IDeAs

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Seeing how they run

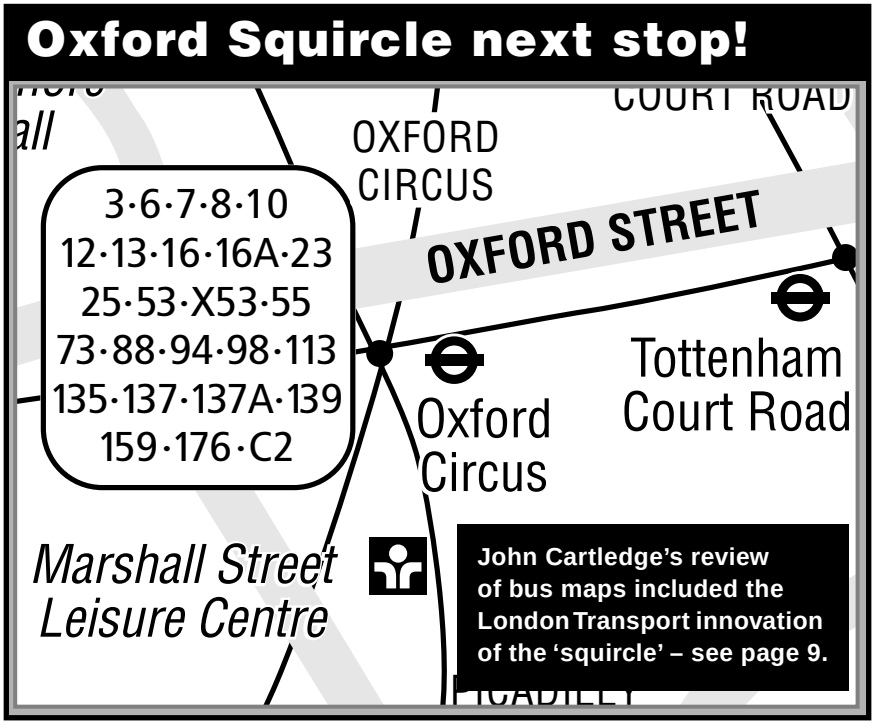
John Cartledge is assistant secretary of the London Regional Passengers Committee

The issue of public transport information has aroused a lot of interest amongst information designers. John Cartledge, who has been involved in consumer issues in public transport for nearly twenty years and who was the author of the report 'See How They Run' in 1984, addressed the IDA's evening meeting in February 1995.

John Cartledge started by saying, 'It is flattering to be invited by the IDA to talk about a subject which has long been close to my heart—mainly because the inside jacket pocket is an obvious place to keep a bus map. It is also terrifying to be in the company of so many experts. I am not an information designer, much less a cartographer or typographer.' But John's talk was memorable, informative and entertaining.

Buses are A Good Thing

John stated his basic assumption: that public transport is a good thing in itself, not merely because it is more democratic than the private car, being available to all who need to use it, but also because it is more civilised and environmentally friendly, especially in urban areas.



John Cartledge's review of bus maps included the London Transport innovation of the 'squircle' – see page 9.

Buses are more energy efficient than cars; relative to the number of people carried they create less noise and emit fewer pollutants. They are many times safer in terms of accidents and injuries, either to users or passers by. They make fewer demands on scarce land space for road building or widening or car parks and in the process they create much less community severance too.

'Even in Los Angeles, where the automobile has been king—where one third of the land area is given over to roads and another third to parking lots so that only the final third remains for any other directly productive use—the authorities have realised that the life style that has created this urban form is unsustainable, and they are investing massively in a new mass transit system.

'However good public transport is, if you want it to be people's first choice when they decide how to make a journey, you have to meet their expectations for frequency, reliability, comfort, cleanliness, personal security, accessibility of vehicles, affordability and so on. You've got to get the ticketing system right, make waiting as brief and stress-free as possible, and take steps to allay anxieties about the possibility that through no fault of their own they may find themselves seated beside Steve Norris.' (*Shortly before the talk, this Tory transport minister had said that many car users fear having to sit next to 'dreadful human beings' on the public transport system.*)

'In addition, one other critical component is the intelligibility of the service. If you want prospective passengers to be attracted to the services, you have to ensure that everyone has easy access to the information they need to be able to use these services and that they can make sense of it.'

continued p. 4

John Cartledge, cont. from page 1

Car Deprivation Syndrome

John described an experiment conducted by Granada Television's *World in Action* programme to investigate the extent of car dependency in Britain. They did this by depriving members of one Lancashire family of the use of their cars for a period of a week, so see how easily they coped in this unfamiliar situation.

