey times, as reported by the two methods table (see Table 3.7.2 above), are very similar (within 10 per cent of each other, say).

    - uncertainty over exact origin and destination: the exact origin is never known ("Mirfield" only) and the exact destination is rarely reported (respondents typically wrote "Leeds" or "Manchester". A trip to "Manchester", if it is to south Manchester could take much longer than a trip to "Manchester" if it is north Manchester, for example). This source of error could be relatively great for short journeys but less so for long journeys. Unsurprisingly but unfortunately, all popular destinations are close or quite close (between 4 and 15 miles) from Mirfield. Errors could be large for these short distances.

    - variations in optimal travel time through the day. This can to some extent be controlled by disaggregating journeys into peak and off-peak. This would however further disaggregate already small data sets eg public transport trips.

3. Comparing the sub-optimality results obtained in stage 2 with those obtained in stage 1, using exactly the same set or subset of journeys.

4. Making a best-estimate of sub-optimality based on the results of stage 3.

Throughout all stages of the analysis it is necessary to separate familiar and unfamiliar trips and car and public transport journeys. This four-way split causes sample sizes to be small for public transport trips which comprise only just over a quarter of all reported trips.

4.2 AUTOROUTE EXPRESS

Autoroute Express is a software package which provides recommended road (including ferry) routes between specified origins and destinations. It is possible also to specify that the route should pass through one or more intermediate places. Autoroute will then calculate, according to user instructions, the fastest route or shortest route between these places. Alternative routes, which come in the envelope between the shortest and fastest routes, can also be output if desired as can a "preferred" route which takes into account preferences or (or dislikes of) certain types of road (motorways, A-roads or B-roads) as input by the user. Autoroute will also display a map of any of the recommended routes, to a degree of detail determined by the user.

Thus Autoroute consists essentially of a comprehensive road "map" database with each link classified as being of a particular road type. These road types, together with the speeds assumed for each type, are shown in Table 4.2.1. The speeds for each type may be altered by the user, and the Table shows the speeds used in the course of this research. In addition to the road network Autoroute contains a gazetteer of named locations (cities, towns, villages, some motorway junctions, football and cricket grounds) superimposed on the network, and it is from this gazetteer that the user can specify origin, destination and intermediate points. The algorithms within Autoroute allow it to select the fastest, shortest, alternative and preferred routes, as required by the user. 'Preferred' routes were not used in the course of this research, in other words all types of roads were given equal preference and routes selected purely according to whether they were quickest in time or shortest in distance, as appropriate for the analysis in hand.

Table 4.2.1 Autoroute speeds

Road type	Speed (miles/h)
Motorway	70
Dual carriageway	60
Single lane A road	42
Narrow A road	40
B road	30
Other road	25

4.3 COMPARISON OF REPORTED ROUTE AND QUICKEST ROUTE: CARS

Table 4.3.1 shows the difference between the 'exact route time' and the 'minimum time' for familiar and unfamiliar car journeys.

Table 4.3.1: Time difference: exact route time minus minimum time: car journeys

Value of difference (mins)	No. of occurrences of this value	
	Familiar trips	Unfamiliar trips
0	35 (76)	22 (54)
1	1 (2)	2 (5)
2	1 (2)	2 (5)
4	2 (4)	2 (5)
6	1 (2)	0 (0)
7	0 (0)	2 (5)
8	0 (0)	1 (2)
9	0 (0)	2 (5)
10	0 (0)	2 (5)
11	2 (4)	1 (2)
15	1 (2)	1 (2)
17	1 (2)	1 (2)
18	1 (2)	0 (0)
29	1 (2)	0 (0)
39	0 (0)	1 (2)
44	0 (0)	1 (2)
48	0 (0)	1 (2)
Total	46 (100)	41 (100)
Missing	14	19
Mean difference (mins)	2.56	6.05
Standard deviation of difference (mins)	6.14	11.69

note: column percentages in brackets

The missing values in Table 4.3.1 are trips for which the route was either not reported or the description was too poor to be used. The trips included in Table 4.3.1 were classified according to the fullness of the reported route description, as shown in Table 4.3.2. Trips whose route description was less than "fair" quality were not included in this analysis but there is no reason why the subset analysed should be systematically biassed in relation to the full sample.

