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ABSTRACT

Information from various sources, but most specifically from the YORKSHARE car sharing schemes, is brought together in an analysis of public reaction to and participation in a car sharing scheme with centralised matching of applicants. The importance of various attributes of the sites, of the individuals and of the scheme organisation are assessed and conclusions drawn.

The motivation of individual participants is analysed and is seen to vary from one person to another depending to some extent on their circumstances but the universal importance of some features, notably cost savings, is revealed.

This report is one of several describing the findings of the YORKSHARE project.

Bonsall P.W., A.H. Spencer and W-S. Tang (1982) What makes a car sharer ? a motivational investigation, Leeds : University of Leeds, Inst. Transp. Stud., W.P. 158 (unpublished).

CONTENTS

LIST OF TABLES

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1. INTRODUCTION

1.1 Background

This paper is one of a series based on the establishment and monitoring of the YORKSHARE organised car sharing schemes for the work journey. Its aim is to investigate the nature and motivation of public response to the schemes. It does not consider, except in passing, the impact of the schemes or a discussion of car sharing policy which are considered in Bonsall, Spencer and Tang (1982) and Bonsall (1981) respectively.

The schemes were established during 1979 and 1980 at four sites within West Yorkshire - a city centre industrial firm in Wakefield, an out-of-town office (The Lending Division of the British Library), the city centre offices of Leeds City Council, and a residential suburb (Garforth). Taken together, the four sites had a target population of over 6,500 people. The launch of each scheme was preceded by a publicity campaign varying in intensity from simple distribution of posters at Wakefield, to coverage in the local press and broadcast media at Garforth. Each member of the target population received a package (in some cases individually addressed, in some cases not), containing publicity material and an application form (see appendix). The publicity material described the scheme, indicated the benefits which would accrue to participants and gave instructions for the completion and return of the application form. The benefits as described, included special incentives: cards entitling participants to receive discounts from local suppliers of automotive products (at all sites), and free reserved car parking (at Leeds only).

Completed applications were processed and manually matched on the basis of journey origin, destination and timing, the type of application made (whether to drive, to ride or to pool), and compatibility of smoking habits. Applicants were then sent details of their potential travelling companions on 'match lists' which also indicated that they should take the initiative in making contact with the proposed partners and which gave advice on the scale of charges that a driver might reasonably charge his passengers.

At Wakefield and the Library that was then the end of the organiser's role. At Leeds and Garforth, however, the organisers telephoned each applicant shortly after despatch of his match list in order to encourage him to start forming an arrangement if he had not already done so.

Further details of the sites, and the organisation of the schemes can be found in a companion report (Bonsall, Spencer and Tang, 1982) but, for convenience, they are summarised in Table 1.

1.2 Data Sources

In keeping with the experimental objectives of the YORKSHARE project, considerable emphasis was placed on the collection of information with which to monitor the performance and impact of the schemes. In order to minimise any bias in response to the schemes, every effort was made to keep scheme organisation and data collection as separate entities. Details of the data gathered are given elsewhere (Bonsall and Spencer, 1982) but, to summarise, the main data sources were:

1) Published material on the characteristics of the target populations; the 1971 Census (OPCS), the WYTCONSULT surveys (WYTCONSULT, 1976) and an earlier study of Garforth (Peat, Marwick and Mitchell, 1976).

2) Management interviews and workforce questionnaires (at the three employer based sites) to determine workforce characteristics, working hours, existing modes of travel to work, parking availability, public transport services and so on. (2280 completed questionnaires.)

3) A question on the application form to determine current mode use.

4) A questionnaire distributed to each member of the Leeds workforce to determine changes in car availability, mode use, household travel patterns etc. since the inception of the YORKSHARE schemes. (1123 completed questionnaires.)

5) Follow up telephone interview of applicants to determine which arrangements materialised, how long they lasted and how they evolved and to give the applicants an opportunity to state why they had done what they did. These interviews were supplemented (at Leeds) by a questionnaire survey of applicants some months after they had been sent their match lists. (175 telephone interviews, 98 completed questionnaires.)

6) One week household travel diaries filled in by volunteer Leeds employees in March 1979 (before the Leeds scheme began) and in March 1981 (after the scheme had begun). Of the sixteen households who responded both to the 1979 and 1981 surveys, half had a member who had joined a YORKSHARE arrangement between the two surveys.

Table 1. Site characteristics

	Wakefield	Library	Leeds	Garforth
Size of target population	890	750	2350	2800 *
Occupational status:				
% manual/shop floor	73	18	1	32.5)
% technical/clerical	24	16	79	40.2) **
% professional/managerial	3	21	21	16.7)
Personal characteristics:				
age % under 30	30	55	40	-
% 30 - 50	46	36	49	-
% over 50	24	9	11	-
sex: % male	92	43	61	67.3 +
Household characteristics:				
% from 1 person households	4	9	9	5.6)
% from 2 person households	33	39	36	32.1) ++
% from 3 person households	26	23	22	23.9)
% from 4+ person households	31	29	33	38.4)
% with household phone	61	75	85	-
Car ownership				
% from 0 car households	34	24	20	15.7)
% from 1 car households	55	49	63	74.9) ++
% from 2+ car households	11	27	17	9.4)
Travel and transport:				
mean journey to work (kms)	6.6	15.2	11.3	10.5
% requiring car at work	8	4	38	-
Mode of work journey (am):				
% solo driver	35	19	25	
% accompanied driver	14) 27	24) 62	16) 34	66.3)
% car passenger	13)	38)	18)	) +++
% bus	) 17	) 15	) 38	19.3)
% train	)	)	)	11.5)

Sources: Interviews of management and of a 50-60% sample of employees at Wakefield, Library and Leeds.
Census material and Dept. of Employment data at Garforth.

* Population in employment
** Of economically active persons
\+ % of employed residents
++ % of all households
+++ % of employed persons working outside Garforth U.D.

It is accepted that the individual data sources are not all above scientific or statistical reproach (in large part because of the shortage of independent observations of YORKSHARE participants), but is is believed that, taken together, they form a unique data base on which to base an investigation of the nature and motivation of public response to organised car sharing schemes.

2. ANALYSIS

2.1 Introduction

Table 2 summarises the performance of the four YORKSHARE schemes. The following points are of particular note. The application rates varied from 0.8% in Wakefield to 6.8% in Leeds; applications to ride predominated with applications to pool (alternate driving) in the minority; the proportion of each target population who actually became participants varied from 0.3% in Wakefield to 2.0% in Leeds; the durability of arrangements varied from scheme to scheme.

The purpose of this analysis is to examine a variety of possible reasons for variations in scheme performance. The report is structured so as to consider in turn the effect of several features, which might be thought significant. Thus we will consider the influence of journey length, regularity and directness of previous travel mode, of socio-economic and personal characteristics, of household characteristics and of social factors. We will also consider the influence of the presentation and quality of the matching service.