'The resulting documentary showed the family grouped around the table studying bus timetables for the first time in years, trying to make sense of them. These were not people of limited intellect, and there is no reason to suppose that their perplexity was anything but genuine. It was clear that timetables had been difficult to obtain, and that they were thoroughly confusing.'

John commented: 'Now, when people who don't regularly use public transport find themselves in circumstances in which they wish to or need to, it must surely be in the operators' self interest to ensure that the experience is as simple and non-traumatic as possible. If they don't, there is scant chance of stemming the diminishing ridership that has afflicted the industry for years.'

Services in 'bandit country'

The 1985 Transport Act, pushed through by Nicholas Ridley, deregulated buses outside London, removed or circumscribed local authorities' role in promoting and co-ordinating transport policies, and paved the way for privatisation of the bus companies.

'This Act supposedly liberated the industry's managers from the shackles of state ownership and control and gave them freedom to respond to the needs of current or prospective users. So successful has this been (I stress it applies only *outside* London, the areas that some bus managers call 'bandit country') that in the space of a decade, the industry has lost one fifth of its customers and the shrinkage continues apace.'

Where is the advertising?

In a study published in 1986, Professor John Hibbs reported the results of interviews with bus company managers around the country. Advertising and publicity was regarded by everyone as extremely unsatisfactory, yet there was little evidence of new strategies being developed.

Two thirds of those interviewed believed that levels of information had deteriorated; barely one sixth thought they had improved.

Hibbs' conclusion: *We come to promotion, and my heart fails me; the image of the bus is poor, the availability of information to the public has been suicidally neglected, and of innovation there has been little or none.*

Your local paper is filled with advertisements offering every imaginable service—except bus services. There is turnover to be gained from potential customers waiting to find out where buses run and at what price, and it's no good expecting someone else to tell them.'

Some telling surveys

In October 1982, the bus industry's trade paper carried out a survey. Its readership was asked to assess the adequacy of information provision to customers, both by their own company and by public transport as a whole. Only 29% felt their own efforts showed need of improvement; but tellingly, this rose to 82% when asked for their opinion of the industry as a whole.

Those are views of industry professionals. Others have looked at perceptions of passengers themselves. In *Women on Transport*, a study of the impact of deregulation in West Yorkshire, Kerry Hamiliton and her co-authors quoted opinions gathered from a number of interviewees.

The main complaint: *The information is not clear…It was so difficult to work out and the print was terrible and minute.* Many women said that both the timetable and maps were particularly difficult for older women to follow.

Another woman summarised some problems of the information and the confusion that it caused. *The map wasn't very clear as to where in fact the buses did go, it was just a very big map and I wasn't sure which bus to expect when I wanted to go out…It wasn't very helpful, because it tended to generalise and you didn't want generalisations when you want a bus that runs only once an hour.*

Other researchers came to similar conclusions. In *Buses for People*, a study of local buses in Wales, the Welsh Consumer Council concluded that: *The situation is far too patchy, the standards are far too low. Too few operators or councils are really looking hard at what the potential bus users would need in order to make travelling on a bus a feasible option. It can be extraordinarily difficult for even an experienced bus user to negotiate the bus network in a strange town or county; better information, clearer information, more accessible information and comprehensive information are an essential part of any attempt to establish the bus as a serious part of a more balanced future transport system.*

Design shortcomings criticised

Six years before, the National Consumer Council argued in *Catching up with the bus* up to date, comprehensive timetable s designed to minimize difficulty in reading should be widely available.

Timetables and leaflets should be designed with the target audience in mind, taking into account difficulty with the traditional two-dimensional format and the 24-hour clock. More attention needs to be given to design and layout, and all material should be tested on its potential market.

Seeking answers to why people don't use buses, a recent report entitled *Buses in Towns* contains quotations from interviews in Birmingham. As well as comments on convenience, expense, unreliability and lack of information, they include: *The writing is so small; it takes you half an hour to look at it because you have to figure out the day of the bus. Then there is the 24-hour clock. The writing should be at least double the size so that people could see and understand a bit more.* The authors conclude that: *In addition to being informative, reliable and integrated at all stages of the journey there is a growing need for information to be decipherable.*

It isn't only British bus companies that labour under this handicap. The Institute of Applied Social Science in Nijmegen, The Netherlands reported findings of a survey of information needs of travellers which showed that 20% of car users had considered both modes for certain journeys, yet chose the car because of a lack of information about public transport. Three quarters of those who did go by public transport wanted more information on journey times, delays, arrival and departure times, and how to change between modes and services.

'All studies came independently to a conclusion which should be self evident: if prospective passengers are to be enabled to make fuller and effective use of public transport, ready availability of information about routes, times, fares, connections and tickets is imperative—but no less important is the question of information design. Service particulars must be presented in an attractive and easily intelligible format, if users are to be able to travel in confidence.'