Table 4.3.2: Quality of car route descriptions

	No of familiar trips	No of unfamiliar trips
Full description	18	13
Fair description	28	28

A "full" description enabled routes to be traced virtually from origin to destination with little or no doubt. "Fair" descriptions required the author to make assumptions about gaps in the description: the assumption was always that the respondents 'jumped' the gap by the "Autoroute" quickest route.

Table 4.3.1 shows that on familiar journeys respondents were more likely to take the fastest route (76 per cent did so) than on unfamiliar journeys (54 per cent did so). The mean 'time sub-optimality' on familiar trips was 2.56 minutes and on unfamiliar trips was 6.05 minutes.

Figure 4.3.1 shows the time difference between the exact route and the fastest route as a function of the distance on the exact route (with all times from Autoroute) for familiar car trips using the same subset of car journeys as used in Table 4.3.1. The figure indicates the likelihood of a positive relationship and this is confirmed by regression analysis which gives a relation ship of

Time difference (mins) = -1.12 + 0.121 (distance) (miles)

This has an R^2 value of 0.40. The intercept is not significantly different from zero but the slope coefficient is ($\alpha = 0.05$, $N = 46$). For familiar car trips there is thus evidence that absolute sub-optimality (in minutes) increases as distance increases for familiar trips, with sub-optimality over the sample generally being 0.12 minutes greater for every extra mile.

Figure 4.3.2 shows a similar plot for unfamiliar car trips. In this case regression analysis indicates that the best fit straight line has both intercept and slope coefficient not significantly different from zero ($\alpha = 0.05$, $N = 41$, $R^2 = 0.04$). There is thus no evidence that absolute sub-optimality (in minutes) is either greater or less for longer unfamiliar journeys.

Table 4.3.3 shows, for the same car journeys as shown in Figure 4.3.1 the ratio of the exact route time to the minimum time. Overall, the exact route time was 6 per cent longer than the minimum time for familiar journeys and 7 per cent longer for unfamiliar journeys.

Table 4.3.3: Time ratio: exact route time divided by minimum time: car journeys

Actual route time ÷ minimum time	No of occurrences			
	Familiar trips		Unfamiliar trips	
1.0	35	(76)	22	(54)
>1.0 - 1.1	3	(7)	9	(22)
>1.1 - 1.2	0	(0)	6	(15)
>1.2 - 1.3	6	(13)	1	(2)
>1.3 - 1.4	1	(2)	1	(2)
>1.4 - 1.5	0	(0)	0	(0)
>1.5 - 1.6	1	(2)	1	(2)
>1.6 - 1.7	0	(0)	0	(0)
>1.7 - 1.8	0	(0)	1	(2)
Total	46	(100)	41	(100)
Missing	14		19	
Mean ratio	1.06		1.07	
Standard dev of ratio	0.13		0.15	

note: column percentages in brackets

Figure 4.3.1: Sub-optimality versus distance: familiar car trips

Figure 4.3.2: Sub-optimality versus distance: unfamiliar car trips

Table 4.3.4 shows, for the same car journeys, a comparison between the distance of the route actually taken and the distance of the minimum time route.

Table 4.3.4: Distance difference: actual route minus minimum time route: car trips

Value of difference (miles)		No. of occurrences of this value	
		Familiar trips	Unfamiliar trips
Actual route shorter than minimum time (quickest) route	-38	0 (0)	1 (2)
	-23	1 (2)	1 (2)
	-13	1 (2)	0 (0)
	-10	0 (0)	1 (2)
	-7	0 (0)	1 (2)
	-6	0 (0)	1 (2)
	-5	0 (0)	2 (5)
	-4	0 (0)	2 (5)
	-3	4 (9)	1 (2)
	-2	0 (0)	2 (5)
	0	34 (74)	23 (56)
Actual route longer than minimum time (quickest) route	1	3 (9)	0 (0)
	5	1 (2)	1 (2)
	6	1 (2)	1 (2)
	7	0 (0)	1 (2)
	11	0 (0)	1 (2)
	16	1 (2)	0 (0)
	22	0 (0)	1 (2)
	23	0 (0)	1 (2)
Total		46 (100)	41 (100)
Missing		14	19
Mean difference (miles)		-0.39	-0.85

