



Static timetables: a relic of the past?

A study of changing conventions in travel information design: comparing printed bus timetables with their digital counterparts

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Abstract

This dissertation investigates approaches by Reading Buses to visually present temporal tabular information in the context of user-facing material over time. The dissertation specifically focuses on analysis of the user experience in the context of planning – and then following – a journey over the bus network in Reading.

As a result of a limited amount of research existing in this field, the dissertation first completes a literature review; based on this review, a framework through which bus timetable analysis can take place is presented. The introduction of a new framework specifically useful to the visual analysis of bus timetables ensures that the discussion of research questions remains focussed and based on the visual evidence.

Later, the comparative review between visual presentations both digitally and on print suggests that – whilst dynamic digital display has certain advantages over printed ephemera – the attention to the quality of the user experience in printed ephemera is much higher. Digital timetables, particularly with the representation of the network, it appears, still have much to do to match this quality, despite the clear shortcomings of a paper format when relating information such as real-time information and readily-accessible route information.

Introduction

This dissertation presents a close comparative analysis of bus timetable information design in the period between 1980 and 2025, with a primary concern for the shift of document format – from printed matter to dynamic digital display. I will investigate how this has affected the user experience – from the user's decision to take the bus to their arrival at the destination – through a formal analysis of the textual features of timetables by the development of a framework.

To meet the comparative criterion, I will assess these features across printed and digital examples, divided by time and theme. I will then consider how changing conventions in the representation of these textual features has changed the user experience, and then critically reflect – based upon my conclusions – about whether (or not) these changing conventions have enhanced or improved the user experience over time.

Defining a timetable

We must first define the scope for our investigation into travel information design. Literature is poor at indicating the ultimate purpose of a timetable. Ebester notes that a timetable is 'an arrangement of information, designed to show when events happen'¹; whilst true, this definition appears slightly too vague; with this definition, for example, one could include storybooks and novels; after all, they meet the same criteria. White's analysis of the timetable is more convincing: grouping it with such other aids as fare information, he argues it exists to disseminate information in order to provide a lack of uncertainty to the public transport user.² Whilst the concept of *helping the user* returns frequently when discussing timetables, and indeed in wider public transport policy,³ this definition feels too broad and unfocused on the core issue of planning journeys with an understanding of the times at which they may be made.

A combined definition is more satisfying and allows us to include modern items under the umbrella of 'timetable'. We can say that they are a user aid (to assist with the planning of transit over a network of public transport) with respect to time. Thus, this meaning can be taken to include modern digital displays which help the user to plan their journey in much the same way as a printed timetable functions, but excludes other assistance provided to the user in a graphic way (for example, with fare information, as White notes).⁴

¹ Ebester, M. (2009), 'Designing time: the design and use of nineteenth-century transport timetables', *Journal of design history*, 22.2, p.93

² White, P. (1995), *Public transport: Its planning, management and operation* [third edition]. London: UCL Press. pp.136–137

³ See for example Simpson, B. (1994), *Urban public transport today*. London: E & FN Spon. Practically the whole book revolves around meeting user needs with policy matters.

⁴ It is interesting to note that in many modern publications the fare information is presented in the same volume as the timetable. Indeed, many of the examples looked at in this dissertation are branded as 'Bus guides' and feature yet further information for the user, such as the telephone number of the bus company and links to access service updates. It therefore seems that a 'timetable' as a discrete item does not really exist, but similar objects will continue to be referred to as such in this dissertation to avoid confusion.



Figure 1 The route name is presented across the user experience – here, on a bus blind. See footnote 7.

Mockup of bus blind on the TfL operated route 38 bus

Author provided

Bus blind adapted from TfL Press image, available at flickr.com/photos/tflpress/7677647786/sizes/l/; accessed 27 Feb 2026

The underpinnings of a bus timetable

In this section, we explore the elements of a bus timetable and their importance in the passenger's user experience. In *Planning for public transport*, White argues that public transport has come to be 'essential' in cities worldwide;⁵ but to use this essential service users must first consult a timetable. In the *Public transport* journal, Liebchen and Stiller argue that timetabling and scheduling have a 'prominent influence on the customers' satisfaction' with the service provided,⁶ and it therefore follows that the way in which passengers read this information is exceptionally important. It is also expedient to understand what form that information takes, so that it can later be analysed and assessed.

Based on the definition arrived at for the purpose of this dissertation, this section defines the core components of 'timetable' design. To illustrate how these might appear, both digital and physical exemplars (Figure 2 and 3) are provided.

1 Route name

The route name denotes the name, or number, of the service for which information is then provided. In doing so, it acts as a title for the page. When among many similar buses on a busy street, the route name or number is imperative, as it often features on the blinds of the bus⁷, as demonstrated in Figure 1 opposite.

2 Route map

The route map shows a generally nodal overview of the route of the bus, where the stops of the bus are nodes and the transit between them lines. The lines may be represented geographically, as in Figure 2, or schematically, as in Figure 3. Authors disagree with whether or not it should be featured as part of a 'timetable';⁸ however, as it meets the definition of a timetable previously set out (specifically, it being a 'user aid, with respect to time'), it is included in this dissertation. The route map may, of course, be omitted, placed on another page, or follow a different convention in its illustration.

3 Indication of direction of travel

Buses necessarily operate in only one direction at a time, and as such, departure times for a specific timing point cannot be the same for both directions. It follows that the timetable, in whatever form, must indicate the direction of travel.

4 List of times (or other denotation)

The list of times presents the departure, arrival, or a mix of departure and arrival, times for a specific service. For reasons of space, particularly on print, the list of times is usually presented in relation to a specific stops present on the service known as a 'timing point'⁹ instead of all the stops the bus could possibly make on the journey. The temporal information comprising the list of times could be of any format – on Figure 2, for instance, it is displayed in terms of relative time for the next hour; after the hour and at all times on the print example, however; the format is absolute. Information on frequency or start and end times of service fulfil this role, too.

5 Notes (including real time notices and unusual stopping points)

Buses do not necessarily follow the same physical route or set of times for all journeys listed in a particular timetable. Thus, this keyword refers to how timetables demonstrate a change in regular service or delays. This also refers to how the timetable communicates its changes to service on entire days. In the app example, such a notice is provided above the list of times and is able to be dynamically changed. In Figure 3, the notes are more formally presented with a set of codes and a legend which translates between the two types of information.

⁵ White, P. (1976), *Planning for public transport*. London: Hutchinson & Co.. pp35–36

⁶ Liebchen, C. and Stiller, S. (2008), 'Delay resistant timetabling', *Public Transport*, 1.1. pp55–72.

⁷ A bus blind is the display that exists at the front of the bus above the windscreen. See e.g. Armstrong, I (2026), Bus blinds. Available online at ondobuses.co.uk/routes/blinds.html; accessed 19 April 2026.

⁸ For example, in *Accessibility and the bus system*, the authors separate timetables and route maps in their analysis of information along the user experience, which they call 'the journey chain'. See Caiafa, M. and Tyler, N. (2002), 'Information and communication along the journey chain'. In: Tyler, N. (2002), *Accessibility and the bus system: from concepts to practice*. London: Thomas Telford Publishing, p244.

⁹ For a more thorough explanation of timing points, see reading-buses.co.uk/faqs. It appears that for longer routes, or routes with many tightly-spaced stops, it is not economical to supply a full list – even online, unless action is taken by the user. Accessed 27 Feb 2026.

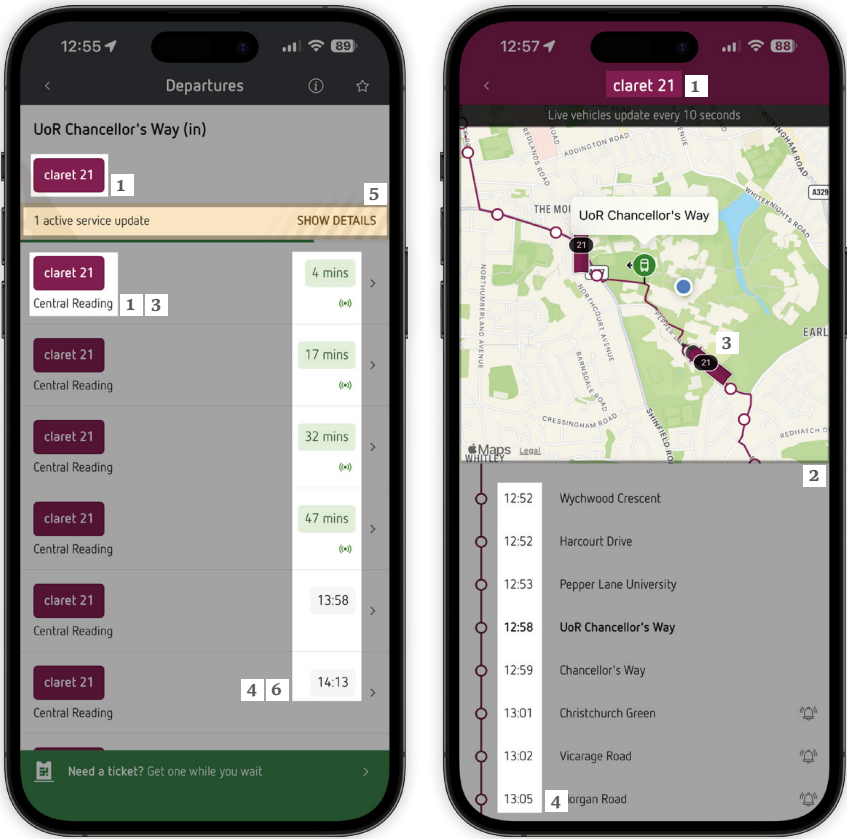


Figure 2 Two screenshots from the Reading Buses app, illustrating how features are visually presented on 'timetables'

Screenshot of Reading Buses app: departures and route overview
[with layer mask to identify features]
Published by Reading Buses (2026)
Mobile phone size 77mm × 160mm; shown here at 69%
Author-provided image; accessed 18 April 2026

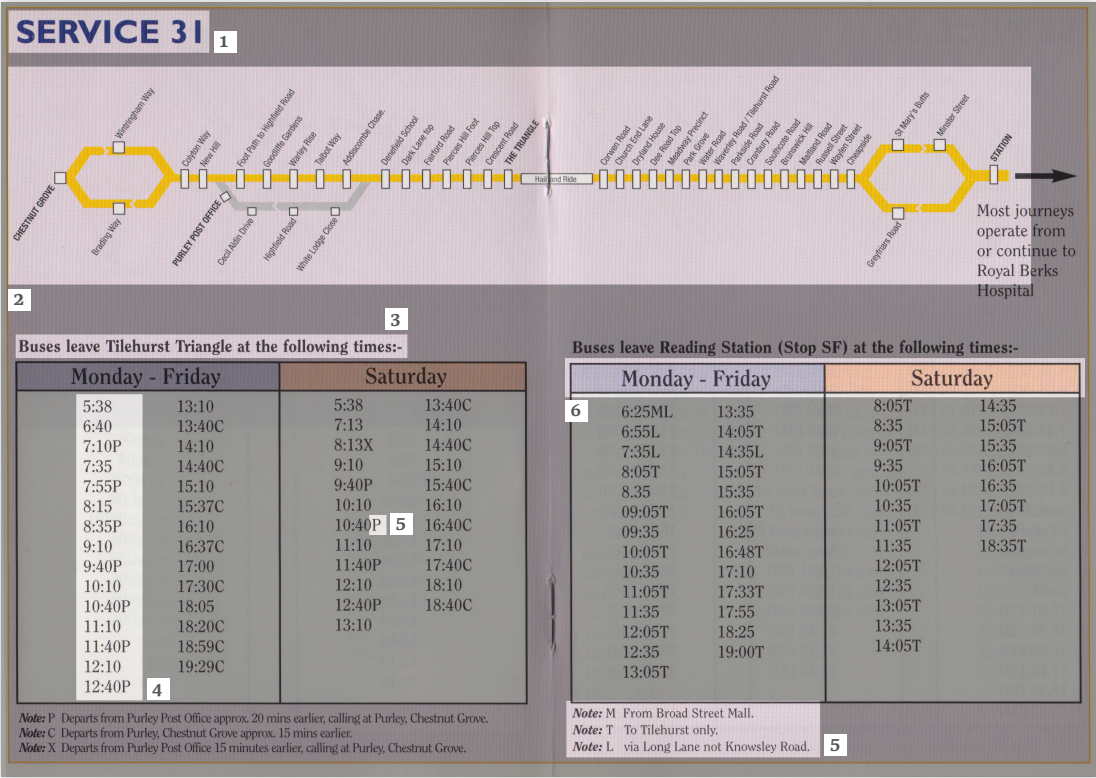


Figure 3 Illustration of timetable features in print.

Bus guide: West Reading and Tilehurst
[with layer mask to identify features]
Published by Reading Buses (2000)
Spread size 210mm × 148mm; shown here at 69%
Reading Central Library: Bus Ephemia box

The historical context of timetable design

To understand the timeline on which examples presented in this paper sit, it is important to consider the historical context of the subject matter from a cultural – and design – perspective. It is hoped that such an understanding will be able to underpin arguments and assist the creation of aids to review the development of Reading Buses' timetables.

The literature available for critical review is, however, scarce. In his analysis of nineteenth century timetables in his 2009 paper, Ebester propounded that the reason for this is a historical lack of interest in ephemera,¹⁰ coupled with the inevitable disposal of the documents once they had run their course. As seen in Figure 4, it is self-evident that timetables are ephemeral – because they only ever display a snapshot of information, they become invalid at their point of expiry.

Rickards' *Encyclopedia of Ephemera* provides a concise overview of the subject, reinforcing the timetable's presence on the ephemera category: early timetables resided in the unlikely home of the newspaper, accompanied by adverts, and the publication was later taken on by independents. Rickards' reflection that many passengers 'professed their inability to read timetables'¹¹ implies a distrust of the timetable from a cultural perspective. It is later argued by Ebester that timetables since 1914 'have considered passengers' needs,¹² even if only to a limited extent', implying that this distrust of such ephemeral material may continue to the present day because of the continuation of design features.