The variations in scheme performance highlighted in table 2 will be used as evidence and particular use will also be made of the information in tables 3 to 8. Table 3 contains a comparison of the characteristics of the Leeds target population, the Leeds applicants and the Leeds participants. Table 4 shows a comparison of the target population, the would-be applicants and the existing sharers in an earlier study.* Table 5 gives a comparison of the evolution of arrangements of different types. Table 6 lists reasons quoted by applicants and participants for their initial interest in car sharing and for their subsequent actions in establishing or abandoning arrangements. Table 7 similarly lists problems and benefits of car sharing; and finally Table 8 is an analysis of the modes formerly used by car sharers.

... ...

* The earlier study was based on questionnaires distributed in Yorkshire in 1977 which included the questions, "If there were an information service which could put you in touch with people with a view to sharing your journey to work, would you use it?" "In what mode of car sharing would you be interested - driving, riding or pooling?" and "Are you already sharing?" Details of this study are available elsewhere (Bonsall, 1980a).

Table 2. YORKSHARE scheme's performance

	Wakefield	Library	Leeds	Garforth
Application rates:				
number of applicants	7	34	160	64
as a % of target population	0.8	4.5	6.8	2.3
Application types:				
% of applications which were				
to drive	(n sig)	26	39	31
to ride	(n sig)	53	40	47
to pool	(n sig)	22	21	22
% of applicants who applied for more than one kind of sharing	(n sig)	29	34	36
Participation rates				
number of participants	3	7	46	17
as % of target population	0.3	0.9	2.0	0.6
as % of applicants	(n sig)	20.0	28.0	27.0
Durability of arrangements*				
no. of arrangements surviving				
first week	1	3	21	8
six months	1	3	20	7
one year	1	3	18	n.a.
two years	1	3	n.a.	n.a.

Notes

* Surviving in some form albeit perhaps with some change in membership.

One of the 3 arrangements at the Library and one of the 7 at Garforth.

Source: YORKSHARE application forms and follow-up interviews

Table 4. Incidence of attributes among various groups (1977)

Item	Population of survey study area	Respondents to the survey	Respondents expressing some interest in car sharing	Respondents already engaged in some form of car sharing
1. % of population owning telephone	58.13	82.2	79.63	84.45
2. % male	60.30	71.32	66.95	69.51
3. % age under 30	29.93	24.84	29.47	27.31
4. % age 30 - 50	43.02	52.52	47.36	50.88
5. % age over 50	27.05	22.63	23.17	21.18
6. % in manual occupations	48.47	22.12	25.64	21.13
7. % in technical/ clerical occupations	27.76	32.39	36.24	33.33
8. % in professional /managerial occupations	23.78	45.60	38.12	45.53
9. Mean length of journey to work (km)	5.95	6.69	7.24	6.92
10. % driving a car in the mornings	35.41	64.47	59.86	71.92
11. % travelling by public transport in mornings	36.04	17.80	23.88	3.67

Source: Survey of attitudes to car sharing (Bonsall, 1980a)

Table 5. Longevity of YORKSHARE arrangements (Wakefield, Library and Leeds schemes combined)

	No. of arrangements * (Figures in parenthesis indicate the number of arrangements expected on the basis of durability of all arrangements.)				
	At launch	After 1st week	After 6 months	After 12 months	After 20 months
All arrangements	27	24	23	21	18
Arrangements whose remotest member travelled > 10 km	15	12 (13.3)	12 (12.8)	10 (11.7)	9 (10.0)
Arrangements involving payment	20 **	19 (17.8)	19 (17.0)	17 (15.6)	15 (13.3)
Arrangements whose members' travel times, as matched, were only compatible in one direction	4	3 (3.6)	3 (3.4)	3 (3.1)	2 (2.7)
Arrangements whose members knew each other previously ***	8	7 (7.1)	7 (6.8)	7 (6.2)	5 (5.3)
Arrangements which were expansions of pre-existing arrangements	7	6 (6.2)	6 (6.0)	6 (5.4)	6 (4.7)
Arrangements with > 2 YORKSHARE applicants when formed	7	6 (6.2)	6 (6.0)	6 (5.4)	6 (4.7)
Arrangements with > 2 members (i.e. including non YORKSHARE) when formed	13	11 (11.6)	11 (11.1)	11 (10.1)	11 (8.7)

Notes: * Sporadic arrangements have been excluded but arrangements which were modified as time went by are included.

** 2 additional arrangements which lasted less than a week may have involved payment.

*** This information was not available for six arrangements.

Source: Follow up interviews of YORKSHARE applicants.

Table 6. Number of people* quoting specified reasons for a particular action

A. Reasons for applying:

	Number	
To save money	19	(11)
Quicker or more reliable journey	9	(4)
To share driving	3	(2)
Sociability (e.g. to have company on journey)	4	(3)
To help others/social conscience	17	(8)
Curiosity	3	(3)
Leave car at home for spouse	1	(1)

Figures in parenthesis indicate the number of people quoting the specified reason who, at the time of the interview, had begun to participate in a YORKSHARE arrangement.

B. Reasons for applying - by mode:

	Pre YORKSHARE mode of interviewee				
	Solo driver	Accompanied driver	Car passenger	Bus	Train
Cost savings	9	2	1	7	3
Easier journey	1	0	3	8	1
Wish to share driving	3	0	0	0	0
Wish to socialise	2	3	0	0	0
Wish to help others /social conscience	15	5	1	2	4
Curiosity	3	0	0	0	1

If a respondent used more than one mode he will appear in more than one column.

C. Reasons for failure to form arrangements with anyone on their match list:

	Number
Journey timing or irregularity	39
Inconvenient route	24
Partner already matched	6
Insufficient remuneration	4
Change in circumstances	3
Other reasons	31

D. Reasons for failure of arrangements during their first week **

	Number
Unreliable partner	2
Misunderstanding	3
Temporary problems (illness, bad weather etc.)	2
Ungrateful partner	1
Change of mind	1

E. Reasons for leaving arrangements (after the first week) **

	Number
Ceasing to make the journey -	
- ceasing to work	7
- changing job	8
- moving house	2
Change in work hours	1
Change in route due to work commitments	2
Unreliability of the arrangement	1
Incompatibility or irregularity of work hours	3

Notes: * If a respondent quoted more than one reason, he may appear in more than one row of a table.

** If 2 people from the same arrangement gave the same reason it is only counted once.

Source: A and B - interviews of Garforth applicants.
C, D and E - follow-up interviews of applicants at Leeds and Garforth

Table 6 continued on page 11

F. Numbers of existing (non YORKSHARE) participants quoting each reason for participating

	Drivers	Passengers	Poolers
Time savings	2 (11)	23 (40)	60 (46)
Money savings	11 (61)	18 (31)	45 (35)
Inadequate public transport	1 (6)	1 (2)	1 (1)
In order to liberate the family car	3 (17)	0 (0)	0 (0)
Comfort	1 (6)	0 (0)	0 (0)
Friendship/obligation to relations	0 (0)	6 (10)	18 (14)
Convenience	0 (0)	6 (10)	4 (3)
Other	0 (0)	4 (7)	2 (2)

Numbers in parenthesis indicate the % of reasons quoted by people in that column.