Social profile of bus users

In tackling this problem, regard must be paid to the social profile of the bus industry's customers. Relative to the population at large they are disproportionately likely to be drawn from the ranks of the young, the elderly, the ethnic minorities and people with low incomes.

'It is essential that bus service information be presented in a way that everyone can readily comprehend. It is interesting to note that the ability to plan journeys using bus and rail maps is one of the skills required by 14-year-olds to obtain key stage 3 (whatever that is) in the National Curriculum Geography syllabus.'

The Guardian has reported the findings of a survey of adult numeracy which concluded that more than a third of adults could not cope with a timetable based on the 24-hour clock. One suspects this message is unlikely to have been lost on, for example, publishers of television and radio listings magazines, yet it is one that has passed much of the bus industry by.

Low spending on information

Manufacturers of toothpaste spend more than a fifth of their turnover on promoting their product, because experience has taught them that failure to do so results in a decline in market share. The bus industry in most of Britain has been losing market share for as long as any one can remember, yet the sums it spends on promotion are trivial by comparison and many of its managers seem resigned to this.

One exception is the Brighton and Hove bus company, well known for its outgoing, publicity-conscious style. Its annual Customer Report reveals that for every 50p ticket sold, 1p goes on marketing—a term which embraces more than simply timetables and maps. This is a company which regularly distributes literature on a house-to-house basis throughout its operating area.

'If the Brighton and Hove publicity budget is a mere 2% of turnover, one can speculate how little the more self effacing operators spend,' said John. 'Some are characterised by a Trappist response to enquiries, at any rate out of office hours; by timetables whose availability from newsagents or libraries suggests that they are covered by the Official Secrets Act; and by literature which appears to have been designed with the Enigma code-breakers in mind.'

Paper information still vital

The view is sometimes expressed that critiques of bus maps and timetables are of no contemporary consequence because advances in electronic technology are fast rendering the printed word redundant. Some electronic systems do have the potential to make information more quickly and more widely accessible than has hitherto been possible. In particular they can offer real-time data in a way no printed document can match. But, as John put it, 'It will be some time yet

before every bus stop is equipped with a telephone and a dot-matrix display, or every home, office and shopping centre sports an interactive on-line touch-screen database workstation.

'Even when that day dawns, it is by no means certain that demands for traditional methods of information retrieval will automatically lapse; the postal service has yet to be made redundant by telecommunications, and TV has not brought about the demise of newspapers, books, theatre, or live music and sport.'

Academic studies

John provided some copies of a synopsis of the contents of the more significant studies on passenger information provision, specifically on the design of passenger information literature.

'Much of this work has been undertaken in academic institutions; some of it is couched in terminology which demonstrates that communicating effectively with one's intended audience is a problem with which bus operators are by no means uniquely afflicted.' He treasures this extract entitled *Managing information: provision for passengers in the bus industry:*

> Knowledge and perception are part of the nexus of factors which influence individual behaviour and movements spatially and temporarily. They interact with behaviour which in a time–geographic framework is filtered through propensity to activity mediated by capability, coupling and authority constraints…
>
> There remains the problem of time–geographic approach and incorporated theories of power relations and the construction of space/time prisms and activity paths as they are mediated though economic social and political processes. In parallel there is an aggregation problem of relating the behaviour of individuals to macro-social or systemic structures. The way in which information is utilized by individuals is a component of the manner in which the urban system is worked by those individuals, and thus of their ability to utilize its resources. Information then has a component of accessibility which is spatial temporal and social.

John commented: 'I wonder what the Plain English campaign could do with that…'

The DoT's working party

Until now there have been few signs that this problem has been recognised within the industry or in local government, in whose hand the opportunity of solving it rests. Happily this state of affairs may now be changing for the better.

Responding from pressure from the industry and local authorities, the Department of Transport set up a working party looking at means of promoting bus use. This identified information provision as one of the most potentially cost-effective areas for innovation

As a result, the Department has commissioned work on information for bus users under the auspices of the Transport Research Laboratory. The aims of this study are to identify where gaps exist in provision of information, to what extent these deter people from using buses, and what is likely to be the most effective way of plugging these gaps. It will seek to distinguish the needs of regular users from casual users, and propose action to improve public awareness.

Case studies are being carried out to discover users' and non-users' views on the adequacy of existing levels of information, the impact on travel behaviour if information is made more accessible, and whether alternative methods of information (printed or electronic) offer any positive benefits.

The first small step in this direction has already been taken by a group convened under the auspices of the Disabled Persons' Transport Advisory Committee, which has produced its own code of good practice on legibility of bus timetables, books and leaflets.