¹⁰ Ebester, M. (2009), 'Designing time: the design and use of nineteenth-century transport timetables', *Journal of design history*, 22.2, p.93

¹¹ Rickards, M. (ed.) (2000), 'Timetable', in *The Encyclopedia of Ephemera*. London: British Library, pp.327–28; specifically p.327.

¹² Ebester, M. (2009), 'Designing time: the design and use of nineteenth-century transport timetables', *Journal of design history*, 22.2, p.110

REID'S A B C TABLES.

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WHITLEY.
From Central Station.
0 miles. Pop. 1,350
Fares—1/3, 1/1, 1/8
Return—2/0, 1/5, 1/1

New.	Whit.	Whit.	New.
dep.	arr.	dep.	arr.
7 0	7 39	7 28	8 8
7 45	8 24	8 23	8 55
9 40X	9 8	9 53	9 32
9 48X	10 19	10 20X	9 30
10 35	11 19	10 18X	10 48
11 0	11 39	11 8	11 53
1 5	1 42	11 50	12 30
1 40	2 39	2 15X	3 18
2 30X	2 59	2 15X	3 45
4 0	4 39	3 48	4 28
4 45X	5 14	5 23X	5 53
5 7	5 46	5 45	6 25
5 50X	6 19	6 30X	7 0
6 20	6 59	7 18	8 3
7 5X	7 44	8 30	9 0
7 30X	7 59	8 48	9 28
8 5	8 44	9 58	10 38
9 20	9 59	..	..
10 45	11 24	..	..
..	..	..	..

* Stops at Wallaseid.

New.	Whit.	Whit.	New.
dep.	arr.	dep.	arr.
7 0	7 39	7 28	8 8
7 45	8 24	8 23	8 55
9 40	9 8	9 53	9 32
9 48	10 19	10 20	9 30
10 35	11 19	10 18	10 48
11 0	11 39	11 8	11 53
1 5	1 42	11 50	12 30
1 40	2 39	2 15X	3 18
2 30	2 59	2 15X	3 45
4 0	4 39	3 48	4 28
4 45	5 14	5 23	5 53
5 7	5 46	5 45	6 25
5 50	6 19	6 30	7 0
6 20	6 59	7 18	8 3
7 5	7 44	8 30	9 0
7 30	7 59	8 48	9 28
8 5	8 44	9 58	10 38
9 20	9 59	..	..
10 45	11 24	..	..
..	..	..	..

From New Bridge St.

New.	Whit.	Whit.	New.
dep.	arr.	dep.	arr.
7 0	7 39	7 28	8 8
7 45	8 24	8 23	8 55
9 40	9 8	9 53	9 32
9 48	10 19	10 20	9 30
10 35	11 19	10 18	10 48
11 0	11 39	11 8	11 53
1 5	1 42	11 50	12 30
1 40	2 39	2 15X	3 18
2 30	2 59	2 15X	3 45
4 0	4 39	3 48	4 28
4 45	5 14	5 23	5 53
5 7	5 46	5 45	6 25
5 50	6 19	6 30	7 0
6 20	6 59	7 18	8 3
7 5	7 44	8 30	9 0
7 30	7 59	8 48	9 28
8 5	8 44	9 58	10 38
9 20	9 59	..	..
10 45	11 24	..	..
..	..	..	..

SUNDAYS.

9 5	9 33	9 49	10 17
10 5	10 33	1 39	2 7
2 30	1 58	2 39	3 7
2 40	2 38	3 39	4 7
3 30	3 37	4 39	5 7
5 5	5 48	6 39	7 7
7 5	7 43	7 44	8 12
8 40	8 38	8 44	9 12
9 20	9 48	9 54	10 22

WIGTON.

7 1/2 miles. Pop. 9,133
Fares—9/8, 8/5, 5/11
Return—19/6, 18/1, 11/11
See page 25.

WIDDRINGTON.
23 miles. Pop. 764
Fares—3/2, 2/8, 1/11
Return—6/4, 5/4

New.	Wid.	Wid.	New.
dep.	arr.	dep.	arr.
8 50	9 23	8 6	Sats.
10 25	11 27	8 15	9 25
1 25	2 25	1 15	12 15
3 30	Sats.	3 20	4 35
4 30	Sats.	4 20	5 40
6 30	7 31	8 45	9 47
8 45	9 49	..	..
..	..	..	..

SUNDAYS.

8 0	9 5	8 8	9 30
6 30	7 33	7 41	8 50

WIGAN.

14 1/2 miles. Pop. 48,194
Fares—33/6, 18/2, 12/5
Return—43/1, 33/4, 24/1

New.	Wign.	Wign.	New.
dep.	arr.	dep.	arr.
7 45X	1 2	2 53X	8 55
9 30X	2 59	3 33X	12 0
10 5X	3 32	10 29X	1 50
12 50X	6 19	11 17X	4 7
1 43X	7 20	11 17X	4 57
* 3 0X	8 17	12 49X	8 0
4 0X	9 25	12 49X	9 0
* 4 45X	11 22	3 11X	9 12
11 10X	9 5	4 29	9 55
..	..	8 7X	3 5

* Via Carlisle.

† Via Sunderland.

SUNDAYS.

p.m.	a.m.	p.m.	a.m.
11 10X	9 5	3 0X	5 58

WILLINGTON QUAY.

Via Riverside Line.

See page 7.

7 miles.

Fares—9/-, 7/-, 5/-

Return—1/6, 1/2, 1/9

WILLINGTON.

Near Durham.

22 1/2 miles. Pop. 5,006

Fares—3/4, 2/8, 1/10

Return—6/8, 5/6, 3/3

New.	Will.	Will.	New.
dep.	arr.	dep.	arr.
5 10	6 43	8 30	9 35
7 45X	8 36	10 25X	11 23
10 30X	10 56	1 45	2 55
10 40	11 53	3 55X	4 57
14 5X	2 36	5 15	6 15
4 0X	4 46	7 5X	8 0
5 12	6 24	..	..
7 15	8 4	..	..

SUNDAYS.

6 30	7 49	8 30	10 0
5 29	6 43	7 55	9 25

WINDERMERE.
See also pages 13 and 30.
10 1/2 miles. Pop. 5,332
Fares—15/2, 12/1, 8/3
Ret. 1 mo. 22/10, 22/1, 16/11

New.	Wind.	Wind.	New.
dep.	arr.	dep.	arr.
* 5 10	10 37	9 25	3 36
* 9 30X	2 17	1 15	6 40
10 15X	4 49	3 33X	5 40
10 25X	6 10	11 17	4 7
* 1 45X	6 7	..	..
* 3 0X	8 57	..	..
* 4 0X	8 57	..	..

* Via Barnard Castle.

WINGATE.

30 miles. Pop. 5,949

Fares—4/2, 3/4, 2/6

Return—8/4, 6/8, 4/2

New.	Win.	Win.	New.
dep.	arr.	dep.	arr.
7 45	8 4	7 56	9 30
10 40	12 24	9 49	11 23
2 35X	3 52	2 34	3 40
5 12	6 55	6 41	8 0
7 8	8 28	..	..

SUNDAYS.

6 30	9 17	7 7	10 0
7 40	8 22	5 32	7 15

WINSTON.

For Staindrop.

49 miles. See page 13.

Fares—6/7, 5/6, 4/4

Return—13/2, 11/1, 7/-

WITTON-LE-WEAR.

33 miles. Pop. 2,469

Fares—4/5, 3/6, 2/8

Return—8/10, 7/4, 4/7

New.	Wit.	Wit.	New.
dep.	arr.	dep.	arr.
9 10	8 6	7 42	9 30
10 5X	11 38	9 11X	11 23
1 45X	3 43	1 11	2 55
4 0X	5 1	5 38X	8 0
5 12	8 6	7 15X	9 12

* Via Darlington.

SUNDAYS.

a.m.	a.m.	p.m.	p.m.
6 30	8 20	6 5	9 25

WITTON GILBT.

20 miles.

Fares—2/11, 2/4, 1/8

Return—5/10, 4/8, 2/10

See page 25.

WITTON PARK.

See Etherley.

See page 12.

WOODBURN.

37 1/2 miles. Pop. 681

Fares—6/8, 5/5, 3/11
Return—11/2, 8/11, 5/11
See pages 7 and 26.

WOLVINGHAM.
3 1/2 miles. Pop. 7,895
Fares—5/4, 4/5, 3/3
Return—10/8, 3/10, 5/9

New.	Wols.	Wols.	New.
dep.	arr.	dep.	arr.
5 10	8 19	7 30	9 30
10 5X	11 51	8 59X	11 23
1 43X	3 36	12 59	2 55
4 0X	6 4	4 26X	8 0
5 12	8 19	7 3X	9 12
..	..	..	..
..	..	..	..

SUNDAYS.

a.m.	a.m.	p.m.	p.m.
6 30	8 19	9 25	9 25

* Via Darlington.

WOLVERHAMPTON.

19 1/2 miles. Pop. 131,587

Fares—27/5, 22/5, 16/7

Ret. 1 mo. 54/1, 44/5, 33/2

New.	Wol.	Wol.	New.
dep.	arr.	dep.	arr.
1 42X	11 33	3 33X	12 0
* 7 45X	3 10	9 25X	4 7
10 5X	5 32	9 25X	4 57
12 50X	8 30	10 15X	8 0
1 43X	10 43	12 0X	9 12
4 0X	1 5	* 22X	10 53
7 8X	2 5	3 59X	12 33
..	..	6 15X	1 52
..	..	10 40X	5 58

* Via Sunderland.

SUNDAYS.

1 42X	2 0	3 38	9 25
6 30	6 28	10 40	5 58
p.m.	a.m.	10 40	5 58
7 8X	2 5	..	..

WOLVINGHAM.

Via Midland.

Fares—27/5, 16/7

Ret. 1 month. 54/1, 33/2

New.	Wols.	Wols.	New.
dep.	arr.	dep.	arr.
1 42X	1 37	3 33X	4 7
9 30X	4 38	7 55X	4 57
10 5X	6 24	10 25X	5 11
12 50X	8 30	11 15X	9 12
1 10X	8 30	3 59X	12 33
..	..	5 20X	3 5
..	..	8 50X	5 58

SUNDAYS.

p.m.	a.m.	p.m.	a.m.
11 10X	2 26	2 40X	5 58

WORKINGTON.

Via Bishop Auckland.

See page 25.

53 miles.

Fares—12/11, 10/5, 7/9

Ret. 1 mo. 25/6, 20/7, 15/6

New.	Work.	Work.	New.
dep.	arr.	dep.	arr.
6 25	10 47	8 20X	12 2
10 15X	3 7	10 49X	4 25
4 45	9 17	3 19X	40

SUNDAYS.

p.m.	a.m.	p.m.	a.m.
7 15	7 39	9 8	8 45

WORCESTER.
Via Midland.
23 1/2 miles. Pop. 30,069
Fares—31/9, 26/1, 19/5
Return—53/4, 49/1, 36/10
See pages 34 & 35.

WYLM.

8 miles.

Fares—1/2, 1/1, 0/8

Return—2/4, 2/2, 1/2

New.	Wym.	Wym.	New.
dep.	arr.	dep.	arr.
6 20</			

Figure 4 Ebester argues that the elements of design which have remained constant (such as matrix-based designs, which have been used consistently on timetables since their very introduction) could be reviewed in light of research detailing 'demonstrable flaws' in them. Whilst it is not this dissertation's aim to evaluate timetable design, it is nevertheless interesting to note how other authors characterise the user experience of historic timetables.

Page xxxi from Newcastle-based Reid's railway guide and north-east coast ABC timetable
Originally published by Andrew Reid (1886)

Copyright © British Library Board. All rights reserved.
Reference PP.2500.NK

Reproduced and sourced from journal. See Ebester, M. (2009), 'Designing time: the design and use of nineteenth-century transport timetables', *Journal of design history*, 22.2, p.91–113
190 x 155 mm; shown here at 58%

13 Thelen, K. (1979), 'Communication considerations for transit route and schedule brochures', *Transport Research Record*, 735, pp.23–27.

14 McCann, C. (1981), *An evaluation of information to be included in bus transit timetables* [PhD thesis]. Texas: Texas A&M University

15 Ebester, M. (2009), 'Designing time: the design and use of nineteenth-century transport timetables', *Journal of design history*, 22.2, pp.91–113

16 Improvements of note suggested by Thelen include a clearer map design, focussed on the stops (not the geography), clearer labelling of routes and stops, and better systems to deal with route deviations that use letters to codify information instead of symbols, which may be inaccessible or confusing. See Thelen, K. (1979), 'Communication considerations for transit route and schedule brochures', *Transport Research Record*, 735, pp.23–27.

17 For example, Bartram, D. (1984), 'The presentation of information about bus services', *Information design: the design and evaluation of signs and printed material*. Chichester: John Wiley & Sons, pp.299–319, or Bartram, D. (1980), 'Comprehending spatial information: the relative efficiency of different methods of presenting information about bus routes', *Journal of applied psychology*, 65.2, pp.103–110

18 Bartram, D. (1984), 'The presentation of information about bus services', *Information design: the design and evaluation of signs and printed material*. Chichester: John Wiley & Sons, p.300

19 Sollohub, D. and Tharanathan, A. (2006), 'A multidisciplinary approach toward improving bus schedule readability', *Journal of public transportation*, 9.4, pp.61–86

20 Sollohub, D. and Tharanathan, A. (2006), 'A multidisciplinary approach toward improving bus schedule readability', *Journal of public transportation*, 9.4, p.68

21 Bartram, D. (1984), 'The presentation of information about bus services', *Information design: the design and evaluation of signs and printed material*. Chichester: John Wiley & Sons, p.301

Visual critiques and recommendations: what's important in a timetable?

Although it is useful to understand the cultural perspectives of the timetable as an item, a more important subject to understand is that which the present subject is concerned: the user experience of the bus timetable. In comparison with the work published on timetables from a visual and cultural point of view, the repository of work published to explain such user needs and experiences when using timetables is much more expansive.

It appears that research regarding user needs, experiences and psychology took place most intensively in the 1970s to 90s. Whilst this represents some cause for concern – in that this period does not cover the introduction of real-time information and the digital display of timetable information – it is argued here that they remain critical to the study because the nature of public transport has not changed from when they were published. In other words, notwithstanding the medium of presentation, because people still use buses for transportation from one point to another (and such users need to know the timings of a bus), their needs will be broadly similar to the needs of passengers thirty to fifty years ago.