SOURCE : 1977 questionnaire (Bonsall 1980a)

Table 7. Number* of people quoting specified benefits or problems with car sharing

A. Benefits

	Number	
Cost savings	30 (24)	Figures in parenthesis
Time savings/easier journey	19 (16)	indicate the number
Help others/social conscience	8 (8)	of respondents giving
Parking space incentive	4 (4)	the reason, who were
Sociability	11 (8)	still sharing at the
Release of car for spouse	4 (4)	time of the interview.
Save driving	2 (1)	
None cited	1 (0)	

B. Problems

	Number
Need to fit in with another person's schedule	4 (2)
Variability of the other person's schedule	3 (1)
Unpunctuality of the other person	3 (2)
Constraint on one's freedom of action	7 (5)
Need to communicate in emergencies	3 (2)
Unease about imposing on others	3 (3)
Problems on those days when arrangement suspended	4 (3)
No problems mentioned	23 (20)

Note: *42 people were interviewed - if they quoted more than one problem or benefit they may appear in more than one line in the table.

Source: Follow-up interviews of YORKSHARE participants at all schemes.

Table 8. Former mode used for journey to work

A. Application rates of different mode users

	Wakefield	British Library	Leeds	Garforth
% of solo car drivers who applied	1.2	2.4	9.2	
% of accompanied drivers who applied	1.6	6.1	9.3	1.9
% of car passengers who applied	0	3.3	0.7	
% of bus users who applied	0.6	7.1	5.7	3.5
% of train users who applied		*	5.5	1.2

B. Former modes of members ** (all 4 YORKSHARE schemes combined)

	Role of member in the arrangement		
	Driver	Passenger	Pooler
Solo car driver	14	2	6
Car driver with passenger	10	0	0
Car passenger	0	12	0
Carpool	0	0	9
Bus	0	24	0
Train	0	3	1
Motor cycle	0	1	0
Mixed mode (car and public transport	0	1	6

Notes: * There is no train service to the British Library site.
** These figures include car sharers who joined arrangements independently of YORKSHARE.

Source: YORKSHARE application forms and subsequent monitoring of individuals participating by telephone interviews.

2.2 To what extent do applicants and participants have similar characteristics?

The first three columns of Table 3 show how the occurrence of certain attributes in the target population compare with their occurrence among applicants and among participants; thus for example household telephones are owned by 85% of people in the target population, by 90% of applicants and by 92% of participants. We may interpret this as an indication that telephone ownership is positively correlated with propensity to apply (90 is bigger than 85) and positively correlated with propensity to participate once having applied (92 is bigger than 90).

However it is clear from Table 3 that not all the attributes demonstrate the same sign of correlation with propensity to apply as with propensity to participate having applied. For example, in row two, we note that men are more likely to apply than are women but, having applied, they are less likely to participate.

Comparison of the attributes which, like maleness, are associated with above average propensity to apply but below average propensity to participate having applied, with those (like femaleness) which are associated with low propensity to apply but high propensity to participate having applied, suggests, in caricature, two contrasting profiles: on the one hand there is the professional family man who needs his car at work and drives an above average distance to work - he is keen to apply but, when it comes to participation he finds it difficult to find any passengers who can fit in with his tight schedule; on the other hand, there is the woman working in a technical or clerical post who usually travels by bus for her shorter than average journey to work - she is diffident about applying in the first place but, if she does apply, she finds it relatively easy to agree to participate in an arrangement with a would-be driver.

Clearly the attributes associated with deciding to make an application are not always the same as those associated with deciding to participate - this distinction must be recognised in the following analyses.

2.3. What is the influence of journey length and duration ?

It is quite reasonable to suppose that the longer one's journey the more attractive will car sharing appear - both because of the greater absolute cost savings and the smaller contact costs (diversions to pick up a passenger, waiting for one's partner morning and evening etc.) relative to these savings. Evidence from tables 3 (line 8) and 4 (line 9) confirms a positive correlation between journey length and likelihood of applying and table 6 shows that cost savings figure prominently among the reasons for applying. It is of course, also possible that the 'social conscience' reasons quoted in table 6a might be distance related, a longer journey being more difficult and expensive and thus engendering greater compassion for those forced to undertake them. 'Companionship on the journey' would also tend to be a more potent reason for sharing on longer journeys.

Although propensity to apply is positively correlated with journey distance, table 3 (line 8) and table 4 (line 9) show that participants' journeys are shorter than those of applicants - this is simply due to geometry: as distance from a workplace increases the density of residents working at that site decreases. The density of applicants will likewise decrease and thus there will be a reduced probability of finding a compatible travelling companion for any given applicant.

It is interesting to note from tables 3 and 4 that applicants to ride live less far out than applicants to drive who in turn live less far out than applicants to pool. These differences may be due to the relative complications involved in the three modes (riding being the simplest and pooling the most complicated) which makes them viable at different distances; the complications involved in pooling requiring the longest 'line haul' element in the journey to make it worthwhile.*

Table 3 (line 8) shows that the differences in the work journey lengths of drivers and riders is more marked among participants than among applicants. While this increased differential may result from actual participation bringing the relative complications into sharper focus, it must also reflect the tendency of drivers to pick up their passengers en route rather than to backtrack and thus almost inevitably drivers tend to have longer journeys.

* section 2.6 describes another possible reason for these differences; it considers the link between car availability and length of work journey.

Table 3 (line 9) shows that previous journey duration is not related to the different types of application and participation in the same way as is journey length. In the case of previous journey duration the longest journeys are associated with riding and the shortest with pooling. This reflects the fact that would-be riders tend to have previously used slow modes and would-be poolers to have used fast modes (see table 8b). This question of previous mode use will be returned to in section 2.5.

Despite the greater savings to be made from sharing on the longer journeys (both in time or distance), there is no evidence (see table 5) that such arrangements are more durable than others.

2.4 How important are regularity and directness of the work journey ?

Participation in a car sharing arrangement is not likely to be compatible with an irregular work journey (one which may occur at different times on different days) or one which is part of a trip chain (i.e. with intermediate destinations). In an earlier study (Bonsall 1980a), when asked why they were not interested in car sharing 30% of respondents mentioned the irregularity of their journey, 26% mentioned a desire for flexibility or independence and 20% indicated that they would find it difficult to share because they needed their car in the course of work.

Table 3 (lines 21, 23, 24) shows that taken overall participants are more likely to have had a simple and regular work journey than are the target population at large - note in particular that variation in journey timing is much less marked among successful participants than it is among applicants.

Table 6c shows that journey timing or irregularity feature quite prominently both among the reasons quoted by applicants for their failure to form arrangements with anyone on their match list, and among the problems of car sharing as perceived by actual participants. Even bearing in mind that some of these quoted 'reasons' may have been rationalisations rather than true reasons* it is still evident that journey timing and irregularity were important determinants of the success of a scheme. There is some evidence (see table 5) that of those matches which we proposed the ones with a good synchronisation of preferred journey times were more successful than were the others. It is also noticeable from table 6e

... ...