Note: column percentages in brackets

Table 4.3.4. shows that some respondents who did not use the quickest route, in fact made distance savings over the quickest route distance, while others did not. Table 4.3.5 summarises this directly from Table 4.3.4.

It can be seen from Table 4.3.5 that six familiar trips not using the quickest route saved distance but six went both a longer and a slower way. On average over these 12 trips, 1.5 miles/trip was saved in comparison to the quickest route distance. For unfamiliar trips the respective numbers were twelve and 6 and on average these unfamiliar trips saved 1.94 miles over the quickest route distance. Overall there was a tendency for drivers to follow routes shorter than the fastest route. The journey making the largest distance saving (38 miles) was an unfamiliar trip to Jedburgh which chose a route of 163 miles (close to the shortest possible) in preference to the quickest route of 201 miles.

Table 4.3.5: Distance savings compared to quickest route for trips not using quickest route: cars

	Familiar trips	Unfamiliar trips
No of trips travelling further than quickest route	6	6
No of trips travelling less far than quickest route	6	12
Mean difference from quickest route (miles)	-1.50	-1.94

Generally speaking, those not using the quickest route tended to save distance. Most of the distance savings were achieved by avoiding motorways. The familiar trip in Table 4.3.4 which saved 23 miles compared to the quickest route, for example, used the A65 and A59 to Ulverston, rather than using the M6 motorway. This "lost" the driver 29 minutes in time (see Table 4.3.1) but "saved" 23 miles in distance.

It could be argued that it is unreasonable to class a journey by any 'longer' route as suboptimal if the driver was not attempting to minimise distance, time or cost, but had deliberately chosen that route. The most likely reason for doing this would be going the "pretty way", probably on leisure journeys. To investigate whether there is a tendency for apparent sub-optimality to be greater for leisure journeys, the above analysis was repeated for leisure journeys alone. Table 4.3.6 shows the time differences for leisure trips (equivalent to Table 4.3.1 for all trips).

Table 4.3.6: Time difference between exact route time and minimum time: leisure journeys by car

Value of difference (mins)	No of occurrences of this value	
	Familiar trips	Unfamiliar trips
0	7 (70)	12 (43)
1	0	2 (7)
2	0	2 (7)
4	0	2 (7)
7	0	2 (7)
8	0	1 (4)
9	0	2 (7)
11	0	1 (4)
15	1 (10)	1 (4)
17	0	1 (4)
18	1 (10)	0
29	1 (10)	0
44	0	1 (4)
48	0	1 (4)
Total	10 (100)	28 (100)
Mean diff (minutes)	6.20	6.75

Note: column percentages in brackets

Comparing the mean differences with those in Table 4.3.1, it appears initially that familiar leisure trips are far more sub-optimal than for all trip purposes combined. However, when the data for familiar car trips were split into two groups, "leisure" and "non-leisure", and a t-test was performed to test the null hypothesis of no difference between the mean time difference of these two groups, the test indicated that this null hypothesis was accepted at a significance level of 0,05 (two-tailed). So, it can be concluded that the apparent difference is not a real one. This is due to the small sample size for familiar leisure trips by car (10) and the large variance in time differences of both leisure and non-leisure trips.

For unfamiliar trips there is clearly no real difference between the mean time differences for leisure trips and for all trip purposes combined, and this was confirmed by a t-test.

The subset of familiar and unfamiliar leisure trips used in this analysis were those for which the description of the actual route taken was either "full" or "fair".