This repository of writing bears crucial fruit. Critical writings in journals, particularly by Keith Thelen of the Knoxville-Knox County Metropolitan Planning Commission, suggest that the contemporary timetables were poorly formatted and difficult for a new traveller to decipher; recommendations he made are shown in **Figure 5**.¹³ while McCann's PhD thesis, published in 1985, provides an abridged literature review from a variety of conferences and studies.¹⁴ Possibly having picked up the cultural perspective of the design of timetables like Ebester,¹⁵ the overall impression gained from this literature is that there was an effort to enhance user experiences of timetable by suggesting a variety of 'improvements' that could be made by changing the design of certain elements.¹⁶

Of particular note to the study of UK-based bus systems is the work of Bartram. Whilst the conclusions of *practitioners* such as Thelen are notable, Bartram's study of bus information design is generally firmly rooted in primary research, thus increasing the confidence with which one can agree with the arguments he presents.¹⁷ Bartram's suggestion of a 'reflected' design of timetable – where route is listed horizontally instead of vertically, and time is placed vertically instead of horizontally – is a repeated theme of his writing. Outside of this, Bartram has written about the types of information bus users desire, settling on 'information at the departure point', 'in-transit information', and 'supportive information', which he defines as information not required to complete a journey but that which provides reassurance.¹⁸

Several similar research projects have taken place which also assess to what extent the user experience is improved by the design of a timetable changing. In 2006, Sollohub and Tharanathan co-authored a paper where printed timetables in New Jersey were redesigned.¹⁹ Their study, however, lacked an application of previous pieces of writing to critically analyse historic (or even present) ways of presenting information. Indeed, the 2006 project surveyed twelve transport agencies against just three specific criteria; the authors themselves admit that this was 'unsystematic'.²⁰ This unsystematic review led to type size not being considered, and as such the results of the test suggested that participants in focus groups scored poorly at understanding timetables. In contrast, by *systematically* understanding past user experiences, it becomes possible to identify trends in information design over time, assessing to what extent an improvement has taken place – particularly with the introduction of digital means of accessing information. For bus companies, analysing user experiences in this way allows for future users to benefit from more considered design decisions when exposed to timetable information. Bartram also notes an economic case for better transit information.²¹

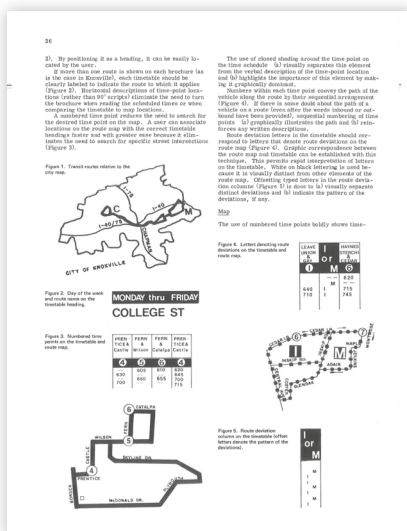


Figure 5 Thelen's numerous recommendations to the Knoxville-Knox County Metropolitan Planning Commission were published in a 1979 paper in *Transport Research Record*. Though the strategies to distinguish information are based on quantitative analysis of so-called 'schedule brochures', they demonstrate a keen typographic attention to layout and information.

Page 26 from Thelen's 1979 paper
Published by Transport Research Board (1979)

Page from journal. See Thelen, K. (1979), 'Communication considerations for transit route and schedule brochures', *Transport Research Record*, 735, pp.23–27. Specific page here p26.

Methodology

How will I begin to research this issue?

The focus of literature on the user – and the literature's resultant exploration into the core parts of a bus timetable with respect to the user – suggested that a user focus in my investigation would be beneficial. The wide body of literature that has been collected will be used to generate a framework which will be then used to answer research questions which will relate to the user.

My investigation will focus on analysing archival material related to a single bus company. As set out previously, it will investigate items that meet the criteria of 'timetable' only; and, as far as possible, it will disregard branding and other stylistic choices. Instead, it will analyse the presence of certain features and how they are designed.

Key outcomes my investigation will achieve

- This investigation will develop a framework in which to analyse and assess bus timetables in both a printed and digital context. The development of the framework will refer to published literature, particularly literature covered in the literature review, on travel information design. It will primarily deal with what components of a bus timetable are important to the user experience of the timetable as a whole. It will not, for reasons of clarity and scope, analyse other parts of the 'user journey' through the transit network.
- The investigation will then present a close empirical and comparative analysis of primary and secondary source material, based on the results of the developed framework, from the 1980s to the present day. The selection of 1980 gives the opportunity to assess whether timetables were affected by the aforementioned increase of research and literature at the time. The primary source material will be principally sourced from the archives of Reading Central Library, which covers printed ephemera from the 1950s to the present day. It will also use my own personal collection of Reading Buses printed material, dating from 2014 to the present day. For secondary source material for digital examples of 'timetables', the Internet Archive, as well as historic posts on social media, will be used. All of these archives are uncurationed, which helps develop a more critical standpoint.
 - Primary source material for the mobile app, particularly the first and second generation, is not generally available. Instead of primary source material, as far as possible I will use secondary source material. When neither primary or secondary source material can be found, a necessary gap will be displayed in the framework table, and conclusions of the research questions will be less confident.

My research questions

To guide my analyses and critical reflections I will refer to the following three research questions. These research questions will ensure that at all times throughout the dissertation I am focusing on the required points.

- 1 What are the formal textual features of bus timetables across time?
- 2 How have these features changed over time, particularly in the shift from static printed matter to dynamic digital display?
- 3 To what extent has this change enhanced or improved user experience?

Developing a framework

By referring back to the literature reviewed, it was possible to curate a list of textual elements that had the potential to affect the user experience of a given timetable, both digitally and physically. The resultant list allows for a framework to be developed which can then be used to analyse the timetables from a user-focussed perspective. Crucially, the framework will be used to ensure that the answer is at all times focussed on the research questions at hand: what features exist, how and why features changed, and to what extent the user experience was enhanced as a result of these changes.

- **Key route information**

- Presentation of key route information (bus route, name) – ²²(p.25); ²⁵(p.316)
- Presentation of operator name and contact information – ²²(p.25)
- Presentation of service availability on certain days – ²²(p.25–26)

- **Network overview**

- Graphic presentation of route (via use of schematic or geographic map) – ²⁵(p.303); ²⁶(throughout); ²²(p.26); ²²(p.76)
- Graphic relationship between network overview (the graphic presentation of route) and the presentation of temporal tabular data – supported by ²²(p.26); ²⁵(p.314); ²²(p.76)

- **Temporal tabular data**

- Presentation of route direction – ²²(p.27 [only supported somewhat]) ²²(p.72)
- Presentation of temporal tabular data, specifically departure and arrival time at a selected stop (with reference to Presentation of service availability on certain days) – ²⁵(p.314); ²²(p.24)
- Graphic accessibility of return journey – ²⁸(p.96)

- **Service deviations and delays**

- Presentation of real-time temporal data and relationship with scheduled times – ²⁷(p.336)
- Presentation of notices detailing changes, alerts, and closures – ²⁵(p.314); ²²(p.26)

The following pages represent the result (with respect to the framework) of the visual inspection of four thematic reviews. The thematic reviews are arranged roughly by major shifts in the design of timetables and the introduction of other mediums in which to represent time.

²² This category is supported by the referenced page in Thelen, K. (1979), 'Communication considerations for transit route and schedule brochures', *Transport Research Record*, 735, pp23–27.

²³ This category is supported by the referenced page in McCann, C. (1981), *An evaluation of information to be included in bus transit timetables* [PhD thesis]. Texas: Texas A&M University

²⁴ This category is supported by the referenced page in Ebester, M. (2009), 'Designing time: the design and use of nineteenth-century transport timetables', *Journal of design history*, 22.2, pp.91–113

²⁵ This category is supported by the referenced page in Bartram, D. (1984), 'The presentation of information about bus services', *Information design: the design and evaluation of signs and printed material*. Chichester: John Wiley & Sons, pp.299–319

²⁶ This category is supported by the referenced page in Bartram, D. (1980), 'Comprehending spatial information: the relative efficiency of different methods of presenting information about bus routes', *Journal of applied psychology*, 65.2, pp.103–110

²⁷ This category is supported by the referenced page in Brakewood, C. and Watkins, K. (2019), 'A literature review of the passenger benefits of real-time-transit information', *Transport reviews*, 39.3, pp.327–356

²⁸ This category is supported by the referenced page in Horne, M., Roberts, J. and Rose, D. (1987), 'Getting there: an assessment of London Transport's endeavour to improve bus passenger information literature for central London; part 2', *Information design journal*, 5.2, pp.87–110

No.	Category	The 1980s Moving away from monospaced solutions	The 1990s Working towards a visual identity?	Early 2000s Forgetting print? Going all-in online	Late 2000s to 2020s Real-time information and a more unified approach
0	Summary of format for each category of timetable in review period	<p>L c1987–1990 Each route had printed for it a 100mm × 210mm leaflet, accordion folded. The front cover for each was printed in colour and the inside pages in black and white.</p> <p>O No online presence.</p> <p>M No mobile app presence</p>	<p>L 1991–c2000 Each route had, again, printed for it a 100mm × 210mm leaflet, accordion folded. The front cover is printed in colour; the interior pages are in two colours, with a set of specific elements using colour inside. Towards the end of this thematic review, routes are compiled together based on their geographic location and in the same format.</p> <p>O No online presence.</p> <p>M No mobile app presence.</p>	<p>L c2000–2005 Timetable booklets are now a different size (105mm × 148mm) and are stapled. Each booklet features all routes for a specific area of Reading. They are now printed in full colour throughout.</p> <p>O 2000–c2008 Timetables appear online as single webpages for each route. Timetables</p> <p>M No mobile app presence.</p>	<p>L 2005–2025 Timetable booklets are again available for each route and are now fold-out instead of stapled. They again measure 105mm × 148mm and fold out.^a Printed in full colour.</p> <p>O c2008–2018 Early timetables in this period appear as static HTML pages with no Reading Buses branding. Later in the period, timetables appear as the same PDF files as used for print.</p> <p>O 2018–2025 A new website brings together the mobile app and the website. Timetables are presented as single webpages and as relative times away when selecting a stop.</p> <p>M 2014–2016 (1st generation) Real-time, relative-time timetables are introduced.</p> <p>M 2016–2019 (2nd generation) Individual buses are able to be tracked; timetables mainly appear as real-time information.</p> <p>M 2018–2026 (2nd generation) <i>Overlaps with previous solution</i> Individual buses are able to be tracked; timetables mainly appear as real-time information. Route planner introduced.</p>

No.	Category	Key route information			
		The 1980s Moving away from monospaced solutions	The 1990s Working towards a visual identity?	Early 2000s Forgetting print? Going all-in online	Late 2000s to 2020s Real-time information and a more unified approach
1.3	Presentation of service availability on specific days	<div><div>L</div>Written in block capitals above each 'table' detailing times.</div> <div><div>O</div>No online presence.</div> <div><div>M</div>No mobile presence.</div>	<div><div>L</div>Written reversed out of colour in block capitals above each table detailing times.</div> <div><div>O</div>No online presence.</div> <div><div>M</div>No mobile presence.</div>	<div><div>L</div>Written in coloured blocks that act as headings to each column of the temporal tabular information.</div> <div><div>O</div>Written in coloured italic type above individual examples of temporal tabular information.</div> <div><div>M</div>No mobile presence.</div>	<div><div>L</div>2005–2025 Written in coloured blocks that act as headings to the tables.</div> <div><div>O</div>c2008–2018 Written in bold type that acts as headings to the table.</div> <div><div>O</div>2018–2025 No distinction provided.</div> <div><div>M</div>2014–2016 (1st generation) No distinction provided.</div> <div><div>M</div>2016–2019 (2nd generation) <i>Unknown – no archive available</i></div> <div><div>M</div>2018–2026 (2nd generation) No distinction provided.^y</div>

2 Network overview

2.1 Graphic presentation of route (via use of schematic or geographical map)

2.1	Graphic presentation of route (via use of schematic or geographical map)	L	Not present on leaflet.	L	A straight line, ignoring geography, with all stops is provided with some highlighted. ^b	L	A straight line, ignoring geography, with all stops is provided with some highlighted. For stops that operate on one side of the road only, the block is made smaller and made to align to the side of the road the bus stops at.
		O	No online presence.	O	No online presence.	O	None provided on the <i>Timetable</i> page. ^c
		M	No mobile presence.	M	No mobile presence.	M	No mobile presence.

2.2	Graphic presentation of route (via use of schematic or geographical map)	L	A schematic map is provided with either all (urban routes) or selected (regional routes) stops shown. Stops are shown as discrete icons negating the need for a distinction of one-way stops	O	2008–2018	None provided on the <i>Timetable</i> page.
		O	2018–2025	A straight line, ignoring geography, with all stops is provided with times presented by the side. To the side, a line is overlaid onto a geographic map. This line has no stops highlighted except for the user’s currently selected stop. Overlaid are pictograms of live buses.		
		M	2014–2016 (1st generation)	Unknown – no archive available		
2.3	Graphic presentation of route (via use of schematic or geographical map)	M	2016–2019 (2nd generation)	A geographic map with all stops is provided. It is unknown how to access the stops. Overlaid are pictograms of live buses.		
		M	2018–2026 (2nd generation)	A straight line, ignoring geography, with all stops is provided with times presented by the side. To the side, a line (which has nostops highlighted except for the user’s currently selected stop) is overlaid onto a geographic map. Overlaid are pictograms of live buses.		

^a The highlighting is not explained in any ephemera but probably refers to destinations that the passenger can ask to go to (and pay a specific fare to get to).

^b Even though a map for each route could not be located, Reading Buses did develop a complete map showing all routes.

^c Even though a map for each route could not be located, Reading Buses did develop a complete map showing all routes.

c Even though a map for each route could not be located, Reading Buses did develop a complete map showing all routes.

Table 1 *cont* Overview table detailing findings from thematic review with respect to the framework developed earlier.