* some of the quoted reasons cannot be valid; for example some of the Leeds applicants said they had not contacted anyone on their match list because they did not regularly work the same hours as their proposed partners; but in fact they could not have known that since they had not yet contacted their partners !

that problems of incompatibility or irregularity of journey times were prominent among the endogenous reasons for the failure of arrangements. We also note from table 7b that synchronisation of journeys figured quite prominently among the problems experienced by car sharers and, moreover, that such problems seemed to be particularly evident among those arrangements which failed to survive.

Problems of synchronising the journey times of three or more people will help explain why so few arrangements involved more than two people and why, although accompanied car drivers were keen to apply to YORKSHARE (table 3 line 27) they rarely succeeded in forming arrangements.

The procedures adopted when matching applicants ensured compatibility of journey timings for at least one journey per day. The majority of applicants were in fact matched with people both of whose journey times were compatible. However, 12 of the Leeds applicants could only be found partners with times compatible for one journey per day. As expected, these 12 had greater difficulty than the rest in forming arrangements; their success rate was 25% (3 out of 12) compared to 33% for the matched applicants at Leeds as a whole.

The relationship between flexitime and successful car sharing is quite interesting. It has been argued that flexitime is incompatible with car sharing because it provides the individual with an extra freedom which would be compromised by participating in a regular car sharing scheme; and we certainly did have some applicants quoting this as a reason for not participating. On the other hand the introduction of flexitime allows people to synchronise their journeys so that they can share - this could obviously be important where partners worked for separate employers whose work hours were different.

In the Leeds scheme about three-quarters of the target workforce worked flexitime while the rest had voluntarily decided to retain fixed hours - the fixed hours differ from one department to another. Table 3 (line 25) shows, surprisingly, that the flexitimers were neither more nor less likely to apply but that they were more likely to participate having applied than were the fixed time workers. Had the propensity to apply been higher among flexitimers, one might have concluded that the differential participation rates were due to different attitudes to regularity of travel but since application rates were not related to flexitime it seems reasonable to suggest that it is the possibility of synchronisation that resulted in the

greater participation by flexitimers. This thesis is supported by the fact that in 11 of 21 arrangements in Leeds the preferred travel times of partners differed by 30 minutes or more but that their ranges of possible travel times always overlapped. (3 of the 11 did, however, mention timing problems as among the disbenefits they had experienced from car sharing).

Table 3 (line 22) suggests that trip chainers (those who make stops en route between home and work) are less likely to apply than others but in practice the desire of participants to trip chain was not as hindered by their involvement in a car sharing arrangement as might have been expected. Our investigation of the extent to which trip chaining was curtailed by membership of an arrangement revealed (Bonsall, Spencer & Tang 1982) that arrangements were often suspended or modified for one or more days a week if either of the participants wished to make a stop-off en route. In practice we found that almost half (15/33) of the Leeds arrangements regularly operated for less than 10 journeys per week - clearly the image of car sharing as a 2 journeys-per-day 5 days-a-week arrangement is incorrect - there is much more room for variability in journey timing and regularity than might have been expected.

2.5 Does an individual's existing mode* of travel influence whether (and how) he will participate in car sharing ?

Table 3 (line 26 onwards) can be used to determine the different levels of interest in the Leeds scheme shown by users of different modes. Table 8A shows the information somewhat more clearly and includes all four schemes. Taking both tables together we note that, in general, applications are most forthcoming from those already car pooling or driving with passengers, slightly less forthcoming from existing solo drivers and public transport users and very rare from car passengers. There were variations: at the library bus users were very keen to apply (no doubt reflecting the poor quality of their bus services); at Leeds car drivers both solo and accompanied seemed especially keen to apply (no doubt reflecting the existence of the parking space incentive - see section 2.10) and at Garforth bus users were keener to apply than were rail users (perhaps reflecting the recent bus fares increase and cut in services and the long standing dissatisfaction with the local service (see for example WYTCONSULT 1976)).

Lines 26 onwards in table 3 show that by and large car drivers were applying to give lifts or to pool and public transport users were applying to receive lifts. Table 8B shows how this pattern is emphasized by the roles that they eventually took up within an arrangement, thus highlighting the fact that different people are seeking different benefits from car sharing. Table 6B shows this quite clearly: existing drivers (most of whom sought to give lifts) claim to have been acting out of a desire to help others or to save costs; existing car passengers (all of whom were seeking another lift) clearly wished to have an easier journey; existing public transport users (the vast majority of whom were seeking lifts) were obviously seeking to reduce costs and to improve journey convenience.

The behaviour and motivation of accompanied drivers and of those who use different modes on different days are particularly interesting: Table 3 (line 27) shows that although accompanied drivers are very likely to apply they are unlikely to participate and that, although they apply to pool and to ride as well as to drive they invariably end up as drivers. This suggests that their keenness for the concept of car sharing is tempered by the problems of reconciling the requirements of their existing passengers with those of additional partners. Table 8B quite clearly shows that applicants who had previously used different modes on different days of the week (either because they car pooled or because they used public transport on some days and car on others) almost invariably became poolers. This reflects their stated desire to retain or enhance arrangements by which they left their car at home (usually for spouse use) on one or more days per week.

It is interesting to compare these different motivations with the problems and benefits experienced by those applicants who became car sharers. When the data in table 7 is disaggregated by the role of the respondent in a car sharing arrangement it turns out that all car sharers experienced cost savings but that time savings/easier journeys were quoted almost exclusively by riders and car release and reduced driving by poolers. Drivers seemed more likely than riders or poolers to mention problems, particularly problems of timing and communication.

Examination of the modes used by those sharers who ceased to share during the study period but continued to make the journey, reveals that although all previous car users reverted to their car mode, several of those who had used public transport prior to YORKSHARE changed to a car mode when their car sharing arrangement terminated. This suggests that dissatisfaction with public transport, whether conscious or unconscious, may have been a strong reason for their sharing in the first place.

Analysis of the durability of arrangements also shows that people who had, prior to YORKSHARE, been public transport users were likely to continue sharing longer than those who had previously been car users, suggesting perhsps that their experiance of public transport made tham more dedicated car sharers!

2.6 Is interest in organised car sharing related in any way to personal characteristics such as socio-economic group, age and sex ?

There was strong evidence from the Wakefield scheme to suggest that blue collar workers were not interested in the car sharing scheme (not a single application was received from the shop floor workers although they made up the majority of the workforce). While this might be due in part to the way in which the application forms were distributed at that firm (see 2.10) there is broader evidence to suggest that interest is always more forthcoming from white collar workers; taking the four schemes separately there seems to be an inverse relationship between the proportion of blue collar (manual) workers in a population and the overall rates of application from that population; also the 1977 surveys (table 4, lines 6,7 and 8) showed that, compared to their incidence in the study area population, professional workers showed the greatest interest, and manual workers the least*

Tables 3 and 4 suggest that while professional workers are more conscientious about returning their questionnaire forms they are less likely to end up participating than are technical or clerical workers. So few manual workers applied that no conclusions can be drawn about their likelihood of participating having once applied.

It is no surprise to note from table 3 that professional workers tend to become the drivers in arrangements and that technical/clerical workers (primarily women) tend to become the passengers. It is possible that this link between socio-economic status and application type, taken together with the tendency of more affluent people to live in the outer suburbs, contributes to the different journey lengths of different sharers that was noted in section 2.3. (the influence of car availability on application type will be considered more fully in section 2.7).