A parade of examples

The remainder of John Cartledge's presentation took the form of comments on examples of current practice. Starting with timetables, John showed us, amongst others:

- Ill-typed columns of departure times from the point of origin of each journey, with no route numbers or indication of the routes they follow, how long they take or when they might arrive. (*This bus company has since gone out of business.*)

- A typed leaflet in which the operator is shown only by the initials **CMS** in the third column. These aren't explained: you are left wondering if you will be travelling with the Church Missionary Society or Cumberland Motor Services.

Dimensions and matrices

John explained that there are broadly speaking two types of timetable display; one dimensional or two. One dimensional timetables are **departure lists**, such as are the norm at larger railway stations. In the bus industry they are favoured mainly by municipal operators.

John also showed a **matrix timetable**: places served down the side, times across horizontally, and some ruled lines to help you read across.

■ 'There are several operators on the same sheet: nice to see, as there are not many buses anyway —if you had them all on different sheets you would have even more problems.

■ 'The biggest trap for the unwary: all those codes and footnotes. Some footnotes may be unavoidable—you always have the occasional journey that does something different—but it may be over the top to have *twelve* variations for only *ten* journeys.'

Columns, contrasts and clocks

In another busy matrix timetable shown by John, some times are only one minute apart: are they all strictly needed? A couple of design features which he noted:

■ 'Ruled lines are vertical here: such lines are no help in reading across; and they aren't needed for reading down because the eye copes better with columns than with rows.

■ 'Light and dark type is used to distinguish *a.m.* and *p.m.* journeys—this particular operator is not into the 24-hour clock.'

Nor was the 24-hour clock apparent on John's next example—because it is unheard of in the American bus industry.

■ 'There are four different typefaces in use on this timetable. Only from the alternation of light and dark type and the timing columns can you work out that you could spend *four days* on one of those buses! Fortunately we don't have many 3,000 mile bus routes here. If, having got to the end of the journey, you want to go back, you have to read *up* the timetable *on the right hand side*—not for beginners.'

The reflexive format

John introduced an example in what is called the **reflexive format** because the matrix has been turned on edge: you read down for each point, and across for each journey, so the list of places served is running across the top of the timetable.

The Department of Psychology at the University of Hull demonstrated that when people got used to it, people found that format easier to read. It hasn't caught on widely in industry because it is more difficult to fit it into the page size, depending on how many places you are listing.

Colour with a purpose

Timetables are often clearer if colour is available, but not everybody is sensible in how they deploy the colour resource. In an example which used tints of blue, some headings had type reversed out of light blue tint: no-one can read it.

■ 'If you are going to use colour, use it for some real purpose. One possible purpose is to distinguish morning from afternoon trips.'

■ Another example showed the use of colour is to distinguish different operators. 'Nice to see them collaborating voluntarily on a single timetable: a bright and cheerful layout with room for the different operators' logos on it.'

■ In an example with four routes in one table, colour was used to show which is which. 'I accept there may be a legibility problem because you need adequate contrast between the typeface and the background for people with impaired vision, so maybe it is not ideal, but at least colour is used for a purpose.'

Irrelevant colour

Some other examples used colour or tint to distinguish information categories of doubtful utility to the passenger:

■ Tints to distinguish which services are run on County Council contracts… 'Riveting news for the passenger!'

■ Colour to warn that some buses don't run in the winter— important information. 'But *half* the journeys run until February, and the *other half* don't start till February!'

Few bus timetables use colour to prevent users making the commonest mistake of the lot: mixing up the days of the week.

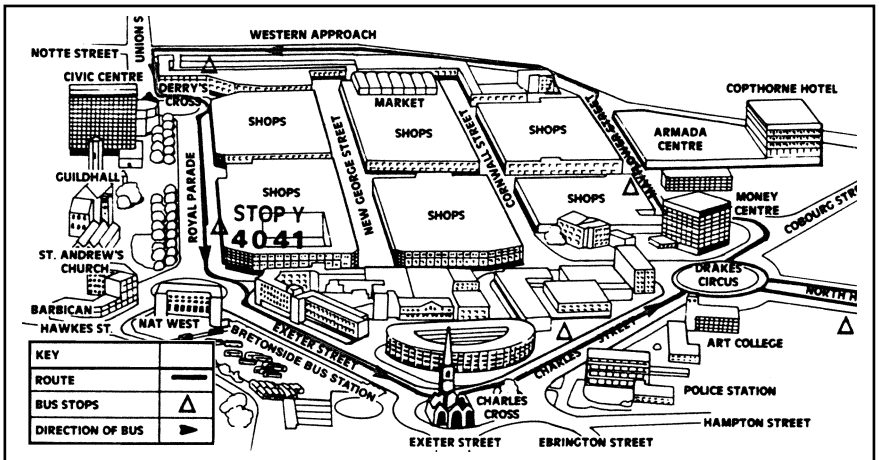
'I have had to go to a railway timetable to find weekdays and Saturdays and Sundays in different colours—which I have always thought is the best and most obvious use you could put colour to. Even on railways it is most often done in posters; you do not often see it in leaflets.'