Continues overleaf

3.2	Presentation of temporal tabular data, specifically departure and arrival time (with reference to 1.3)				
		L c1987–1990	L 1991–c2000	L c2000–2005	L 2005–2025
		Provided in 12-hour clock format with times delineated by a full point. The 12-hour clock is not explained elsewhere in the leaflet. The temporal data is available for a range of stops across the route; each stop has listed (horizontally) all times that the bus stops there. Numerals are tabular and align vertically.	Provided in 12-hour clock format with explanation. The times are delineated by a full point. The temporal data is available for a range of stops across the route; each stop has listed (horizontally) all times that the bus stops there. Numerals are tabular and align vertically. (Starting c1997, provided in a 24-hour format).	Provided in 24-hour clock format with no explanation. The times are delineated by a colon. The temporal data is only available for the two terminus points, and lists (vertically) all stops at that terminus point. Numerals are tabular and align vertically, but times do not consistently have leading zeroes and so after 10:00 the times occupy more horizontal space.	Provided in 24-hour clock format with no explanation. The temporal data is only available for the two terminus points, and lists (vertically) all times that the bus stops there. Numbers are tabular and align vertically and times have consistent leading zeroes.
		O No online presence. M No mobile presence.	O No online presence. M No mobile presence.	O 2000–c2008 Presented as multiple tables stacked vertically. Provided in 24-hour clock format with explanation. The times are not delineated. The temporal data is available for a range of stops across the route; each stop has listed (horizontally) all times that the bus stops there. Numerals are tabular and align vertically.	O c2008–2018 Provided in 24-hour clock format. The temporal data is available for a range of stops across the route; each stop has listed (horizontally) all times that the bus stops there. O 2018–2025 When less than an hour away, provided in relative time vertically for each stop; when more than an hour away, provided in 24-hour clock format.
					M All generations except 2016–2019 When less than an hour away, provided in relative time vertically for each stop; when more than an hour away, provided in 24-hour clock format.

Table 1 cont Overview table detailing findings from thematic review with respect to the framework developed earlier.

Continues overleaf

No.	Category	Key route information			
		The 1980s Moving away from monospaced solutions	The 1990s Working towards a visual identity?	Early 2000s Forgetting print? Going all-in online	Late 2000s to 2020s Real-time information and a more unified approach
3.3	Graphic accessibility of return journey	<div><div>L</div><div>c1987–1990 Presented on same page below the first table. For longer timetables, the return journey flows onto other pages.</div><div><div>O</div><div>No online presence.</div></div><div><div>M</div><div>No mobile presence.</div></div></div> <div><div>L</div><div>1991–c2000 Presented on separate (often overleaf) pages.</div><div><div>O</div><div>No online presence.</div></div><div><div>M</div><div>No mobile presence.</div></div></div> <div><div>L</div><div>c2000–2005 Presented on the opposite page of the spread.</div><div><div>O</div><div>2000–c2008 Presented on the same page below or above the current set of tables.</div></div><div><div>M</div><div>No mobile presence.</div></div></div> <div><div>L</div><div>2005–2025 Presented on opposite page of spread. (Starting 2010, presented on opposite side of booklet)</div><div><div>O</div><div>c2008–2018 Presented on same page below or above the current set of tables.</div></div><div><div>O</div><div>2018–2025 Presented on a different page after the reverse stop has been selected.</div></div><div><div>M</div><div>2014–2016 (1st generation) Presented on different page after the reverse stop has been selected.</div></div><div><div>M</div><div>2016–2019 (2nd generation) <i>Unknown – no archive available</i></div></div><div><div>M</div><div>2018–2026 (2nd generation) Presented on different page after the reverse stop has been selected.</div></div></div>			

4 Service deviations and delays				
4.1	Presentation of real-time temporal data and relationship with scheduled times (with reference to 3.2)	L Not present on leaflet.	L Not present on leaflet.	L Not present on leaflet.
		O No online presence.	O Not present online.	O c2008–2018 Not present online.
		M No mobile presence.	M No mobile presence.	O 2018–2025 Where buses are able to be tracked, relative times are visible, indicated with a green box. Delays are not indicated and manual comparison with the schedule is required.
				M 2014–2016 (1st generation) No relationship to the scheduled time is present.
				M 2016–2019 (2nd generation) <i>Unknown – no archive available</i>
				M 2018–2026 (2nd generation) Where buses are able to be tracked, relative times are visible, indicated with a green box. Delays are not indicated and manual comparison with the schedule is required.

Table 1 cont Overview table detailing findings from thematic review with respect to the framework developed earlier.

Continues overleaf

No.	Category	Service deviations and delays			
		The 1980s Moving away from monospaced solutions	The 1990s Working towards a visual identity?	Early 2000s Forgetting print? Going all-in online	Late 2000s to 2020s Real-time information and a more unified approach
4.2	Presentation of notices detailing changes, alerts, and closures	<p>L c1987–1990 Deviations to service for specific schedules are detailed with a key (known in the timetable as a ‘code’) which uses symbols to connect specific points in the tabular display to textual notes.</p> <p>O No online presence.</p> <p>M No mobile presence.</p>	<p>L 1991–c2000 Deviations to service for specific schedules are detailed with a key (known in the timetable as a ‘code’) which uses letters to connect specific points in the tabular display to textual notes.</p> <p>O No online presence.</p> <p>M No mobile presence.</p>	<p>L c2000–2005 Deviations to service are detailed with a ‘note’ which uses letters to connect specific points in the tabular display to textual notes.</p> <p>O 2000–c2008 Deviations to service are detailed with a ‘code’ which uses letters to connect specific points in the tabular display to textual notes.</p> <p>M No mobile presence.</p>	<p>L 2005–2025 Deviations to service are detailed with either a label directly connecting to the times or typographic coding (usually with colour)</p> <p>O c2008–2018 Deviations to service are detailed with a ‘code’ which uses letters to connect specific points in the tabular display to textual notes.</p> <p>O 2018–2025 Deviations to services are not explicitly mentioned and must be manually compared to ascertain deviation. Some deviations are categorised into ‘service updates’ which appear as headings on the timetable pages they relate to.</p> <p>M 2014–2016 (1st generation) <i>Unknown – no archive available</i></p> <p>M 2016–2019 (2nd generation) <i>Unknown – no archive available</i></p> <p>M 2018–2026 (2nd generation) Deviations to services are not explicitly mentioned and must be manually compared to ascertain deviation. Some deviations are categorised into ‘service updates’ which appear as headings on the timetable pages they relate to.</p>

Table 1 cont Overview table detailing findings from thematic review with respect to the framework developed earlier.

Introduction to discussion

The discussion makes use of the framework table to answer questions two and three: how the formal textual features have changed in timetables, and the extent to which these changes have enhanced the user experience.

To link back to the table, each period with applicable items is discussed categorically, where the category is the heading of part of the framework table. In text, these categories take on the following format:

x	Reference to framework table	L	Time specified
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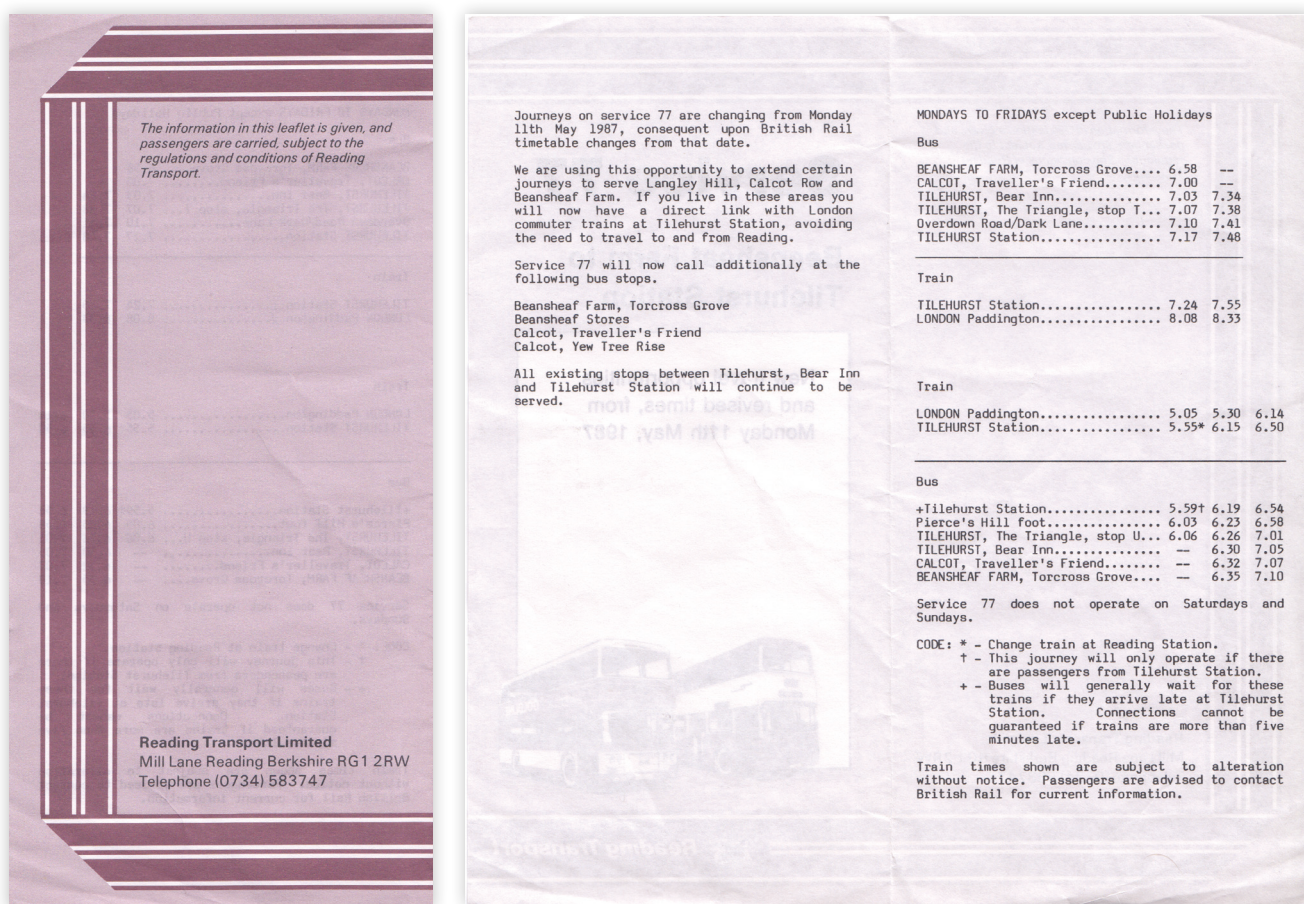


Figure 6 The exterior and interior of the service guide for route 77 (from Beansheaf Farm to Tilehurst Station). The timetable was printed on poor-quality paper and as such the front cover bleeds through and the typewritten nature of the type suggests little thought was employed to enhance or consider the user experience.

Service guide for route 77
Published by Reading Buses (1987)
200mm x 210mm; shown here at 55%
Reading Central Library: Bus Ephemeria box

The 1980s

Moving away from monospaced solutions

In this section, we answer part of question one in identifying the formal textual features of timetables in the period of the review. As this is the 'baseline' (as identified in the scope of the project) it is not possible as yet to answer questions two and three (a comparative review of the documents identified, and an explanation as to whether they have enhanced the user experience).

1 Key route information

L c1987–1990

As the framework informs us, the key route information is displayed in bold type on the front of the leaflet, the operator information is presented on the rear of the leaflet, and the key information surrounding service availability on specific days presented in block capitals above each item of tabular information.

It is almost impossible to make any other argument than that the placement of the key route information in **Figure 6** is appropriate and considered. It is curious to assess the choice of typeface, Helvetica; in Rowe's 1982 discussion of display typefaces, Helvetica Light scores highly; it is supposed that this can be down to lay readers becoming 'habituated' in this typeface.²⁹ The familiarity that users have with this typeface makes it a choice suited to the large audience we can assume timetables like this would be distributed to. The typefaces are also of a large size; size, according to Lonsdale, is an important component in the hierarchy, with larger sizes indicating greater importance.³⁰ It is interesting to consider what is more 'important' – the destination or the service number – in this example, but it is reasonably clear that they both hold significant importance as they are both significantly larger than the body type.

²⁹ Rowe, C. (1982), 'The connotative dimensions of selected display typefaces', *Information design journal*, 3.1, 30–37, specifically 36. The study focused on Helvetica Light, but the bold variant is in use in this leaflet. It is assumed that the use of bold does not negatively impact users' perceptions of the font.

³⁰ Lonsdale, M. (2014), 'Typographic features of text: outcomes from research and practice', *Visible language*, 48.3, p.52.



Figure 7 The front cover of the service guide for route 77 (from Beansheaf Farm to Tilehurst Station). See Figure 7.

Service guide for route 77
Published by Reading Buses (1987)
200mm × 210mm; shown here at 55%
Reading Central Library: Bus Ephemeria box

2 Network overviews

L c1987–1990

The framework indicates a lack of line diagram or other geographical aid to the user. Whilst the lack of a graphical map is likely a byproduct of the typesetting process the interior of timetables produced at this time enjoyed;³¹ whilst it is somewhat possible to argue that the vertical list of stops that the bus stops at functions as a crude network overview (as Bartram does³²) it is immediately apparent based on inspection that the sequential list does not qualify as a ‘map’ in the spirit in which this study is operating.

3 Temporal tabular information

L c1987–1990

The temporal tabular information is typeset in the same typewritten type as the rest of the interior, and there is very little typographic coding for the user to navigate the table with. The use of the 12-hour clock is acceptable – in 1984, three years before this timetable was published, Bartram proposed in that the 24-hour clock ‘cause[s] confusion’³³ – but there is a lack of distinction between the morning and afternoon in the table, as seen in **Figure 6**.

The temporal tabular information itself is of the ‘standard’ format; that is, the route presented on the vertical axis and the time on the horizontal axis. Despite the clear amount of space available, the route is truncated into only six stops, which are preceded the general location of them in block capitals. The timetable does not translate this block capital typographic coding into usable information – they could reasonably represent fare zones, closest population centre, or any number of other categories.