4.4 COMPARISON OF REPORTED ROUTE AND QUICKEST ROUTE: BUSES

Table 4.4.1 shows the details of route descriptions for the 21 familiar and 11 unfamiliar bus trips made.

Table 4.4.1: Bus routing details

	Familiar trips	Unfamiliar trips
Route description given	14	5
Route not specified	5	3
Specified route does not serve Mirfield	2	0
Private hire coach	0	1
Interchange time not known (1)	0	1
Bus and boat to Ireland	0	1
Total	21	11

(1) Trip with two stages. Timetabled interchange time depends on when trip was made (unknown)

Table 4.4.2 shows the time difference between the timetabled time of the reported bus route and the time of the quickest timetabled bus route. The quickest timetabled bus route was determined by assuming the journey was from any Mirfield bus stop (Black Bull, Ings Grove Park or the Post Office) to the centre (unless otherwise stated) of the destination town. Only those bus trips for which usable route description were given (14 familiar and 5 unfamiliar trips - see Table 4.4.1) are included.

Table 4.4.2: Time distance between exact route time and minimum time: bus journeys

Value of time difference (mins)	No of occurrences of this value	
	Familiar trips	Unfamiliar trips
0	6	2
2	2	2
4	2	1
6	2	0
7	1	0
11	1	0
Total	14	5
Missing	7	6
Mean difference (mins)	3.0	1.6

The mean sub-optimality was 3 minutes for familiar bus trips, which appears quite large considering that most familiar bus trips were short - mostly to Dewsbury (4 miles) and Huddersfield (5 miles). However, this must be treated cautiously because sample sizes are small. Also, with several bus routes and a number of alternative bus stops to choose from between Mirfield and these popular destinations, it is quite likely that many bus passengers chose to travel from a stop which minimised their walking time or door-to-door journey time (their address is unknown) or alternatively to choose a route which departed at the most convenient time, rather than trying to minimise their bus in-vehicle time.

The small usable sample size clearly prevents any conclusions being drawn for unfamiliar bus trips.

4.5 COMPARISON OF REPORTED ROUTE AND QUICKEST ROUTE: RAIL

Only two familiar and ten unfamiliar trips used rail. The details of routing information are shown in Table 4.5.1.

Table 4.5.1: Rail routing details

	Familiar trips	Unfamiliar trips
Route description given	1	1
Route description partially given	0	3 (1)
No route description given	1	6
Total	2	10

(1) All multi-mode trips involving rail

Clearly an analysis of sub-optimality cannot be made due to the small sample size and the poor quality of route reporting by respondents.

4.6 VARIATION IN JOURNEY TIMES TO COMMON DESTINATIONS

Variation in reported journey times to common destination could help indicate sub-optimality. As the usable sample of public transport trips is small this can only be done for car journeys. Table 3.2.3 shows that Huddersfield, Leeds and Dewsbury are the three common destinations for familiar trips, while no destination can be regarded as being common for unfamiliar trips. Analysis of journey time variation to these three destinations was therefore carried out for familiar car trips.

Table 4.6.1 describes the quality of reporting of journey time for familiar car trips to these destinations.

Table 4.6.1: Car journey time reporting

	Leeds	Dewsbury	Huddersfield
Inaccurate journey time reported (1)	5	2	4
Satisfactory journey time data	2	5	9
Total car trips to this destination	7	7	13

(1) reported door-to-door time more than 10% different from reported (walk + in-vehicle) time.

As with previous journey time analyses (section 3.7 above) it is unreasonable to analyse the reported journey times of trips for which the two estimates of journey time (door-to-door time and walk plus in-vehicle time) are not similar, as little confidence could be placed in the answers given. So, for this analysis as before, observations were rejected where these two reported time estimates were greater than 10 per cent different. Table 4.6.1 indicates that analysis of reported time variation can only be carried our for familiar car trips to Huddersfield (5 miles from Mirfield) and then only for a sample size of nine journeys.

Table 4.6.2: Variation of the travel time reported for familiar car journeys to Huddersfield

Reported in-vehicle time	No of observations of this value
13	1
15	4
20	1
25	3
Total	9

Table 4.6.2 uses in-vehicle time and excludes any walking time involved in the door-to-door journey.