Display and viewing conditions can wreck the use of colour for information. Red ink tends to fade in sunlight; and all colour differentiation is largely ineffective under sodium lighting.

Exotic timetables

John concluded his survey of timetables with a couple of exotica.

■ A 'multi-route departure sheet' boasts departure times, journey times, frequencies, fares and service numbers; plus bar charts to show the hours of the day the buses run, individual departure time superimposed on them, and colours to distinguish a.m. from p.m. 'The thing is obviously a labour of love on the part of whoever put it together—it appeared only once.'



Inset in a bus map of Plymouth shows the bus routes and stops around the city centre in a three-dimensional, realistic style. Bus riders on a journey obviously relate much more to the built environment around them than travellers on an underground railway system, so this map may succeed better than an abstract plan view.

■ An offering from the Transport Research Laboratory: little boxes represent consecutive 5-minute intervals throughout the day; whether they are shaded tells you whether or whether not there is a departure in that slot.

Bus maps and scaling

The other crucial device is the map, and John once again took us though some examples.

'This slide shows a map from a County Council. You have to see the thing in the original,' said John, holding up the modestly-proportioned item. 'Thirteen different towns, all on the same sheet. Every side-street is named, in letters 1/32" high. I am still looking for the free magnifying glass that they gave out with the timetable, and I hope they have better eyesight in Clacton.'

John showed an example using coloured lines, some of them solid and some broken. This is a standard device on maps: the broken lines tell you which are the less frequent services.

■ 'If you are going to distinguish between frequent and less frequent services it is important to have a sensible cut-off point between the two. This key tells you that the more frequent routes (the solid lines) run *at least weekly* throughout the year; so provided you are on a solid line you can be confident that no matter when you turn up you won't wait there more than a week!'

■ 'Some of the broken lines here show buses that run *only on summer Sundays*. Wouldn't it be better to do a summer Sunday route map?'

Relating route to geography

John praised a Plymouth example, simply a one-route diagram superimposed on an outline street plan of the city, so that you can see how it relates the geography of the area. 'I particularly like the bird's eye drawing of the city centre which shows where bus stops are: you can recognise individual buildings, outside which shop you actually get on or off the bus.' (*See left.*)

An elaborate Dublin bus map contained a detailed street plan, with all streets named, all the churches and the parks, the stations and barracks; and all the bus routes are there and picked out in orange. 'Only one thing is missing: they forgot to put on a single route number! It is not the slightest bit of use as a bus map, but it is terrific as a street plan of Dublin—a powerful incentive to walking rather than bus riding.'

The sundering of Southampton

The 'blight of Ridleyism' was demonstrated by John with company bus maps of Brighton and Southampton.

■ The Brighton example was an area bus map—all the local operators are on it, so all the areas you can go to by bus are there.

■ The Southampton example represented the services of just one operator. Large parts of the map are devoid of routes: the message seems to be, *This company doesn't go there and nor can you.*

'Both these examples were the work of a cartographic company called FWT, one of the two major design houses who specialise in this type of work. It is not their fault, just the specification that they are given to work to. In fact there are other routes serving those areas, but you have to know that there is another bus company.

'There used to be one map for Southampton, but those days are long gone. There are now two companies with separate maps, and separate map makers: the other maps are by Pindar, FWT's arch rivals in the bus map design market.'

Flaws of the 'Underground model'