... ...

* Despite initial puzzlement, the fact that, if each of the component parts of the Garforth study area are considered separately, there is a positive correlation between the application rate and the proportion of economically active males who are engaged in manual occupations, this does not negate this finding because in practice we found few, if any, applications from male manual workers but several from technical/clerical females who were perhaps the wives or daughters of manual males.

Tables 3 (line 2) and 4 (line 2) show that males are more likely to apply - or more correctly in the case of table 4 to complete a questionnaire - but females are more likely to participate. Table 9 shows a comparison of male and female application rates at each of the four sites.

In the case of Wakefield, the very low male rate is no doubt related to the fact that the majority of males at that site were shop floor workers, at Garforth the low male rate may again reflect the higher proportion of manual workers among the males, at the Library and Leeds the proportion of manual workers is very low and the male rate is thus not depressed. A further reason for the high male rate at Leeds might be the presence of the car park incentive (which would appeal primarily to drivers, the majority of whom were male) and a further reason (as yet unsubstantiated) for the higher female rate at Garforth might be the tendency of females to be more attracted than males by a residence based scheme.

The intercorrelation between sex and socio-economic status (and car availability - see section 2.7) is also no doubt partly responsible for the fact that as shown in table 3 (line 2) males tend to apply and participate as drivers or poolers while females tend to apply and participate as passengers.

TABLE 9 - Male and Female Application Rates **

	Male	Female	Overall
Wakefield	(0.12)	(8.3)	0.78
British Library	5.5	3.7	4.5
Leeds	7.7	5.4	6.8
Garforth	1.9	3.1	2.3

... ...

** i.e. the number of male applicants as a % of males within the target population, and similarly (figures in paranthesis based on very few observations)

SOURCE - YORKSHARE application forms.

Tables 3 (lines 3, 4 and 5) and 4 (lines 3, 4 and 5) show that people in the age group 30-50 are most likely to show an interest and subsequently to participate in organised car sharing. The younger people who do apply seem most likely to become riders, the older people to become drivers and people in the middle age group to become drivers or poolers. These tendencies, like the sex differences outlined above, may reflect the different social roles and moves of the different groups or, more prosaically, may simply reflect different levels of car availability.

Data from the 1977 surveys were used to calibrate a predictive model of organised car sharing (Bonsall 1980b). Values of the resulting coefficients (tables 2 and 3 in that ref) confirm that likelihood of applying and participating vary with socio-economic group, age and sex much as described above. They also suggest some other tendencies which may help explain the differing carsharing roles of the different types of person; it seems that women are more interested in receiving lifts in the morning only (reflecting their greater involvement in part time work ?), also it seems that females are preferred as passengers (by men and by women) that each sex prefers a member of its own sex as driver (men feel more strongly about this !), people prefer to travel with people of their own age (particularly in pooling arrangements) and females are particularly reluctant to give lifts to or to pool with men over 50.

2.7 In what way is an individuals' interest or participation in organised car sharing affected by the structure, travel patterns, car availability or telephone ownership of the household from which he comes ?

Table 3 (lines 15 and 16) suggests that people from larger households, particularly households with children at school, are quite likely to apply but are less likely to participate - they seem particularly unlikely to participate as drivers. People from households with more than one worker, on the other hand, are less likely even to apply, still less to participate (and again they are particularly unlikely to participate as drivers). These findings may reflect the greater complication of travel arrangement in large households, and the possibility that any spare car seats will be taken up by children.

Other things being equal, one might expect interest in receiving lifts and in car pooling to be associated with low car availability and interest in giving lifts to be associated with above average car availability. In fact table 3 (lines 10 and 13) show that although particularly marked among would-be drivers, above average car ownership and availability are a feature of all would-be car sharers. This is almost certainly a reflection of the greater interest shown by the more affluent groups which was discussed in section 2.6.

Although all groups have above average car ownership (particularly single car ownership - not shown in table) it is apparent that poolers have a much lower level of multiple car ownership than do drivers. This, together with their high licence tenure, suggests that pooling is often associated with a need to maximise household car availability; pooling may provide a means of releasing the household car for spouse use on several days per week (and as such is a cheaper option than purchasing a second car).

Table 3 (lines 17 to 20) shows drivers and poolers to come from households with above average use of cars for peak and off-peak journeys and shows riders to come from households with above-average use of public transport. As such it reflects the different levels of car ownership discussed above. Interestingly, poolers come from households with quite high use of public transport off-peak - this may be more evidence of a requirement for increased car availability among such households.

If we take need for car at work as a special case of a constraint on car availability then this is a suitable point at which to discuss the effect of business use of cars on car sharing behaviour. Table 3 (line 11) suggests that those needing a car at work are more likely to apply but are less likely to participate. This higher rate of application of business users is perhaps related to their higher average socio economic status and the tendency, which was outlined in section 2.6, of such people to be more responsive to organised car-sharing. Their lower rate of participation no doubt reflects the constraint that business use puts on car sharing - it is for example incompatible with receiving lifts and, where the car is needed at work every day, with pooling. A close examination of business use by drivers and poolers however shows that applicants who need their cars at work (but for less than 5 days per week) are more likely to participate than those who never need their cars at work. This result is counter-intuitive.

Our analysis of the impacts of car sharing upon household travel patterns showed that among households where car availability increased as a result of a member of the family joining or leaving a car sharing arrangement, although there was usually no change in the household's use of cars or public transport for non-work non-school trips, increased car use and decreased public transport use was more common than the reverse. More detailed study showed that increased off-peak car use was more pronounced when the increased car availability was due to someone joining a car sharing arrangement than when it resulted from someone leaving an arrangement. This could be interpreted as suggesting that car release is more often a motivation for joining a car sharing arrangement than it is for leaving one.

Line 1 of table 3 and line 1 of table 4 show that household telephone ownership is very much associated with interest and participation in organised car sharing. This again may in part be due to correlation between telephone ownership and socio-economic group and the low responsiveness of manual workers (note that in table 3 telephone ownership is lowest among riders) but it also reflects the practical importance of having a telephone to deal with detailed sharing arrangements and day to day co-ordination - note that all poolers have household telephone. Analysis of the 1977 data showed that not only were people who had telephones more likely to apply but that they were more in demand as partners (particularly in pools) than were their brethren without telephones.

2.8 How does the influence of social factors compare with that of financial savings or convenience ?

Literature from the United States (Margolin and Misch, 1978; Lewin and Gray, 1979) has emphasised the importance of social factors in the performance of car pools; it is clear that some individuals are prejudiced towards sharing just as others are prejudiced away from it. These prejudices can be critical in determining whether or not an individual will apply and whether or not any subsequent arrangement will succeed. At the same time it is clear that potential savings in journey costs feature prominently in the promotional literature for car sharing schemes and, as can be seen from tables 6A and 7A, they, along with journey convenience, are very evident among the stated reasons for wishing to car share and the stated benefits from so doing.