The return journey, an important component of the overall user experience, is displayed on the same page, below the outbound direction. No textual or typographic clues are provided to head the journey, and it is only implied that the opposite journey is taking place based on the vertical order of the route.

By virtue of no map existing, it is impossible to suggest there is any relationship between the network overview and the temporal tabular data.

4 Service alterations, delays and diversions

L c1987–1990

Technology for real-time bus tracking was only developed in the late 2000s,³⁴ so the first point of the framework is not applicable in this instance. Planned deviations to route and extensions are instead listed as ‘codes’ below the table; implied with symbols next to the location or time affected, the legend displays short statements of fact. The codes are presented traditionally with symbols readily available on a phototypesetter (*, †, etc.)

³¹ See e.g. Various authors. (2012). ‘A Monotype timeline’. *Eye*, 85. London: Eye Magazine.

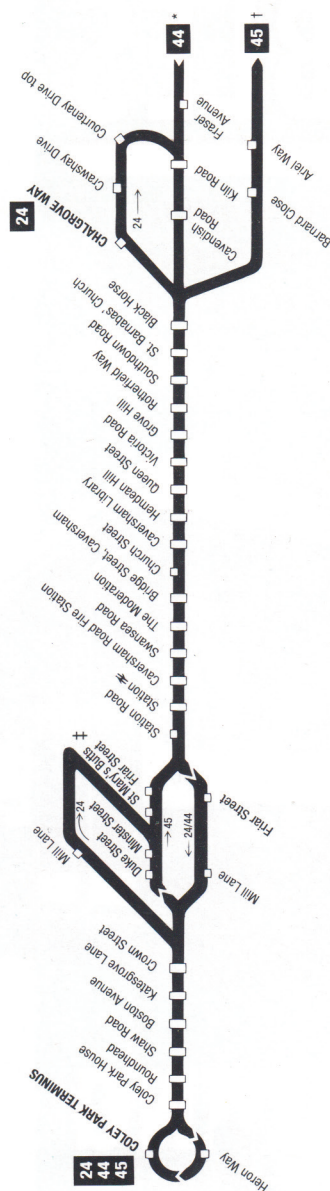
³² Bartram, D. (1980), ‘Comprehending spatial information: the relative efficiency of different methods of presenting information about bus routes’, *Journal of applied psychology*, 65.2, p.104

³³ Bartram, D. (1984), ‘The presentation of information about bus services’, *Information design: the design and evaluation of signs and printed material*. Chichester: John Wiley & Sons, p.315

³⁴ McHugh, B. (2013). ‘Pioneering open data standards: the GTFS story’, *beyondtransparency.org*. Available online at beyondtransparency.org/chapters/part-2/pioneering-open-data-standards-the-gtfs-story/; accessed 10 Apr 2026.

COLEY PARK-EMMER GREEN
via Reading-Hemdean Road

COLEY PARK-CAVERS HAM PARK
via Reading-Hemdean Road

245
24

* Service 44 from Fords Farm, Reading and Caversham Park

Service 44 from Farm, Reading and Caversham Park
at Service 45 continues via Caversham Park, Henley Road and Reading to Fords Farm

Buses departing from Reading Station to Coley Park at or after 2100 do not serve Friar Street, stop FQ but will observe Blagrove Street, stop FW instead

MONDAYS to FRIDAYS

[illegible]

SATURDAYS

[illegible]

Figure 8 The new decade bought substantial increases in the amount of information design presented to bus users. As seen here, the company increasingly used colour to visually communicate types of information to the user: here, for example, colour outlines the service availability. The route map was a new addition.

Service guide for routes 24, 44 and 45
Published by Reading Buses (1997)

210mm x 200mm; shown here at 100%
Reading Central Library: Bus Ephemera box

The 1990s

Working towards a visual identity?

Within wider bus policy, Reading Transport flourished in the 1990s. Following the deregulation of buses in 1986, the now arms-length body faced competition from new companies now able to operate buses in the Reading era.³⁵ In apparent response to the new competition, the organisation embarked on a name change (from Reading Transport to Reading Buses),³⁶ a livery change, and – crucially for this discussion – convincingly enhancing the user experience of its timetables.³⁷ The extent of the change is illustrated with the framework table and **Figure 8**.

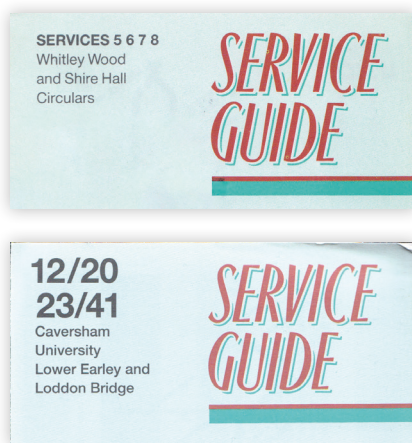


Figure 9 The change in presentation of key route information led to an enhanced user experience.

TOP Cropped edition of 1991 service guide
 BOTTOM Cropped edition of 1993 service guide
 All published by Reading Buses
 (top: 1991; bottom: 1993)

100mm × 45mm; shown here at 54%
 Reading Central Library: Bus Ephemera box

1 Key route information

L 1991–c2000

Possibly having read Thelen's recommendations from 1979,³⁸ the visual presentation of key route information changed significantly at the beginning of the decade. The resultant enhancement in the user experience is noticeable immediately with the printed timetables. As seen in **Figure 9**, the key route information is presented in bold type on the front of the leaflet, but by 1993 the textual 'service' had dropped off, and the services to which the leaflet related were as visually important – if not more for the choice of pure black type, against a tinted colour for the 'service guide' text.³⁹

In a move seemingly designed to meet Thelen's requirements to the degree, the service availability is reversed out on the header of the temporal tabular information. While the clarity that the bold type against the colour brings is somewhat weakened by the fact that it is against a light colour (in comparison to the black of Thelen's proposal), it is nevertheless effective: Lonsdale, in their review of typographic features in text, concludes that many researchers find that bold type, particularly against a dark background, attracts attention.⁴⁰ The enhancement is evident when considering that users' attention is more drawn to the service availability than before (where no such typographic coding was provided).

2 Network overviews

L 1991–c2000

A similar story emerges when dealing with the second set of results from the framework table – the network overview. The inclusion of a map is argued for by several authors⁴¹ (as previously discussed) and its visual presentation here, while not perfect, appears to be a logical progression of the development the timetable and is a clear milestone in the development of the wider user experience.

It is unwise – and outside the scope of the project – to review minute detail of geographical aids afforded to users over time; as the literature review identified, a great deal of studies have taken place on the subject of route maps alone. However, to answer the question of the development of the timetable and the possible enhancement of the user experience, an overview – principally with the aid's connection to the table – is required.

In 1987, a study of the then-new *London Bus Map* found deficiencies in several aspects of the map design; the closeness of subject and time mean that the same skeleton can be used to evaluate the success of Reading Buses' attempt.⁴² It follows that the map shown in the leaflet for a specific route is less detailed than its larger counterpart, but many of the same features can be identified in the bus network: multiple stops that can be used to interchange and overlapping routes.

Whilst it is not the case that Reading Buses needed to adopt the specific styling of the *London Bus Map*, the lack of any implied interchange points on the route map shown on the timetable means that they are unable to tell if their bus operates in isolation on what could be a street which sees multiple buses. Whilst the addition of a map enhances the user experience, such contemporary sources are available to describe a way which would further improve this provision.

³⁵ Roberts, P. (2026) *Reading Mainline*. Available online at www.countrybus.com/independent/readingmainline.htm; accessed 18 April 2026.

³⁶ No name, (1991), 'New Name'. In: *Commercial Motor*, 2 May 1991, p18

³⁷ The success of Reading Buses' endeavours appeared to have worked. In 1998, after a period of dwindling passenger numbers, Reading Buses merged with principal rivals Reading Mainline and took over their operations. See Roberts, P. (2026) *Reading Mainline*. Available online at www.countrybus.com/independent/readingmainline.htm; accessed 18 April 2026.

³⁸ Thelen, K. (1979), 'Communication considerations for transit route and schedule brochures', *Transport Research Record*, 735, pp.23–27.

³⁹ As argued by Thelen, K. (1979), 'Communication considerations for transit route and schedule brochures', *Transport Research Record*, 735, p.26

⁴⁰ Lonsdale, M. (2014), 'Typographic features of text: outcomes from research and practice', *Visible language*, 48.3, p.36

⁴¹ See e.g. Thelen, K. (1979), 'Communication considerations for transit route and schedule brochures', *Transport Research Record*, 735, p.26

⁴² Horne, M., Roberts, J. and Rose, D. (1987), 'Getting there: an assessment of London Transport's endeavour to improve bus passenger information literature for central London; part 2', *Information design journal*, 5.2, pp.87–110

3 Temporal tabular data

L 1991–c2000

The visual presentation of the temporal tabular data is substantially different to that of the previous generation of timetables. Paired above with the advancement in the graphic communication of the service availability, the temporal tabular data is visually presented with the route represented on the vertical axis and time along the horizontal axis. Any advancement with the presentation of this, however, comes with confusion: the divorced nature of the tabular data and the route map again is to the detriment of both.⁴³

Addressing question three, a clear improvement in user experience results from decisions made seemingly in response to the disadvantages of the previous period. The confusing lack of explanation of the 12-hour clock in the previous theme is no longer; on each timetable in this period, a clear explanation accompanies times and provides typographic coding in the form of a tinted background. The tinted background lacks an accessible level of contrast, but the coding is sufficient to imply there is a change of the clock format in the document. Numerals in tables remain tabular and vertically aligned, following recommendations set out in British Standards documents of the time relating to graphs and providing an impression that is 'solid'.⁴⁴

For many routes, seemingly for reasons of space, the vertical presentation of the route includes information only for a few stops. Though this may appear to be too low percentage – particularly when comparing the number of stops available in the map – research completed in the previous decade suggested that 53% of bus passengers preferred three or fewer stops indicated on bus timetables, and as such the tables Reading Buses produced universally exceeded users' expectations.

It is unwise, however, to assess the level of information afforded on the route axis based on a single study in 1981, and further unwise to base it off such a study when 47% of respondents preferred more data. Indeed, McCann goes on to suggest design principles for timetables which include recommendations to include stops spaced 10 minutes apart.⁴⁵

4 Service deviations and delays

L 1991–c2000

Like the time period before, real-time information was not yet available, but planned service alterations, delays and diversions were detailed, again, with a key (known again as a 'code') which used letters to connect to specific points in the tabular display to textual notes. It is interesting to consider the idea that these are 'footnotes' – described in Joshi's essay of 1996 as having a 'significance greater than their appearance may suggest'.⁴⁶ This description is true especially for timetables, whose notes can describe changes to service that may mean a passenger is left stranded without achieving their desired route.

Like both the schematic overview and the tabular information, the visual presentation of notes (or 'codes') changes significantly in this period of competition. Reading Buses existed in. Like Joshi, the designers ruled out the more traditional symbols seen in the previous theme and instead opted for letters; the 'codes' in the timetable go a step further to link information by using key letters from the information. (for example, in **Figure 8**, the code ML stands for 'Terminates at Mill Lane').

In further adherence to Joshi's footnote suggestions, the 'code' is set in the same type size as the rest of the table. The renewed acceptance that footnotes were of vital importance – they exist to 'warn the reader against drawing erroneous conclusions'.⁴⁷ By setting the service alterations, deviations and delays in this way, the user experience of the timetable is substantially improved.

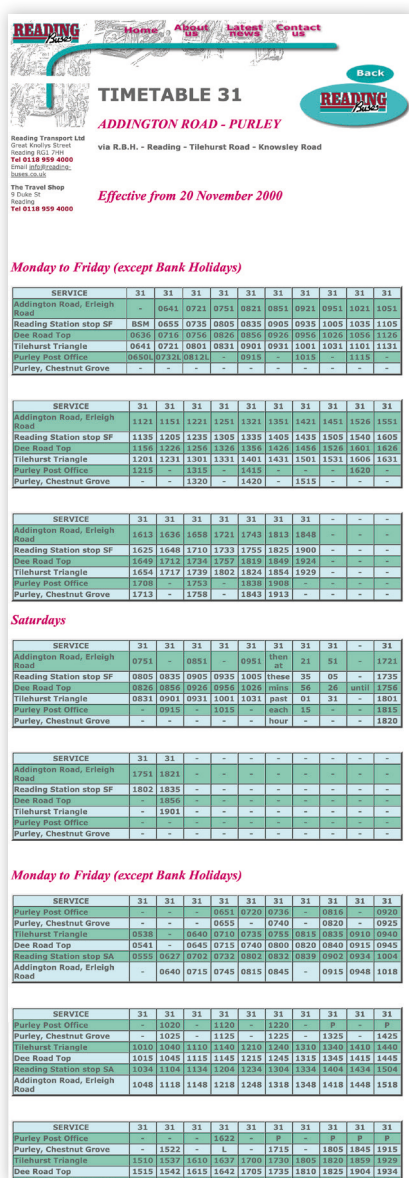
⁴³ This is still the 'standard' way, although Bartram's proposal in their essay of 1978 suggests that users (eventually) prefer a reversed edition (route along the horizontal axis) of this arrangement. It is foreseeable (and possibly a good idea) that one could embed a horizontal schematic map and a timetable set in the reversed arrangement for maximal clarity, but so far no examples the author has come across employ the reversed table, let alone a joined-up map and timetable.