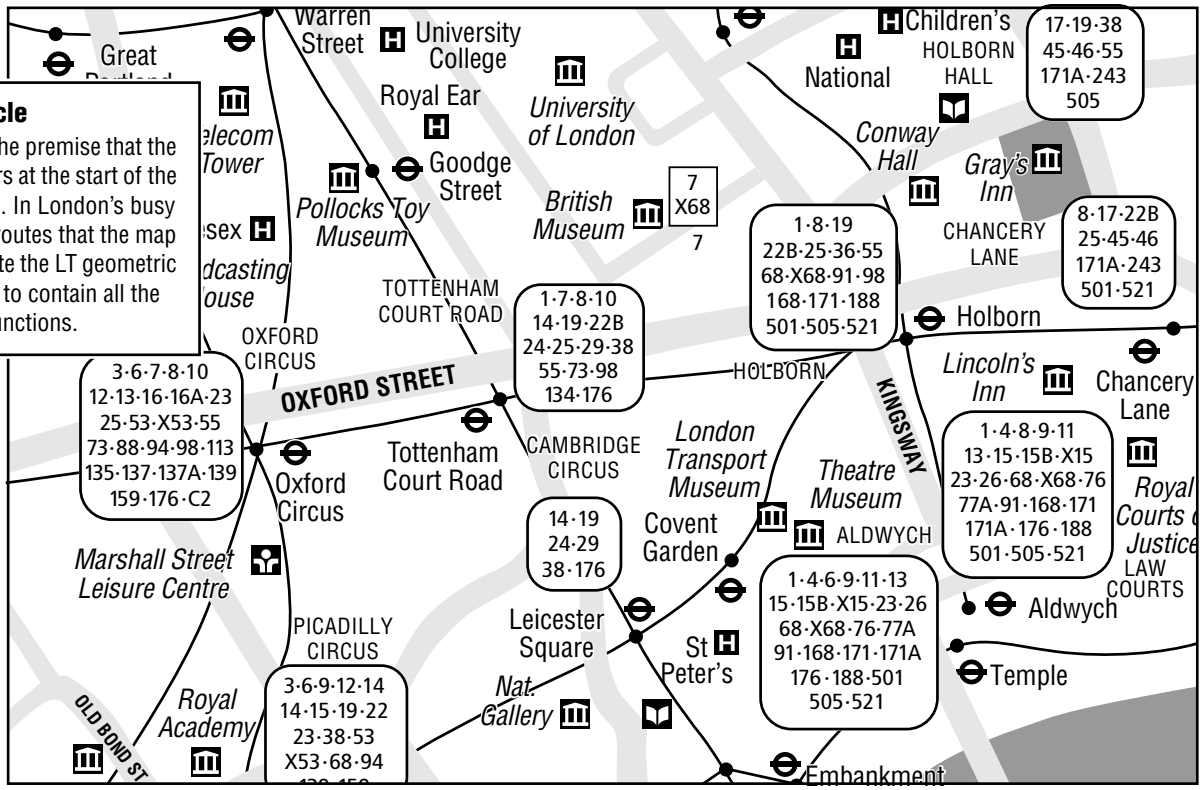
John explained that he is not convinced that a diagrammatic approach, what is technically known as a **topographical transformation**, works with buses as it does with underground route maps or railways, in which it does not matter where you are between stations. With buses it matters a lot. You need ground references: street names, pubs, parks, and so on.

Criticising a 'topographically transformed' bus map of Bournemouth, John commented:

■ 'They have gone to the trouble of putting 22 colours on the map, to distinguish between their routes, but it wouldn't give me much security travelling around Bournemouth.'

From disc map to squircle

The disc map is based on the premise that the user will match the numbers at the start of the route with those at the end. In London's busy centre, there are so many routes that the map becomes congested, despite the LT geometric innovation of the 'squircle' to contain all the numbers at critical route junctions.



■ 'You have the problem of congestion where the routes meet in the centre, so they have put this helpful little diagram to show where the bus stops are in the middle of Bournemouth and how the routes radiate out from there. But it is unsettling, because the number of roads disappearing from the edge of that box is different to the number on the main map!'

Instead of diagrams, John prefers maps such as the example he showed next, which uses colour coding for routes, but which groups routes with a shared colour if they parallel each other for most of their length. 'If I sound a bit gushing about this map it is because it is the only item I have shown you in whose genesis I have played any part. It is my home town, and I drew the first crude sketch in felt pen and coaxed the County Council into getting it done professionally.

'One of the problems was trying to show weekday and Sunday networks on the same map, which is bound to be confusing; we left out the Sunday routes, which are on a different map.'

Insets for busy centres

A common problem is the need to show a wide area of relatively bus-free countryside, and the urban area where the detail is important. The usual way is to have an inset map of the centre. One example John showed even had an inset of an inset. To go from city centre to suburbs, you have to start with the inner map on the right hand side, relate that to what is underneath it and relate that to the main map itself.