The vast majority of YORKSHARE lift giving arrangements involved a financial transaction with the driver and so too did some of the car pools (in practice the more infrequent ones). This tends to confirm that the financial aspects were very evident to the participants - and it is interesting to note from table 5 that those arrangements which involved payment were generally more durable than the rest. Although the impersonal, objective, issues of money and time were clearly important in the establishment and maintenance of car sharing arrangements, it is important to consider the evidence for the influence of the more personal, subjective, issues. From table 5 we note that those arrangements which involved people who had known each other before YORKSHARE were, at 6 months and at 12 months, rather more durable than the rest - suggesting that personal incompatibility may have contributed to the failure of some of the other arrangements. The fact that the arrangements involving old acquaintances were more than normally susceptible to failure between 12 and 20 months may reflect the fact that after 1 year of sharing the existence of a previous relationship is less significant. The failure of one of these arrangements during its first week is less easy to explain !

Also from table 5 we note the greater durability of those arrangements which were expansions of pre-existing arrangements; suggesting that these participants were more than usually predisposed towards sharing - although whether this is due to a state of mind rather than more prosaically to an established regularity of work journey is impossible to say.

After exhaustive analysis, it seemed that the application rate in the Garforth scheme was lower than would have been expected from a scheme which differed only in being workplace- rather than suburb-oriented. The probable explanation is that, in advance of personal contact, an individual has less of a feeling of affinity for and trust in a fellow resident rather than for a fellow employee, and is thus more reluctant to engage in a long term arrangement with such a stranger - hence the lower application rate.

It is difficult to use the information in tables 6 and 7 to determine the importance of social factors in the formation and durability of car sharing arrangements because the tabulated attitudes are necessarily those quoted by the respondents rather than a record of subconscious (or even conscious) motivations; it would be quite reasonable to expect respondents to express their attitudes so as to avoid sensitive issues such as personal compatibility

and to concentrate instead upon the less emotive issues such as comfort, convenience and cost savings. Bearing this qualification in mind we do note a number of points in the tables.

'Sociability' or 'having company on the journey' features more prominently among the benefits quoted by participants than it had among the reasons which applicants gave for applying. Many of the reasons quoted for the failure of arrangements to survive their first critical week (table 6D) have a social component suggesting strained personal relationships. It is quite understandable that such things should become apparent very early in the development of an arrangement.

Reasons quoted for the failure of arrangements after the first week are dominated by external causes (retirement, redundancy, house or job move). No arrangements are reported as having failed because of the incompatibility of partners, and even if all the soft reasons (e.g. 'irregularity of work hours' or 'change in work commitments') are really covering up for personality clashes, they apply to only a minority of the arrangements which did fail.

Although several of the problems of car sharing quoted by the participants could be interpreted as suggesting a strained atmosphere among the members, poor relationships were never mentioned specifically (the closest being perhaps a criticism of the other partner for unpunctuality and a feeling of unease about imposing or being imposed upon). It seems probably that people who would have been predisposed to have personality problems would not have been likely to have applied in the first place, or if they did, their arrangements were likely to have failed during the first critical week.

Comparisons of the two columns in table 6A does not suggest any clear link between quoted reason for applying and likelihood of participating (except that those motivated by curiosity seem very likely to participate!) At a more disaggregate level (not shown in the table) however, some tendencies are apparent: those who gave woolly 'social conscience' reasons such as 'the wastefulness of empty cars' or 'desire to help those who are reliant on the poor bus service' were, on the whole unlikely eventually to participate, but that those who were more clearly motivated by the prospect of self-oriented benefits such as companionship or reduction in their car running costs were much more likely to participate.

U.S. literature has suggested that the motivation to save costs is particularly important in the initial stages of an arrangement and that social factors become more important in the later stages. Brunso and Hartgen (1980) found a 'car sharing attribute rating' was a most significant determinant of whether a car sharing arrangement would survive. Again it is difficult to establish the extent to which the stated attitudes were rationalisations rather than determinants of behaviour but it seems that, as with our own data, the phycho-social aspects can be very revealing. One conclusion we draw is that the phycho-social aspects are a necessary but not a sufficient condition for successful participation - in other words all would-be car sharers must have a positive attitude towards the social aspects but that unless they can also perceive a tangible advantage themselves (such as a cost saving) they will not actually participate.

2.9 To what extent do the characteristics of a car sharing arrangement determine its durability ?

it is clear from table 6E that the majority of arrangements which failed did so for reasons external to the arrangement itself and thus we cannot expect to find any strong relationships between an arrangements' characteristics and durability. Nevertheless it is worth examining such data as is available - particularly in table 5 - note however that the small numbers involved mean that no statistically significant conclusions can be drawn.

It had been expected that arrangements involving more than two people would be more complicated and therefore more likely to fail than those involving only two people - there is no evidence fror this in table 5 and indeed the larger arrangements seem, if anything, more durable (perhaps because of the greater cost saving they allow,or because having more than two members reflects a stronger motivation on their part?

Arrangements involving payment were, as expected, more durable than those that did not, reflecting perhaps the greater incentive to the driver to continue.

As was shown in section 2.8, those arrangements which were extensions of previous arrangements were more durable than completely new ones. There is in fact considerable evidence to suggest that arrangements entered into informally (i.e. without using formal matching service) are different in several respects to those generated by YORKSHARE. This topic is not covered in the current paper although it has been referred to in our earlier work - see Bonsall, 1980a and Spencer 1980. In brief it is apparent that

such arrangements tend to be more durable and to be more socially motivated than the average YORKSHARE arrangement. Arrangements involving people who knew each other in advance were expected to be more than normally durable - and so they were during the first year, after which the fact that they had known each other in advance would be less significant.

Those arrangements involving the longest distance were expected to be more durable than the shorter ones because of the greater savings accruing to the participants. The evidence in table 5, however, suggests that the tendency was, if anything for them to be less durable. Perhaps this is because long distance commuters are more than normally likely to move house or job ? (we note that change of workplace was the reason for ceasing to share in the case of over half the ex-drivers, three quarters of the ex-poolers but only one quarter of ex-riders).

In section 2.4 we noted that those applicants who were provided with potential partners whose journey timings were only compatible for one journey per day, had greater difficulty in forming arranagements. From table 5 we see that these people also had below average success in maintaining their arrangements.

2.10 To what extent is the performance of a car sharing scheme dependent on the presentation of the matching service ?

The object of the publicity for each of the YORKSHARE schemes was to ensure that each member of the target population received, and was motiviated to read, an introductory letter and application form. The primary mode of publicity was the distribution of these letters and forms but it was backed up by a publicity campaign involving, variously, posters, press and broadcast media coverage.

The Wakefield scheme involved the distribution of unaddressed application forms with the wage packets and the publicity was limited to posters on some of the works notice boards. As can be seen from table 2, the resulting application rate was very low and it is now evident that several of the workers had discarded the application forms with at most only a cursory glance because they were regarded as 'just another circular'. There is even some question as to whether every single worker actually received a form. A reminder slip was distributed with the next set of pay packets but it produced no additional applications - by that time the application forms had been discarded or mislaid.