⁴⁴ British Standards Institute (1992), BS 7581:1992: *Guide to presentation of tables and graphs*. London: British Standards Institute

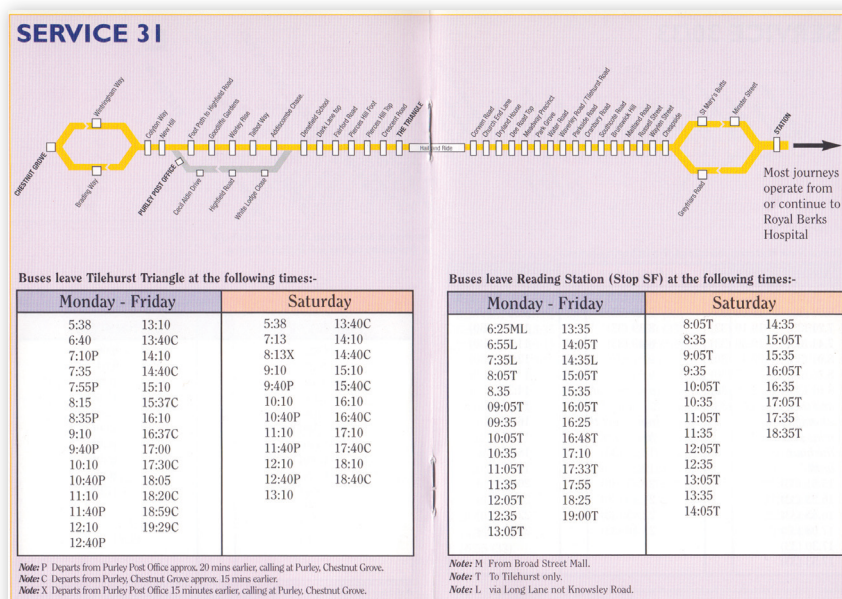
⁴⁵ McCann, C. (1981), *An evaluation of information to be included in bus transit timetables* [PhD thesis]. Texas: Texas A&M University, p.86

⁴⁶ Joshi, Y. (1996), 'Design specifications for tables: a case study'. In: Stiff, P. ed.(1996), *Typography papers 1*. Reading: Department of Typography & Graphic Communication, p.101

⁴⁷ Joshi, Y. (1996), 'Design specifications for tables: a case study'. In: Stiff, P. ed.(1996), *Typography papers 1*. Reading: Department of Typography & Graphic Communication, p.101



Semi-responsive website design. The website's css code indicates that it was designed for screens of 720px, which is not easily reproducible in print. Shown here at a rate of around 1mm = 13.6px. Internet Archive. **The positioning of some elements has been changed to fix age-related css styling problems.** Original archive source (route list): <http://web.archive.org/web/20001203072300/http://www.reading-buses.co.uk/rtdg.htm>; original archive source (timetable): http://web.archive.org/web/200010142235146/http://www.reading-buses.co.uk/timetable112000_31.htm. Both accessed 16 April 2026. See the bibliography.



Early 2000s

Forgetting print? Going all-in online

The framework table indicates that there was significant change in the early 2000s – away from the unified visual identity developed in the 1990s, and towards multiple solutions with separate identities. With these separate identities, the framework further indicates that the information design was substantially different for each of these solutions. For the first time, research questions two and three may be evaluated with respect to a comparison between the digital and printed visual presentation of the items of information design.

1 Key route information



2000–2005



2000–2008

The framework indicates that the shift in the presentation of key route information was particularly pronounced in the leaflet, which abandoned the practice of placing this information on the front cover and instead opted to print the service number only at the head of each spread (as seen in **Figure 13**). To consider any enhancement of the user experience this may have bought, Thelen's qualitative recommendation to display 'prominently' the route number is disregarded here;⁴⁸ whilst each spread shows the route number prominently, the front cover provides only the general geographic region the leaflet covers (see e.g. **Figure 14** overleaf).

In contrast, the framework table indicates that the website follows an almost completely different approach. Reinterpreting Thelen's recommendation for a digital format, the route selector favours the *service number* as its most-prominent feature (insofar as it is in bold italic type) and makes no mention of the geographic areas represented by the leaflets, as seen in **Figure 12**.

In comparison to the previous era analysed, these two practices, taken together, represent an overall deterioration of the user experience in terms of the presentation of key route information. Whilst the website retains the key route information (including operator name and contact information) the lack of service numbers on the leaflet's front cover design is cause for confusion, as it is unclear which timetable leaflet may be used to cover a specific route.

2 Network overview



2000–2005



2000–2008

The framework indicates that the shift in presentation of the network overview was less pronounced. In comparison to the previous era analysed, the linear map on the printed leaflet keeps many of the same properties, as seen in **Figure 12**; specifically, the graphic style of the map being linear means that many problems identified in Bartram's 1980 study are *still* present on this example – crucially, Bartram shows that one-dimensional maps lack suggestions of interconnectivity and force the user to manually compare route diagrams.⁴⁹ In this era of bus timetable design, it is still the case that neither interchanges nor nearby roads are provided in the network overview, and as such it can be concluded that the user experience of these elements, whilst not deteriorated, is unimproved.

The website does not feature an integrated map for the timetables, but there is some suggestion of route by means of text. Whilst studies have shown the importance of a route map in the orientation of the user, the context of the website at the time demonstrates that it was not the primary mode for conveying information to users at this time. Notwithstanding the possibility of being difficult to complete technologically, taken alone, this represents a clear deterioration of the user experience the regard of network overview, as many studies have suggested the importance of such route diagrams to spatially orientate the user.⁵⁰

⁴⁸ Thelen, K. (1979), 'Communication considerations for transit route and schedule brochures', *Transport Research Record*, 735, pp.23–27.

⁴⁹ Bartram, D. (1980), 'Comprehending spatial information: the relative efficiency of different methods of presenting information about bus routes', *Journal of applied psychology*, 65.2, pp.103–110

⁵⁰ See e.g. Bartram, D. (1980), 'Comprehending spatial information: the relative efficiency of different methods of presenting information about bus routes', *Journal of applied psychology*, 65.2, pp.103–110

3 Temporal tabular information

L 2000–2005 O 2000–2008

The framework indicates that the shift in presentation of the temporal tabular information on the leaflet was significant, but the website lacks such a significant change. The main change that the framework identifies in the leaflets is an effective 'reflection' of the tabular data such that the route runs horizontally and the times vertically. Whilst **Figure 14** demonstrates the extent to which this principle was eventually compromised, it is evidence of a shift in thinking that would continue for some ten years.

The principal question asks to what extent changes identified enhanced user experience. Despite Bartram's strong implication 'reflected' timetables improved user experience, the way in which they were implemented in Reading Buses' timetable leaflets of the 2000s led them to be in direct opposition to other authors' perspectives of 'improved' user experience.⁵¹ For example, McCann's PhD research suggests that users desire bus stops to be provided at regular intervals of around ten minutes on printed timetables, but for all routes in this era, irrespective of the total journey time, only two timing points were provided in leaflets – the two terminus stops.⁵² It is also telling that Bartram himself used twelve stops as the basis for his proposed timetable design.⁵³

It is, in essence, difficult to support the view that the leaflets of the 2000s meaningfully improved the user experience by introducing a reflected view of the temporal tabular information; indeed, there is evidence (particularly in the resultant poor relationship to the map) to suggest that by featuring such few stops the user experience was deteriorated.

The website, by contrast, contained a greater amount of information than the printed timetable by virtue of the fact that this medium retained the unreflected timetable layout and thus had a greater range of stops available. The lack of delineation of the times by any character may be somewhat confusing, particularly compared to the previous delineation by means of a full point; Bartram notes that participants in his study found this more confusing.⁵⁴ The lack of a route map for the table to relate to, however, contributes overall to a consideration that the user experience deteriorated in the 2000s in respect to the tabular information.

⁵¹ Bartram, D. (1984), 'The presentation of information about bus services', *Information design: the design and evaluation of signs and printed material*. Chichester: John Wiley & Sons, p.315

⁵² McCann, C. (1981), *An evaluation of information to be included in bus transit timetables* [PhD thesis]. Texas: Texas A&M University, p.86

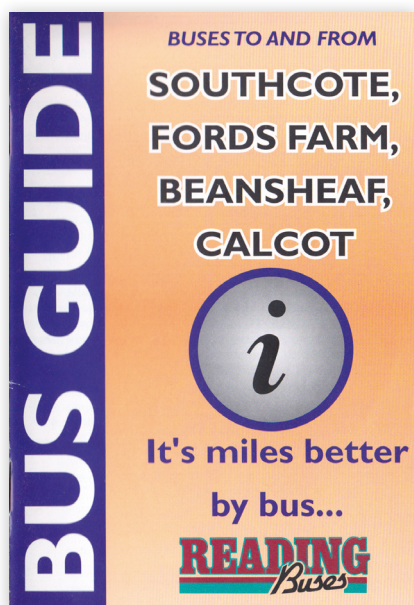
⁵³ See fig 16.8, Bartram, D. (1984), 'The presentation of information about bus services', *Information design: the design and evaluation of signs and printed material*. Chichester: John Wiley & Sons, p.314

⁵⁴ Bartram, D. (1984), 'The presentation of information about bus services', *Information design: the design and evaluation of signs and printed material*. Chichester: John Wiley & Sons, p.315

Figure 14 The printed timetables of this era lacked route numbers on the front – a key feature of the key route information for the previous two eras.

Southcote, Fords Farm, Beansheaf and Calcot bus guide
Published by Reading Buses (2000)

Cover: 105mm × 148mm, shown here at 53%
Interior spread: 210mm × 148mm; shown here at 53%
Reading Central Library: Bus Ephemia box



4 Service deviations and delays

L 2000–2005 O 2000–2008

The framework suggested that this category was similarly presented in comparison to the previous era. Thus, the user experience of these remained the same.

SERVICE 10/25/44/45			
Buses leave Calcot (Savacentre) for town or beyond at:			
Monday - Friday	Saturday	Sunday	
05:30C 06:00C 06:25C 06:57 07:32C 08:02C 08:37D then at 07C, 37 minutes past each hour until 17:07C 17:17C	06:25C 07:25C 07:55C 08:25C then at 07C, 37 minutes past each hour until 17:37 18:07 18:45 19:02	19:15 19:45E 20:15 20:45E 21:15 21:45E 22:15 22:45E 23:25D	08:15 09:15 then at 15, 45E minutes past each hour until 22:45E 23:13
Note: Buses depart Beansheaf Stores at 4 minutes after Calcot Savacentre, with additional Monday to Friday departures at 06:54C, 07:09C, 07:26C, 07:41, 07:56, 08:11 and 08:27C. E = Continues to Lower Earley. D = Commences at Theale 16 minutes earlier. C = Continues to Caversham Park see overleaf → for extra journeys from Fords Farm			
Buses leave the Station Stop SW at:-			
Monday - Friday	Saturday	Sunday	
5:57 6:30 7:02 7:26 B 7:44 B 7:57 B 8:32 and then every 30 mins until 16:02 16:32 16:43	17:03 17:13 17:33 17:43 18:08 18:48 19:17 19:47 20:17 20:47 21:17 21:47 22:17 22:47 T 23:17	19:17 19:47 20:17 20:47 21:17 21:47 22:17 22:47 23:17	7:47 8:47 9:47 then every 30 mins until 22:47 23:17
Note: B = Terminates at Beansheaf T = Extended to Theale Some Service 10 journeys operate via Royal Berks Hospital to LOWER EARLEY			

ROUTE 9

Caversham Heights
central Reading
Royal Berks Hospital
Shinfield Park

your route guide
from 4 July 2005

quality travel for Reading

from **Shinfield Park**
towards Royal Berks Hospital 15 minutes
central Reading 25 minutes
Caversham Heights 45 minutes

Mon-Fri	Sat	Sun
5.38am	6.14am	8.56am
5.58am	6.54am	9.56am
6.18am	7.34am	10.56am
6.38am	8.14am	11.56am
6.58am	8.54am	12.56pm
7.13am	9.14am	1.56pm
7.25am	9.34am	2.56pm
7.38am	9.54am	3.56pm
7.58am		4.56pm
8.18am		5.56pm
8.28am		6.56pm
8.38am		7.56pm
8.48am		8.56pm
8.58am		9.56pm
9.14am		10.56pm
9.22am		
9.34am		
9.54am		
then at 03 18 48 until	then at 14 34 54 until	
3.34pm		
4.03pm		

journeys in green only go as far as Reading station

from **central Reading station**
towards Royal Berks Hospital 10 minutes
Reading University 15 minutes
Shinfield Park 25 minutes

Mon-Fri	Sat	Sun
5.15am	5.50am	8.30am
5.35am	6.30am	9.30am
5.55am	7.10am	10.30am
6.15am	7.50am	11.30am
6.35am	8.30am	12.30pm
6.50am	9.03am	1.30pm
7.02am	9.23am	2.30pm
7.22am	9.43am	3.30pm
7.32am		4.30pm
7.42am		5.30pm
7.52am		6.30pm
8.02am		7.30pm
8.12am		8.30pm
8.22am		9.30pm
8.33am		
8.48am		
9.03am		
9.23am		
9.43am		
then at 08 23 38 53 until	then at 03 23 43 until	
6.38pm		
7.08pm		
7.33pm		
8.30pm		
9.30pm		
10.30pm		
then at 03 23 43 until		
3.43pm		

Nighttrack buses after the last buses on route 9 you can still get back from central Reading to Royal Berks Hospital & Reading University by using Nighttrack N3 & N4

Figure 15 A significant enhancement in the user experience of *printed* timetables occurred in 2004–5, when a Best Impressions, a design consultancy firm, redesigned the company's printed ephemera.^{55,56} This coincided with each route being given a distinctive colour to ensure visibility. Here, route 9 is clearly given a green colour.⁵⁷

Your route guide: route 9 (Caversham Heights, Central Reading, Royal Berkshire Hospital, Shinfield Park)
Published by Reading Buses (2005)
Designed by Best Impressions

Cover: 105mm × 148mm, show here at 53%
Interior spread: 210mm × 148mm; shown here at 53%
Reading Central Library: Bus Ephemera box

Late 2000s to 2020s

Real-time information and a more unified approach

The framework table indicates that the rapid release of new timetable solutions in this period led to substantial changes in how information was presented. The already visually disconnected printed leaflets and website continued to drift apart for a time until they were unified again in 2018. The largest change in this period relates to the introduction of visually presenting live timetable data. The challenge is to consider how this changed the presentation of a timetable and then to what extent this change enhanced the user experience.

With the rapid release of new timetable solutions, it becomes impractical to discuss the results in a purely categorical way. Thus, the categories will present a comparative analysis based on a set of years in the era identified by the framework table. Note that some of these years overlap.