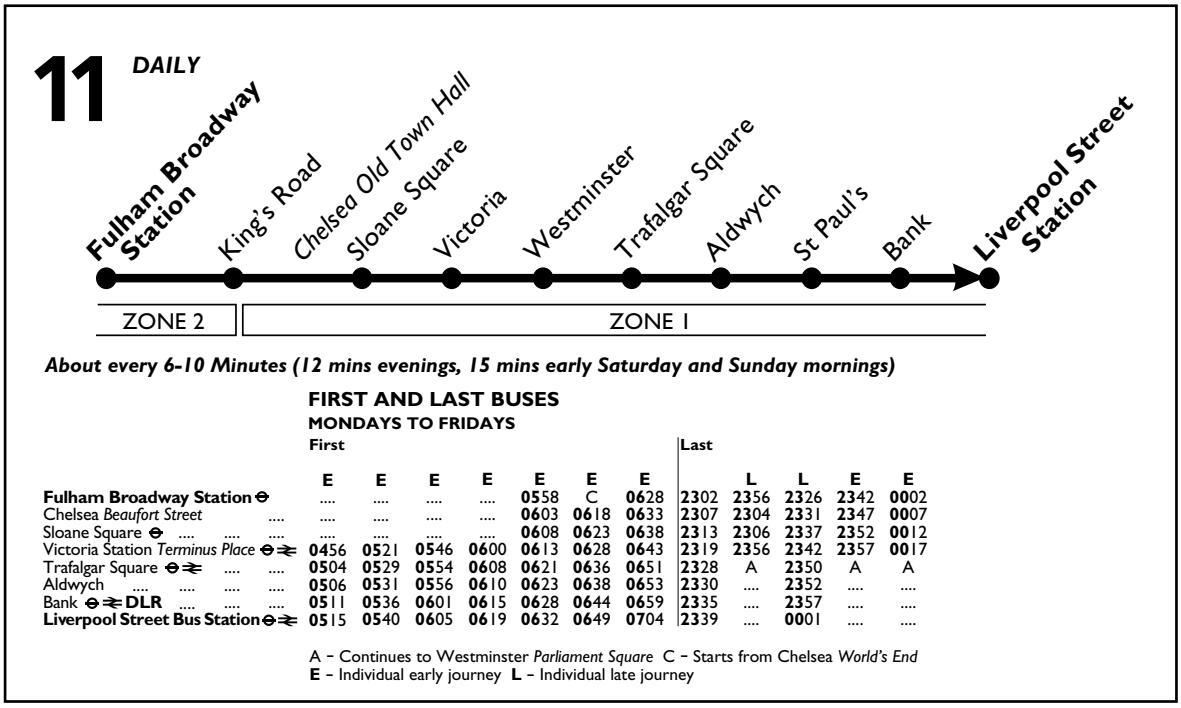
'My main concern is that the thing covers 20 square feet—if you want to refer to any part of the main map you have to open the entire thing. On a crowded bus or at a windy bus stop, it is not the way to make yourself most popular.'

The 'blob map' model

His next example was headlined, *An easy way to trace your routes*. The key feature of this form of map is that major junctions and stopping points are marked with great circles, containing the route numbers of buses which call at that point.

'Officially this is known as a **disc map**, but colloquially in the trade it is known as a "blob map". The theory behind it is that people are at A and need to be at B, therefore if you give them a list of all routes at A and all routes at B, all they have to do is to compare one list with the other to find all the routes that link them—where the bus is in between is immaterial, although you can always check the intermediate blobs if you want to.

'This blobbymania has ruled in London for more than a decade,' said John. 'Quite soon, the discs were supplanted by a new shape previously unknown to geometry —a square with rounded corners, which is therefore called a "**squircle**". The theory is that by using a squircle you get more numbers in the space it covers. In the centre you get squircles the size of Soho. Though a squircle on Elephant and Castle may be a favour to mankind, obliterating local detail in Soho is more regrettable; Oxford Street disappears under a row of them.



A typical bus-stop timetable for a 'high frequency' route in Central London does not bother to list journey times in the middle of the day, but only the first and last buses. Travelcard zone information is also displayed.

Controversially, London Transport uses the 24-hour clock.

(This illustration is not taken from the actual art, but is a simulation after an original supplied by John Cartledge. Saturday and Sunday data have been removed for reasons of space.)

'It is also in rather a trying orange tint, which I think is a relic of the era before computers had mastered the trick of reversing white out of colours; this was the only deep colour that you could print over in black ink and still be legible.

'I have to say regarding blob maps that everyone in the world has been out of step except us; although it has been the norm in London, the blob map has not been imitated anywhere else to my knowledge, except Hong Kong.'

London timetables

John's final topic was the bus-stop mounted timetables in London. Bus routes in London are divided into high- and low-frequency routes. High-frequency routes have five or more buses per hour, and most of them are in Inner London. The timetable for these is simply a summary slip with a route diagram across the top, a narrative statement about frequencies, and actual times of the first and last few journeys (*see above*).

Researchers tried to see if they could avoid the off-putting nature of matrix diagrams by simply listing the places served and making general statements about frequencies. People felt disquiet at the fact that without running times there is no indication of how long a journey will take.

For lower frequency routes, a matrix diagram of running times is unavoidable.

Researchers have also tried to make matrix timetables less intimidating by removing redundant information: for instance, does one need to know times for places the bus has been *before* the stop you are at? But producing such 'stop-specific' timetables would pose huge problems both in production and inventory control, given that London has 17,000 bus-stops!