At the British Library the application forms were distributed to personnel via departmental administrators and the back-up publicity was increased to ensure posters on all notice boards and was supplemented by car stickers and information transmitted on the trade union 'grape vine'. As can be seen from table 2, the application rate was somewhat higher than at Wakefield.

At Leeds the application forms were individually addressed and distributed to each member of the target population via departmental administrators. The associated publicity once again included notice board posters and the trade union 'grape vine'.

The resulting application rate was once again increased but since the Leeds scheme also differed from the earlier two in having included the offer of free reserved parking for sharers, it was difficult to establish whether individual addressing of the forms had in fact helped. Evidence from the Garforth scheme is helpful here.

The application forms for Garforth were distributed in three different ways; one third were delivered to households in blank envelopes, one third were delivered in envelopes bearing the address only and another third were delivered in envelopes addressed to 'the occupier', at 'such and such address', comparison of the rates of application from rates increased with the degree of addressing given on the envelope. This, together with the Leeds evidence suggests that individually addressed forms have more initial impact and command more attention. The Garforth addresses were taken from electoral rolls and, of course, actual names could have been derived from the same source. In fact this was not done because earlier work (Bonsall 1980a) had shown that the inclusion of names would be counter-productive - not only would some of them be incorrect (due to the electoral rolls being updated only annually) but a 'big brother' effect would tend to operate with some individuals worrying about participating in a scheme whose organisers appeared already to know their name and address.

Pre-launch publicity in the Garforth scheme was increased to include, in addition to a poster campaign, articles in the regional and local press (including one paper delivered free to all households) and on the broadcast media. The effectiveness of this publicity cannot be directly gauged except to note that some of the television articles (on the regional edition of B.B.C. Nationwide) was delayed beyond the launch of the scheme and its transmission was followed by a distinct surge in the flow of applications.

All four schemes included the distribution of discount cards to sharers (which entitled them to discount of up to 25% off the price of certain automotive products from specified local suppliers), the Leeds scheme also included the prospect of free reserved car parking for participants. There is no evidence that the discount cards had any effect on application rates; none of the applicants mentioned them among their reasons for applying or benefits from participating. The car park incentive, on the other hand, was very popular, and occasioned several enquiries and favourable comments.

The value of on-site co-ordinators in increasing the application rate has been demonstrated in several studies (see for example Brunso and Hartgen 1980 and Bonsall (1980c) review of U.K. car sharing schemes). The role of the on-site co-ordinator is to encourage applications by dealing personally with potential applicants. It is apparent that some of the extra applicants generated by this process are less highly motivated than those who apply without the personal attention and that, unless the on-site co-ordinator's efforts are maintained, several of the applicants will subsequently lose interest in the scheme and fail to participate. None of the YORKSHARE schemes involved on-site co-ordinators but there was some experimentation, in the Leeds and Garforth schemes, with the use of 'chaser' telephone calls to applicants one week after despatch of their match lists. These calls were designed to maintain the momentum of the scheme and to encourage applicants to contact their potential partners. In the event it became apparent that these phone calls had little impact on the applicants in that those who had not contacted anyone during the first week were either definitely not interested in participating or were too late to find any potential partners not yet fixed up. Follow up phone calls from time to time and more importantly the provision of an enquiry telephone number did result in some late applicants being matched with potential partners and, in several cases, becoming car sharers. The low key approach adopted in the YORKSHARE schemes almost certainly resulted in a much lower rate of application and a slightly lower level of participation than could have been achieved with greater emphasis on personal contact. Note however that, as we explain in our 'impacts' paper (Bonsall, Spencer and Tang 1982), the low key approach is more efficient in terms of new car sharers per unit of organisational effort and that it is perhaps a more realistic model for the amount of effort that an employer or conventional car sharing matching agency would put in.

2.11 To what extent is the success of a scheme affected by the quality of the matching service ?

The purpose of a matching service is to supply each applicant with details of those of his fellow applicants with whom he might share the work journey, ideally the list of potential partners should be long enough to include all feasible matches but not so long as to include a high proportion of infeasible matches - since to do so would risk devaluing the service in the eyes of the applicant. The solution is to devise selection criteria that reject infeasible matches and produce feasible matches in an order of merit and this is indeed the basis of most matching systems.

A desk comparison (Bonsall and Spencer 1981) of matches produced by a fairly advanced computer matching system with matches produced from the same (YORKSHARE) data by a manual technique (map and pins) showed that the manual technique produced much higher quality lists. This was because the co-ordinate based computer method could not deal sensitively with peculiarities of the network; parameters could be set to determine the maximum allowable diversion and minimum ratio of passenger's journey length to driver's journey length but if these were set wide enough to include all feasible matches they would, because of network peculiarities, also include a large number of infeasible matches. Analysis of the YORKSHARE arrangements which did come to fruition and a comparison with those which did not showed that detailed network characteristics were extremely important in deciding which of the proposed matches were acceptable to the individuals concerned:- some arrangements which, in terms of grid co-ordinates, appeared unattractive in terms of the apparent diversion incurred, were in practice quite acceptable due to network details, and conversely, arrangements which, in terms of grid co-ordinating seemed quite good, were rejected if they required the driver to turn off a major road and rejoin it at a difficult junction or if the local network of cul-de-sacs necessitated back tracking by the driver or a long walk by the passenger. In practice it was more common for the passenger to go out of his way to save the driver a diversion; 14 out of 24 of the Leeds lift-giving arrangements involved a home pick up.

When asked why they had not formed arrangements with anyone on their match lists, some applicants to the Leeds scheme said that their journey times were not compatible with any of the proposed partners'. Close investigation showed that in some cases they had formed this opinion without having contacted the people concerned and, since there was no indication of the partners' travel time on the Leeds match lists, this opinion had been based on expectation rather

than fact (no doubt in some cases it was a rationalisation of a decision not to participate rather than a true reason for not so doing). For Garforth, to reassure any applicants who genuinely thought their own travel time wildly eccentric, a statement of the potential partners' desired travel time was included on the match lists. The result was that of those applicants who failed to make contact with anyone on their list, a much higher proportion mentioned timing problems in Garforth than had done so in Leeds (66% compared to 18%). However we cannot assume that this was entirely due to the inclusion of timing information on the match list - it is in the nature of a suburb based scheme to have a greater variety of journey times (simply because the applicants work for a variety of employers) and this is reflected in the fact that of those applicants who did make contact but then failed to form an arrangement, more mentioned timing problems in Garforth than had done so in Leeds (it had been expected that the inclusion of timing information on the match lists would reduce such abortive contacts). In summary it was not possible to determine whether the inclusion of timing information resulted in any arrangements which would not otherwise have come about.

In similar vein, we decided in the Garforth scheme, to ask would-be drivers what type of car they would use and we provided the information to potential passengers on their match lists (we had asked and provided information on smoking habits in all the schemes). The rationale was that the more information we could give to assist the passengers in forming an impression of the type of person with whom they might be sharing, the less reticent they would feel about contacting them - if the information conveyed an unattractive picture to them, then they would no doubt make no contact - although this might theoretically result in fewer arrangements, it was believed that more people would be encouraged to make contact than would be deterred and that those who were deterred would very likely have failed to form a stable arrangement if they had been left to discover the awful truth on the first morning of sharing! A similar case can be made for our decision to provide advice on the level of compensation that a passenger ought to pay his driver.