1 Key route information

2005–2010 2008–2018

From the perspective of printed material, the employment of an outside design consultant substantially changed the visual presentation of timetables. The most significant change, perhaps in response to confusion over route numbers, is that the printed timetables reverted to be route-specific as in **Figure 15**; in many ways, the key route information reverted to how it was shown in the 1990s: on the front of leaflets, as preferred by practitioners,⁵⁸ and showing the availability of route in negative boxes above the respective tables. As previously argued, this presentation leads to an enhancement of the user experience with the printed timetable.

Key route information on the website, however, retained much of its previous presentation, albeit in a less stylised way as they were generated differently. In this respect, the presentation maintained the user experience.

1 Key route information

2010–2025 2018–2025 2014–2025

The framework table indicates here a continuation of the way in which key route information is presented on the leaflet. Notably, there is a reintroduction of stylised illustration of buses on the route; whilst not directly part of the framework the practice is encouraged by practitioners⁵⁹ and is quite possibly an example of 'supportive information' Bartram identified (information that is strictly redundant, but nevertheless helpful to the user).⁶⁰

⁵⁵ Credit to Best Impressions is provided in the first generation of printed timetables on the rear of the document; future editions did not include this and it is unclear if Best Impressions continued to design the physical timetables.

⁵⁶ No author (2026), *Best Impressions*. Available online at best-impressions.co.uk; accessed 26 February 2026.

⁵⁷ No author (2024), *Reading Buses celebrates 20 years of colour*. In: *Coach&BusWeek*, 30 October 2024. Available online at cbwmagazine.com/reading-buses-celebrates-20-years-of-colour/; accessed 16 April 2026.

⁵⁸ Thelen, K. (1979), 'Communication considerations for transit route and schedule brochures', *Transport Research Record*, 735, pp.25

⁵⁹ Thelen, K. (1979), 'Communication considerations for transit route and schedule brochures', *Transport Research Record*, 735, pp.24

⁶⁰ Bartram, D. (1984), 'The presentation of information about bus services', *Information design: the design and evaluation of signs and printed material*. Chichester: John Wiley & Sons, p.300

2 Network overview

L 2005–2025 O 2008–2018

Inspection of the framework table suggests that the network overview provided in leaflets from this time period changed significantly from their previous presentation. Crucially, from the perspective of Bartram's suggestions of map types, the map becomes a hybrid form of both 'road map' and 'schematic map'.⁶¹ In other words, the route becomes generally highly simplified but retains an overall spatial awareness by the inclusion of other roads and places. Bartman notes that advantages may be found in both the 'road map' and the 'schematic map' and it is thus reasonable to suggest that the hybrid form of this map improves the user experience.⁶²

In contrast to this clear enhancement of user experience, the website, possibly for technical reasons, remained not showing a route map, and as such the temporal tabular data was again not related to a spatial representation of any format. The gap between the enhancement of user experience online compared to in print (which had experienced a significant enhancement) appears to have grown so large that by 2011 stopped offering online timetables and instead simply offered the PDF to download.

2 Network overview

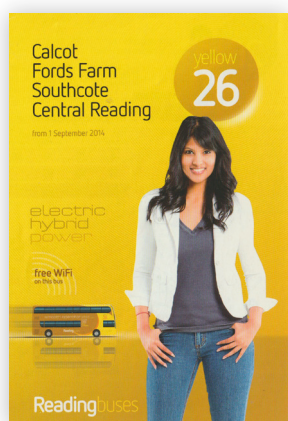
O 2018–2025 M 2014–2025

It is unknown how myBusReading (the first generation of the company's mobile app) presented a network overview, but review of the framework table suggests that the second and third generation (and the online present spatial information in extremely similar ways, as in Figure 17. Specifically, each timetable links to a real-time overview of the selected route, overlaid with pictograms of buses. The real-time information provided by means of this bus tracking meets Carrel et al's research that finds that passengers desire real-time information and as such it is argued here that its inclusion substantially improves the user experience.

However, the fact that the network overview is presented overlaid onto a

⁶¹ Bartram, D. (1980), 'Comprehending spatial information: the relative efficiency of different methods of presenting information about bus routes', *Journal of applied psychology*, 65.2, pp.103–110

⁶² Bartram, D. (1980), 'Comprehending spatial information: the relative efficiency of different methods of presenting information about bus routes', *Journal of applied psychology*, 65.2, pp.103–110



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Station	5:06	5:26	5:46	6:06	6:26	6:46	7:06	7:26	7:46	8:06	8:26	8:46	9:06	9:13	9:21	9:29	9:37	9:45	9:53	10:01	10:09	10:17	10:25	10:33	10:41	10:49	10:57	11:05	11:13	11:21	11:29	11:37	11:45	11:53	12:01	12:09	12:17	12:25	12:33	12:41	12:49	12:57	13:05	13:13	13:21	13:29	13:37	13:45	13:53	14:01	14:09	14:17	14:25	14:33	14:41	14:49	14:57	15:05	15:13	15:21	15:29	15:37	15:45	15:53	16:01	16:09	16:17	16:25	16:33	16:41	16:49	16:57	17:05	17:13	17:21	17:29	17:37	17:45	17:53	18:01	18:09	18:17	18:25	18:33	18:41	18:49	18:57	19:05	19:13	19:21	19:29	19:37	19:45	19:53	20:01	20:09	20:17	20:25	20:33	20:41	20:49	20:57	21:05	21:13	21:21	21:29	21:37	21:45	21:53	22:01	22:09	22:17	22:25	22:33	22:41	22:49	22:57	23:05	23:13	23:21	23:29	23:37	23:45	23:53	24:01	24:09	24:17	24:25	24:33	24:41	24:49	24:57	25:05	25:13	25:21	25:29	25:37	25:45	25:53	26:01	26:09	26:17	26:25	26:33	26:41	26:49	26:57	27:05	27:13	27:21	27:29	27:37	27:45	27:53	28:01	28:09	28:17	28:25	28:33	28:41	28:49	28:57	29:05	29:13	29:21	29:29	29:37	29:45	29:53	30:01	30:09	30:17	30:25	30:33	30:41	30:49	30:57	31:05	31:13	31:21	31:29	31:37	31:45	31:53	32:01	32:09	32:17	32:25	32:33	32:41	32:49	32:57	33:05	33:13	33:21	33:29	33:37	33:45	33:53	34:01	34:09	34:17	34:25	34:33	34:41	34:49	34:57	35:05	35:13	35:21	35:29	35:37	35:45	35:53	36:01	36:09	36:17	36:25	36:33	36:41	36:49	36:57	37:05	37:13	37:21	37:29	37:37	37:45	37:53	38:01	38:09	38:17	38:25	38:33	38:41	38:49	38:57	39:05	39:13	39:21	39:29	39:37	39:45	39:53	40:01	40:09	40:17	40:25	40:33	40:41	40:49	40:57	41:05	41:13	41:21	41:29	41:37	41:45	41:53	42:01	42:09	42:17	42:25	42:33	42:41	42:49	42:57	43:05	43:13	43:21	43:29	43:37	43:45	43:53	44:01	44:09	44:17	44:25	44:33	44:41	44:49	44:57	45:05	45:13	45:21	45:29	45:37	45:45	45:53	46:01	46:09	46:17	46:25	46:33	46:41	46:49	46:57	47:05	47:13	47:21	47:29	47:37	47:45	47:53	48:01	48:09	48:17	48:25	48:33	48:41	48:49	48:57	49:05	49:13	49:21	49:29	49:37	49:45	49:53	50:01	50:09	50:17	50:25	50:33	50:41	50:49	50:57	51:05	51:13	51:21	51:29	51:37	51:45	51:53	52:01	52:09	52:17	52:25	52:33	52:41	52:49	52:57	53:05	53:13	53:21	53:29	53:37	53:45	53:53	54:01	54:09	54:17	54:25	54:33	54:41	54:49	54:57	55:05	55:13	55:21	55:29	55:37	55:45	55:53	56:01	56:09	56:17	56:25	56:33	56:41	56:49	56:57	57:05	57:13	57:21	57:29	57:37	57:45	57:53	58:01	58:09	58:17	58:25	58:33	58:41	58:49	58:57	59:05	59:13	59:21	59:29	59:37	59:45	59:53	60:01	60:09	60:17	60:25	60:33	60:41	60:49	60:57	61:05	61:13	61:21	61:29	61:37	61:45	61:53	62:01	62:09	62:17	62:25	62:33	62:41	62:49	62:57	63:05	63:13	63:21	63:29	63:37	63:45	63:53	64:01	64:09	64:17	64:25	64:33	64:41	64:49	64:57	65:05	65:13	65:21	65:29	65:37	65:45	65:53	66:01	66:09	66:17	66:25	66:33	66:41	66:49	66:57	67:05	67:13	67:21	67:29	67:37	67:45	67:53	68:01	68:09	68:17	68:25	68:33	68:41	68:49	68:57	69:05	69:13	69:21	69:29	69:37	69:45	69:53	70:01	70:09	70:17	70:25	70:33	70:41	70:49	70:57	71:05	71:13	71:21	71:29	71:37	71:45	71:53	72:01	72:09	72:17	72:25	72:33	72:41	72:49	72:57	73:05	73:13	73:21	73:29	73:37	73:45	73:53	74:01	74:09	74:17	74:25	74:33	74:41	74:49	74:57	75:05	75:13	75:21	75:29	75:37	75:45	75:53	76:01	76:09	76:17	76:25	76:33	76:41	76:49	76:57	77:05	77:13	77:21	77:29	77:37	77:45	77:53	78:01	78:09	78:17	78:25	78:33	78:41	78:49	78:57	79:05	79:13	79:21	79:29	79:37	79:45	79:53	80:01	80:09	80:17	80:25	80:33	80:41	80:49	80:57	81:05	81:13	81:21	81:29	81:37	81:45	81:53	82:01	82:09	82:17	82:25	82:33	82:41	82:49	82:57	83:05	83:13	83:21	83:29	83:37	83:45	83:53	84:01	84:09	84:17	84:25	84:33	84:41	84:49	84:57	85:05	85:13	85:21	85:29	85:37	85:45	85:53	86:01	86:09	86:17	86:25	86:33	86:41	86:49	86:57	87:05	87:13	87:21	87:29	87:37	87:45	87:53	88:01	88:09	88:17	88:25	88:33	88:41	88:49	88:57	89:05	89:13	89:21	89:29	89:37	89:45	89:53	90:01	90:09	90:17	90:25	90:33	90:41	90:49	90:57	91:05	91:13	91:21	91:29	91:37	91:45	91:53	92:01	92:09	92:17	92:25	92:33	92:41	92:49	92:57	93:05	93:13	93:21	93:29	93:37	93:45	93:53	94:01	94:09	94:17	94:25	94:33	94:41	94:49	94:57	95:05	95:13	95:21	95:29	95:37	95:45	95:53	96:01	96:09	96:17	96:25	96:33	96:41	96:49	96:57	97:05	97:13	97:21	97:29	97:37	97:45	97:53	98:01	98:09	98:17	98:25	98:33	98:41	98:49	98:57	99:05	99:13	99:21	99:29	99:37	99:45	99:53	100:01	100:09	100:17	100:25	100:33	100:41	100:49	100:57	101:05	101:13	101:21	101:29	101:37	101:45	101:53	102:01	102:09	102:17	102:25	102:33	102:41	102:49	102:57	103:05	103:13	103:21	103:29	103:37	103:45	103:53	104:01	104:09	104:17	104:25	104:33	104:41	104:49	104:57	105:05	105:13	105:21	105:29	105:37	105:45	105:53	106:01	106:09	106:17	106:25	106:33	106:41	106:49	106:57	107:05	107:13	107:21	107:29	107:37	107:45	107:53	108:01	108:09	108:17	108:25	108:33	108:41	108:49	108:57	109:05	109:13	109:21	109:29	109:37	109:45	109:53	110:01	110:09	110:17	110:25	110:33	110:41	110:49	110:57	111:05	111:13	111:21	111:29	111:37	111:45	111:53	112:01	112:09	112:17	112:25	112:33	112:41	112:49	112:57	113:05	113:13	113:21	113:29	113:37	113:45	113:53	114:01	114:09	114:17	114:25	114:33	114:41	114:49	114:57	115:05	115:13	115:21	115:29	115:37	115:45	115:53	116:01	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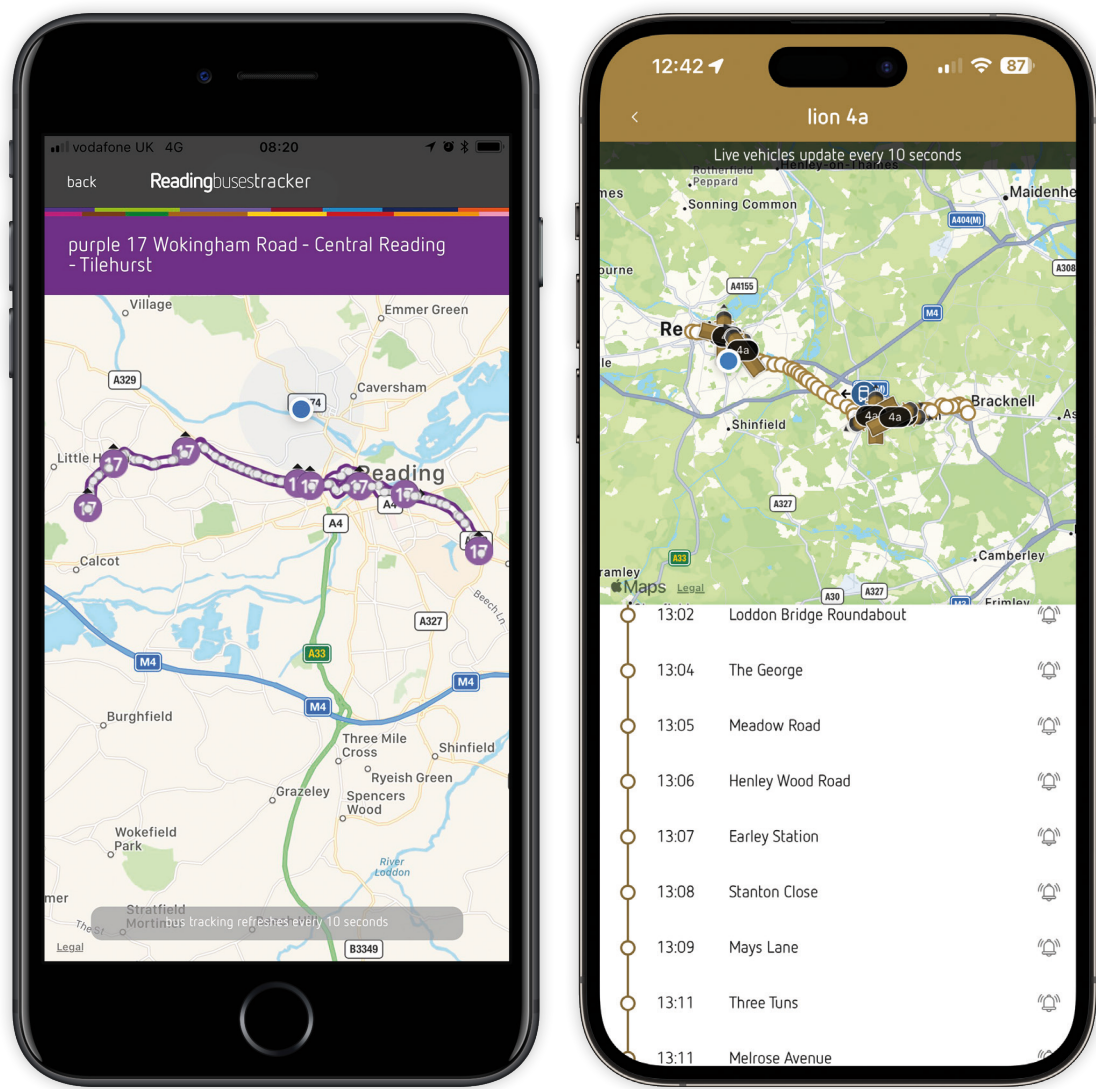