Assuming in-vehicle journey time was correctly reported and also that destinations in Huddersfield were close together, Table 4.6.2 suggests that a considerable degree of sub-optimality exists for these trips, with 4 of the 9 trips reportedly taking 50 per cent or more longer than the fastest trip.

However, these 9 trips all used the same route between Mirfield and Huddersfield (A644 north-west bound, then A62 south-west bound). This is both the quickest route in time and the shortest route in distance. Thus there was no sub-optimality of route in these particular journeys. This is at least partly because there is no reasonable alternative route between these two points. This situation indicates the problems of using reported journey times, even when reported door-to-door times are in close agreement with reported walk plus in-vehicle time.

Given that there is no sub-optimality in these journeys the large variation in reported time shown in Table 4.6.2 are of interest. They have probably arisen from a combination of the following factors:

- inaccurate reporting;
- differences in precise origins in Mirfield and especially destinations in Huddersfield, between respondents;
- differences in driving styles;
- differences in the days or the times at which the journeys took place (congestion effects)

The analysis of travel time variations to common destinations has in this instance therefore been able to contribute little to the quantification of sub-optimality.

5. CONCLUSIONS

1. Only one journey in twenty reportedly took longer than expected for familiar trips by all modes, while for unfamiliar trips the corresponding figure journey in four. In almost all cases road works and traffic jams were blamed for late arrival, for car and bus journeys.

2. About one car traveller in five used route information prior to or during their familiar trip - in most cases the information used was a map. The corresponding figure was three travellers in four for unfamiliar car trips - with maps again being the most frequently used source of information. These results, together with the fact that nearly half of the familiar public transport journeys and 19 out of 20 unfamiliar public transport journeys used route and timetable information, indicate that there is likely to be a demand for trip planning systems.

3. For familiar car trips, congestion information would have been welcomed by seven out of ten respondents and by about three-quarters of respondents making unfamiliar car trips. Route recommendations would have been welcomed by 14 per cent and 42 per cent respectively for familiar and unfamiliar car trips. The numbers of travellers who would have like to have had congestion information was far higher than the numbers who reported taking longer than expected (conclusion 1, above). It would seem that they feel that congestion information would reduce their expected journey time compared to what they currently expect without congestion information. Real time information on road congestion would clearly be a major selling-point of a trip planning system. This is especially true for car users but also for public transport users, as over a third of familiar public transport trips and nearly one in five of unfamiliar public transport trips would have liked to have had congestion information. Public transport users would most have welcomed information on bus or train delays and cancellations: this applied to nearly half of familiar trips and to three-quarters of unfamiliar trips. It would seem that real-time

information on potential delays to all modes would be a key feature of a successful trip planning system.

4. Respondents were asked to report their most recent familiar and unfamiliar trips, regardless of mode. The result was that sample sizes for public transport trips were low, a problem which was further compounded by poor reporting of public transport route details. These small sample sizes made it difficult to make reasonable estimates of public transport route sub-optimality. For car journeys however, reported information was better: three quarters chose to use the fastest route for familiar trips and just over half for unfamiliar trips. On average, sub-optimality for familiar car journeys was 2.6 mins (6 per cent) greater than the quickest route and for unfamiliar trips, 6 minutes (7 per cent). This suggests route information could provide modest but valuable benefits which could be increased if the recommended routing took account of congestion.

5. While some drivers who did not take the quickest route chose routes which were also longer in distance, there was however a tendency to choose routes which were shorter in distance than the fastest route. Overall, about 1.5 miles per trip was saved on familiar trips and 1.9 miles per trip on unfamiliar trips, compared with the fastest route distance. It is not clear whether the reason is that drivers tend to think their shorter distance routes are also quickest, whether they are prepared to sacrifice speed for distance savings or whether they try to avoid certain types of roads - for example motorways, which tend to be longer but quicker.

6. There was no evidence of greater sub-optimality for drivers on leisure journeys.

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