It was not possible with the limited number of applicants and arrangements in the YORKSHARE schemes to determine whether the provision of these various pieces of information and advice really did have the expected effect but interviews with the applicants tended to confirm that

they had found it useful in deciding whether they wished to participate with anyone on their match list. Another hypothesis which was impossible to validate in the YORKSHARE project, was that the very presence of the question on the application form would have increased applications by conveying to a potential applicant the impression of a 'caring' matching service rather than an impersonal information bank or whether, on the other hand, a large number of questions would over formalise the operation and put people off.

The 1977 survey had suggested that 20% of applicants were not interested in sharing journeys in both the morning and the evining: 16% were interested in sharing in mornings only and 4% in the evenings only. Recognising this and realising that some applicants might be quite flexible in the type of arrangement that they entered, it was decided in the YORKSHARE schemes to match people up (given compatibility of origin/ destination, desired role and smoking habits) even if only one of their stated possible travel time bands overlapped (although people, both of whose time bands overlapped, would of course be given preference). Not surprisingly, this resulted in some proposed matches being time-incompatible for either their outward or return journey. This naturally gave rise to mention of time incompatibility as a reason for not participating (see Table 6C). Interestingly, however, a number of the people who were matched for only one journey did in fact form successful arrangements. (they made up about 15% of all arrangements). Some of these arrangements actually operated for two journeys per day even though, according to the applicants' stated range of travel times, they were only compatible for one journey. Conversely some arrangements which operated for only one journey per day were, according to the original application forms, compatible for both.

3. SUMMARY AND CONCLUSIONS

3.1 What motivates a car sharer?

Clearly there is no single feature of car sharing which attracts applicants and participants, rather there are a number of features or possibilities which will attract different people in different circumstances. Cost savings seem to have been important to most participants with time savings and convenience particularly important to ex public transport users (who tend to become car passengers). Liberation of the family car for the spouse was a motivation for poolers but since they form a minority of car sharers it cannot be described as an important reason for car sharers at large.

Social factors concerned with personal relations, desire for company en route for example, are important factors in attracting some applicants (just as they are no doubt important in dissuading others) and an individual's attitude to such things is clearly crucial in determining the success of a car sharing arrangements.

Altruistic reasons, such as a concern to help others, do generate some applications, but unless backed up by some more tangible benefit to the individuals concerned, successful arrangements seem unlikely to result.

As has been observed in the United States Ridesharing Demonstration Programs, it is one thing to generate applications but it is quite another to make people participate. We saw many instances of applicants failing to form or persist in arrangements once the reality of a proposed arrangement became apparent - the diversion involved, change of journey time, arrangements for picking up and setting down passengers, personal characteristics of the proposed partners, rates of payments - any one of these may be unacceptable either singly or in combination with the rest.

One conclusion of these findings is that the publicity for schemes should stress money savings, journey convenience for passengers and the possibility of car release. The social aspects should not be overplayed and certainly it is not worth emphasising the indirect or community benefits.

3.2 What types of people are likely to become car sharers?

When compared to the population at large, we find that participants in organised car sharing schemes tend to have longer journeys to work, to have regular (but not necessarily fixed) work hours, to have telephones at home,

to have small families, and to work in technical or clerical occupations.

Drivers and poolers are likely to come from households with high car ownership (though in the case of poolers there is likely to be strong competition for use of that car), are likely to be males aged 30 to 50, to be professional or managerial in status, to be the only worker in the household and to be currently driving to work. Riders are likely to be female technical or clerical workers under 30 who currently travel to work by bus and come from households with at least one other worker.

An estimation of potential for organised car sharing in a given area should consider the profiles characterised above, but must also consider the mix of person types and journey characteristics in the population - it is no good having a population containing a lot of potential riders if there are no potential drivers or if all the drivers live or work across town from all the riders. Similarly one should examine the range of working hours within the target population - in a residence-based or areawide scheme people will work for a variety of employers with a variety of different work hours, in these circumstances flexitime will help to enable people to match with one another. At the same time it must be recognised that, given similar population characteristics an employer-based scheme is, because of the affinity effect, likely to have more impact than one which is residence-based or areawide. It is also important to recognise that people are much more likely to consider changing to car sharing if their existing mode or journey is unsatisfactory or is being upset - hence the wisdom of concentrating on areas where, for example, public transport is deteriorating or being withdrawn or where established work patterns are being affected by expansion of new employment.

3.3 What lessons are to be learned for the organisation of future schemes?

The previous sections have included some comments on the choice of sites and the nature of publicity for schemes - we will now consider how the schemes might best be organised. It is clear that participation can be increased by individual addressing of application forms, by the use of on-site co-ordinators and the availability of attractive special incentives, such as premium parking space. The cost of these features can, however, add quite considerably to total scheme costs and they

should therefore be included only if maximisation of participation is an important objective of the organisers (some schemes might be being established solely for the benefit of the participants, in which case extra expense incurred in persuading them to participate might be hard to justify).

Given the expense of a premium service, one should consider other options which, while being less costly (and less effective) than the premium service, still represent an advance over the most basic scheme. They are: partial addressing or individual delivery of application forms rather than self service pick-a-form-up-if-you-are-interested arrangements; telephone chasers and an enquiry number rather than a one-off matching service (with no follow up nor maintenance); and cheap gimmicky incentives rather than no incentives at all.

There is less scope for argument about the level of detail and effort appropriate during the matching process. It is clear that network details must be taken into consideration during the matching and this, in turn, means that, where possible, match lists should be produced by someone with a reasonable knowledge of the local network working from a map.

If the number of applicants is so large as to make fully manual matching impracticable, computerisation should perhaps be limited to the use of computers and word processors to check matches for compatibility (in terms of timing, preferred role of sharer, and the other non spatial match parameters) and physically to produce the match lists but with the spatial matching still done manually (the operator would then key in the code numbers of potential matches which would be checked by the computer).

Matching parameters such as role sought (driver, rider or pooler), smoking habits and exact coincidence of preferred journey times should be taken into account but there is room for some lattitude, particularly on journey timing, in order to allow for the flexibility of the individuals concerned. It would, for example, be inappropriate to attempt to deal with detailed requests (such as for only one lift per day) since this would involve considerable extra administrative effort, would relate only to a minority and would not allow for a change of mind (or error in completing the application form) on the part of the applicants.

It is important to give an applicant a reasonable description of his potential partners on his match list (e.g. role sought, smoking habits, range of journey times, and perhaps car type as well as name, address and the rest) in order to give him a mental picture of his potential partner - to do this will make him more willing to contact the stranger and will ensure that he is not so frustrated by contacting people who are unsuitable that he loses interest in the scheme before contacting ones who may indeed have been very suitable.

The emphasis, then, is on a network-sensitive but flexible matching system which leaves the applicants to make the final choice on the basis of their personal circumstances and tastes.

APPENDIX

The next two pages exemplify an application form and introductory letter delivered to each member of the YORKSHARE scheme's target populations.

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