Figure 17 A common theme of real-time information on Reading Buses app is that the user must know their current spatial surroundings to understand the progress of a bus marked on a map. This is particularly unhelpful, Bartman argues, for visiting tourists, and decreases the ‘legibility’ of an area. See Bartram, D. (1984), ‘The presentation of information about bus services’, *Information design: the design and evaluation of signs and printed material*. Chichester: John Wiley & Sons, p.316–7

LEFT Map overview for Purple 17 route
RIGHT Map overview for Lion 4 route
Real time information published by Reading Buses (2018, 2026)
The first image has been sourced from @reading_buses official Twitter account. (x.com/reading_buses/status/969851621902516224 (tweet published 3 March 2018); accessed 20 April 2026) The right-hand image was taken by the author.

63 Bartram, D. (1980), ‘Comprehending spatial information: the relative efficiency of different methods of presenting information about bus routes’, *Journal of applied psychology*, 65.2, pp.103–110
64 Bartram, D. (1984), ‘The presentation of information about bus services’, *Information design: the design and evaluation of signs and printed material*. Chichester: John Wiley & Sons, p.315

geographically-accurate map means that the benefits observed in the printed leaflets overlapping with this period do not translate over. Specifically, Bartram argues that the geographically accurate map does not show connections to other services as well as a schematic map could;⁶³ thus, from a comparative view, the solution represents an enhancement (with real-time information) but also a regression, in that geographically accurate bus routes are simply not required.

3 Temporal tabular data L 2005–2010 O 2008–2018

A clear difference can be ascertained when reviewing the framework table to compare the leaflet to its previous incarnation. Possibly reviewing Bartman’s recommendations, the company reverts to AM/PM representations of time; as Bartman suggests that this is easier for users to understand, it is taken here as an enhancement of the user experience.⁶⁴

Online, the temporal tabular data sees little change in the information available, and only changes stylistically (presumably with the introduction of a new system). As with the network overviews, around 2011 the online timetables were replaced with downloadable PDFs, indicating a deterioration in user experience.

3 Temporal tabular data L 2010–2025 O 2018–2025 M 2014–2025

The key change to the temporal tabular data in most recent years, according to the framework table, is the introduction of ‘relative’ times instead of absolute times.

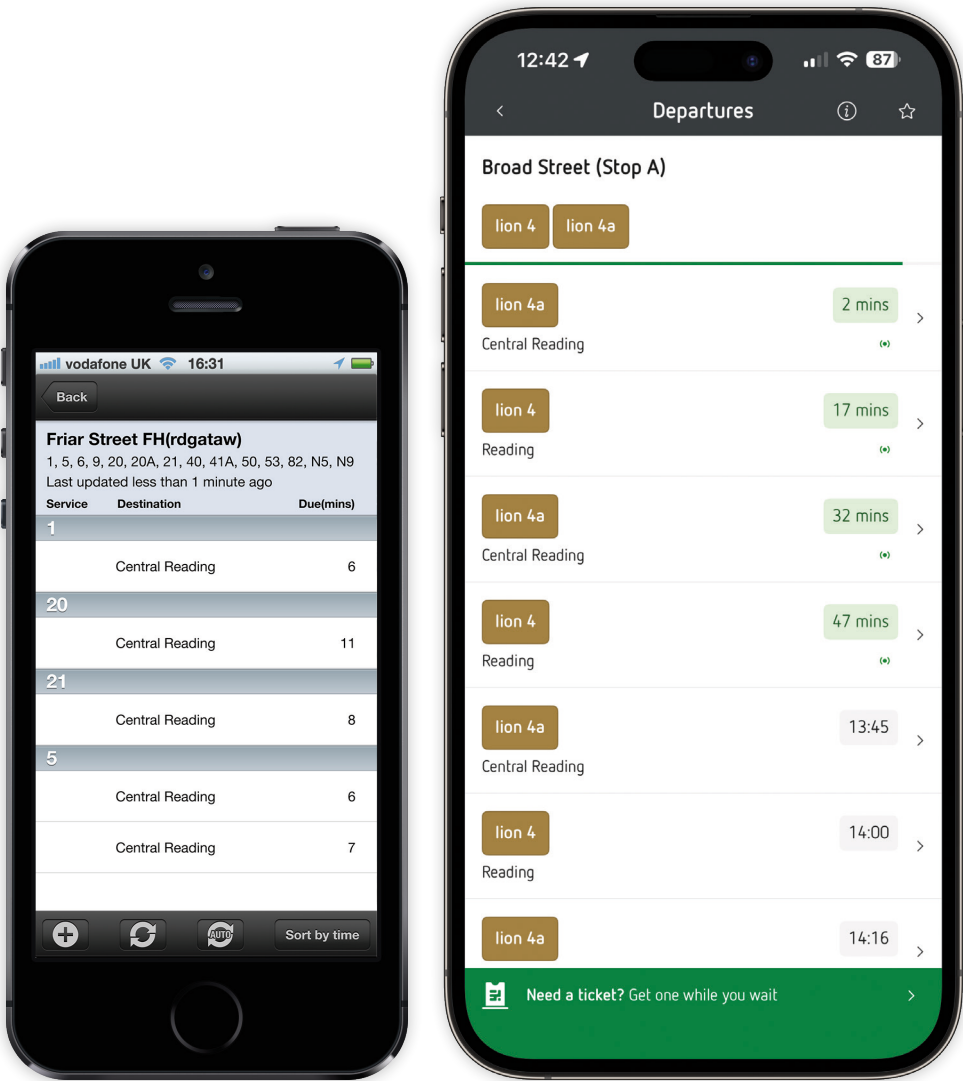


Figure 18 The app ‘myBusReading’ was the first employ real-time data for the region in an app format. The change in the design regarding temporal data is visible immediately: instead of absolute times, relative times are provided to the user.

Departures for specified stop
Real time information published by Reading Buses (2014)
This is a reconstruction of an image that appeared in a 2014 timetable leaflet that is, as far as the author is aware, the only record of the MyBusReading application publicly accessible. (It was reconstructed in Figma using the ‘Legacy iOS v1 kit’, published by ‘Denys Lunov’. Available at figma.com/community/file/1405594264448489514; accessed 13 April 2026) The screen size has been changed to fit an iPhone 5 layout.

By virtue of the real-time information system, the cognitive load of the user is reduced as there is no need to compare the times manually. As indicated by Brake-wood and Watkins in 2019, there is a user expectation of real-time information, and as such this change dramatically enhances the user experience.⁶⁵

4 Service deviations and delays L 2005–2025 O 2008–2018

The framework table indicates that nothing dramatic changed during this period in terms of how service deviations and delays were handled and as such we can assume that there is no change in the user experience.

4 Service deviations and delays O 2018–2025 M 2014–2025

The framework table indicates that there is a strong similarity of the visual presentation across these two mediums, further suggesting there is a shift to a more unified identity. In contrast to previous eras (particularly the era directly previous to this one) there is a very significant enhancement with the user experience, as all real-time information is used to add additional notes to the system by means of a banner or notification. The visual presentation of these matches very closely with the presentation of stops generally, and as such the user experience is further enhanced.

⁶⁵ Brakewood, C. and Watkins, K. (2019), ‘A literature review of the passenger benefits of real-time transit information’, *Transport reviews*, 39.3, pp.327–356

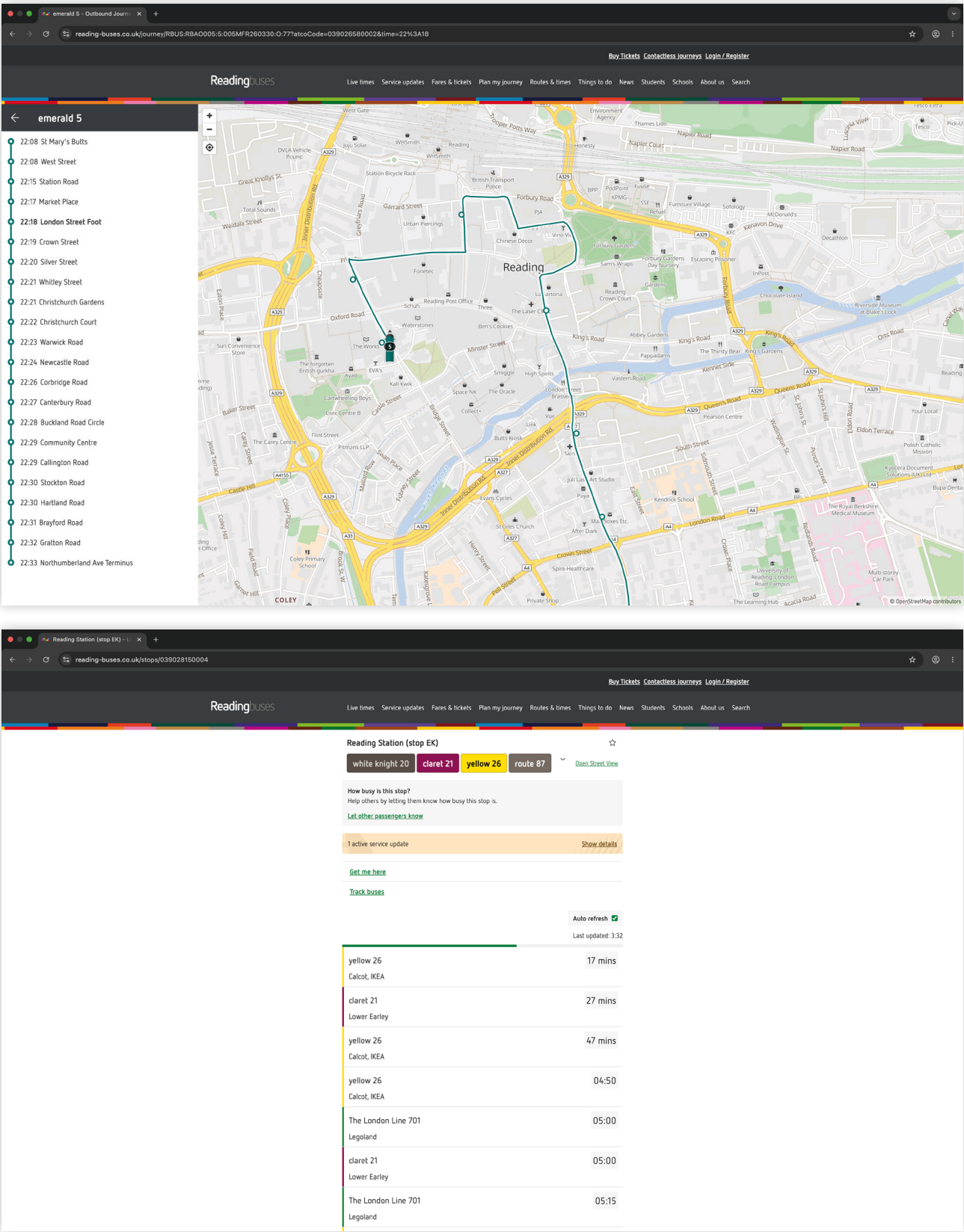


Figure 19 As it was built on the same backend as the app, the desktop website of 2025 features almost the same user experience as the mobile app – with the same discrepancies.

TOP Map overview for Emerald 6 route
BOTTOM Stop overview for Reading Station stop EK
Real time information published by Reading Buses (2018, 2026)
Both images taken by the author

Conclusion

The comparative and empirical analysis of the timetables across the time period surveyed indicated a substantial enhancement of the user experience, with more ways of accessing a larger amount of information becoming available over time. Crucially, these new ways – web and mobile apps – often brought with them design that enhanced the user experience and improved the whole set of timetables.

Whilst the framework was useful to identify the enhancements, it was also very effective at identifying deteriorations in the information design of timetables in the period surveyed. The two main parts of the framework – the temporal tabular data and the network overview – repeatedly changed formats around the 2000s mark, resulting in a noticeable deterioration in the user experience.

As alluded to in the final chapter, the picture gained from the analysis of today's timetable solutions is twofold. On the one hand, the presentation of the real-time information generally enhances the user experience enormously. On the other hand, the network overview of the printed timetable taking on a hybrid role – between schematic map and street map – increases the 'legibility' of Reading as a town to a much greater extent than the purely geographical route maps available online and on the mobile apps.

More research could now be done to suggest improvements to printed and digital ways of presenting information which this dissertation has called a 'timetable'. It is hoped that this historic overview comparing ways of presenting the same types of information provides a springboard into this further investigation, and that this further investigation can meaningfully improve the ways people travel in towns and cities.

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