A further development has been the modification of the route diagram by adding the approximate journey time in minutes between adjacent points along the route (*see opposite*). 'That's fine if you are going from Elmers End to Beckenham on the No 54; it takes about four minutes,' said John. 'But if you want to go from West Croydon to Woolwich on the same route, you must add up sixteen numbers in your head to figure out the journey time.' And he pointed out that these times can vary by a factor of as much as 100% depending on the time of day and the resultant traffic conditions; so inevitably in the interests of accuracy one is pushed back towards the matrix table of running times.

And the final result of these experiments? What is used now at London's bus-stops is a matrix timetable with a diagram; individual journeys are shown in detail where the running times are highly variable, with a summary statement such as *then at x and y minutes past the hour until…* where the timetable is in a 'repeater mode'.

Discussion

One topic which arose in discussion was whether there are a variety of needs that maps and timetables need to meet: for instance, to answer an immediate query about services (as one would expect to find at a bus stop), or to help a resident gain a picture of what services are available and how they fit together to create a total service. The latter is one of the strengths of the London

The lower-frequency routes in outer London are usually shown on complex matrix timetables. LT's designers tried to simplify the display in various ways: here, only start times from Woolwich are shown, with a strip map indicating the time between the main stops.

Arithmetically-challenged passengers find strip maps hard to use for calculating the duration of long trips, and in rush hours the data becomes quite fictitious!

(As on the previous page, this diagram is a simulation. Saturday and Sunday data are removed for reasons of space.)

54 West Croydon – Lewisham – Woolwich

Daily

West Croydon *Bus Station* ⇄	East Croydon Station ⇄	Addiscombe Road	Woodside	Long Lane	Elmers End Green	Beckenham	Beckenham Hill Station ⇄	Bromley Road *Catford Garage*	Catford	Lewisham	Blackheath Station ⇄	Blackheath *Royal Standard*	Charlton	Charlton Park Road	Frances Street	Woolwich
5	6	4	3	3	4	3	8	3	7	5	6	3	2	3	3	*Approx. journey times in mins.*
FARE ZONE 4 (5,6)								FARE ZONE 3							4 (5,6)	

Buses from **West Croydon** *Bus Station* ⇄

Monday to Friday

0641	0806	0906	1026	1226	1426	1550a	1650a	1750a	1920c	2140
0659	0816a	0916a	1046	1246	1446	1600	1700	1800	1940	2210
0714	0826	0926	1106	1306	1506	1610a	1710a	1815b	1955c	2240
0728	0836a	0936a	1126	1326	1515a	1620	1720	1832	2010	2310c
0746	0846	0946	1146	1346	1526	1630a	1730a	1848b	2040	2340c
0756a	0856	1056	1206	1406	1540	1640	1740	1905	2110	

a = Buses to **Lewisham** *Bus Station* only
b = Buses to **Catford** *Lewisham Town Hall* only
c = Buses to **Catford** *Bus Garage* only
All other buses run through to Woolwich

Underground map, but bus services are so much more complex that learning a bus network is a considerable intellectual challenge.

Research shows that some people are more oriented towards maps, and some more towards timetables. Different media may be required to cater for different 'cognitive styles'.

Most people know only a handful of bus routes intimately, and indeed will travel by circuitous routes in order to stay with the services with which they are already familiar.

One member of the audience asked about the occasional practice of putting the route-plan in simplified form on the side of the bus, and/or inside the bus, in place of advertising. Did this help? Clearly yes, said John, and it is a strong feature of the Paris system; but one can do this only where specific vehicles remain bound to specific routes, and London garages maintain a pool of vehicles which are assigned to routes in a flexible fashion.

Technology exists to provide an interactive kiosk which a traveller can use to determine how to travel to a destination, and even have the advice printed out in a variety of languages: an example of this is in service at Waterloo Underground station. But the Waterloo system is based on the assumption that one is departing from Waterloo, whereas a comprehensive system defining routes between all of London's 17,000 bus-stops would have to cover approximately 290 million possible permutations of routes between them!

The Superbrain at Broadway

There *is* a system which can crack this problem, currently being installed at 55 Broadway (the London Transport headquarters). It is based on a powerful Geographical Information System and will be used to assist staff who answer telephone enquiries about travel. Whether it will ever be possible for members of the public to access this system by computer terminal was not yet clear.

The other new technology causing excitement in this area is the electronic display at the bus-stop, stating the predicted time to the arrival of the next bus and its route number and destination (for example, near The Nag's Head, Islington). Such systems require a means of collecting data about the current location of buses, through satellite positioning or radio triangulation.

At the end of the day, such high-technology means are too costly to be supported by the bus industry in its current state, and also offer tempting and expensive targets for vandalism. Paper timetables and bus maps will be with us for a long time to come—as will be the subject of how to design them better. ■