

England underwent substantial changes in its economy and society in the eighteenth and early nineteenth centuries. The same is true of England's passenger coaches. They evolved from slow, heavy vehicles rarely travelling beyond the hinterland of London to swift, elegant stage coaches, reaching all corners of the country. The wealth of contemporary records in trade directories and newspaper adverts has encouraged transport historians to enumerate and list the routes used by these passenger coaches over a period of two centuries prior to the opening of railways.<sup>1</sup> The bulk of the records, and hence most published work, relate to coaches to and from London, but where individual provincial towns have been examined, it is clear there were a significant number of provincial coach services by 1830.<sup>2</sup> Although simple route maps have been drawn for individual towns, the spatial relationship between routes and the evolution of these over a period of decades has not been practical with traditional techniques. The task of integrating these local patterns into a national network has not been attempted.

In this article, we use digital technology to plot routes used by passenger coaching services listed in twenty directories from 1681 to 1835. This gives new insights into the geographic distribution and changes in the pattern of coaching services over time. The core of this new technology is Geographic Information Systems (GIS). As a framework for gathering, managing, and analysing spatial data, GIS has the potential to shed new light on historical trends. One example is the 'Occupational structure of Britain 1379-1911' research project. It uses GIS to reconstruct the evolution of occupations from the late medieval period down to the early twentieth century.<sup>3</sup> In our case, GIS helps to illustrate changes in passenger coaching services hand-coded from directories. We document the change from a simple radial form centred on London to overlapping service networks between London and provincial hubs. Moreover, by classifying connections by coaches, we give insights into how travel was related to broader trends in mobility and economic development.

In historical contexts with transformative change, it is important to accurately date new behaviour or social organization. For that reason, this paper focuses on where passenger coaches went and when. By the mid-1830s national coaching services had differentiated into three, inter-dependent sectors: (I) long-stage services between London and many provincial towns, including mail coaches; (II) long-stage services radiating from the major provincial towns; and (III) short-stage services into London. Our analysis shows that the three major sectors evolved differently over time. Between 1681 and 1760, the long-stage London market was the only significant scheduled coaching sector. Its service numbers grew slowly before 1760, though service lengths increased to reach many of the

major ports and large provincial towns of England. Between 1760 and 1790 there was a step change in the London business, principally to the Home Counties but there was also growth to destinations within a wider area bounded by Dover, Southampton, Bristol and Birmingham. After 1790 the growth in the long-stage sector was marked by a large increase in services to coastal towns, such as Brighton after 1810. This travel was a near monopoly for London coachmasters, as most travellers from the north could only access these prestigious coastal locations through the Capital. These services were a discretionary, luxury spend for the rising middle class “consumers” conscious of fashion and style.

The long-stage trunk services radiating from the major provincial towns emerged about 1760 and began to grow rapidly thereafter. It served travellers going between the expanding industrial towns of the Midlands, South Lancashire and West Yorkshire, but also increased their access to the northern terminals of the London network. Although each provincial hub was much smaller than London, the combined market grew to a similar scale. Services through Manchester, Birmingham, Leeds, Newcastle and Bristol made up almost two thirds of the provincial total in 1830. The strength of this second segment gave operators the power to out-compete London services beyond the closest major hubs such as Birmingham and Bristol.

The third sector, short travel up to 10 miles from London, was relatively new in the 1700s. Using these services, travellers could reach central London, undertake their business, and return home within the day. This allowed those working in the city to travel daily from the pleasant new suburbs and others to enjoy social activities.

Overall this study finds a substantial change in destinations and structure of the coach network, especially during the late eighteenth and early nineteenth centuries. The findings support the broader argument that English transport underwent a ‘revolution’ in service quality and cost before railways started to spread in the 1830s.<sup>4</sup> It brought the convenience of shared public transport to many thousands of new travellers between all the large towns of England and expanded the dormitory area of London. Some of the impetus came from new demands by travellers. The relatively large number of services to resorts suggests that consumerism was an important motivation.

Our findings also have implications for road improvement. In the eighteenth century, there was an important institutional change in which turnpike trusts were given responsibility to improve and maintain the principal roads by levying tolls.<sup>5</sup> There is an argument that higher traffic contributed to the establishment of turnpike roads.<sup>6</sup> However, little is known about the geographic connections between coaching and turnpike roads. Our analysis reveals that

approximately 90% of London and Country coaching services map onto the turnpike network in 1836, but many turnpike roads do not have coaching services at the same date, especially in the provinces. So scheduled coaching cannot easily explain the turnpiking of many miles of provincial roads.

Finally, our paper contributes to the larger ‘digital humanities’ literature, employing new tools like textual analysis and georectification of historical maps.<sup>7</sup> Our findings illustrate how traditional primary sources, like directories, can yield new insights on travel when combined with GIS.

## Coaches and turnpike roads

Although this article refers simply to coach services, these changed over the period considered. The term “coach” is used here for all passenger vehicles, including a machine, fly, diligence, post-coach or omnibus. “Stage coach” refers to a passenger vehicle running to a published schedule with fares per person and making regular stops. “Mail coach” refers to a passenger vehicle that is contracted to carry the Royal Mail and only a few passengers. The term “London service” is a route which has London as one terminus; a “Country service” is a route that runs between two provincial towns; we have used the term “London coach” and “Country coach” to distinguish the vehicles on these routes. A licensed service is one where the Office of the *Commissioners of Stamps* collected a duty on stage coaches starting in 1776. The duty was levied on miles travelled from 1783 to 1836 and services that ran through London were distinguished from Country services. A postchaise was a private service, where the traveler hired a carriage, postilion and horses. Postchaises were possibly complementary to stage coaches.

In the early 1700s, stage coach services ran with heavy vehicles carrying up to six inside passengers, during daylight hours and travelling slowly. Average journey speeds to London by coach were less than five miles per hour in 1755.<sup>8</sup> Technical innovations in the mid-1760s, such as the steel spring, allowed coachmasters to use lighter, faster vehicles. Initially these vehicles had a low carrying capacity, as 2-passenger postchaises, 3-passenger diligences and 4-person post coaches, but the improved speed and comfort of these coaches for only small changes in cost expanded the market for coach travel.<sup>9</sup> Coaches could run safely by 1830 with more outside passengers, even at night and in winter. Improvements in management, particularly using teams of fresh horses every 10 to 12 miles, further increased productivity and the range of services.<sup>10</sup> Consortia of coachmasters spread the risk and logistical costs on long routes, and allowed reliable scheduling of services and opportunities to forward passengers to connecting services. The capital

and management requirements on coachmasters increased, particularly those with large coaching inns in central London, so the expanding number of these services were run by a smaller number of professional operators. In 1791 the ten leading London coachmasters ran 56% of services over 100 miles and 46% of all services over 25 miles. By 1836 the corresponding proportions were 90% and 68% of services.<sup>11</sup>

Prior to 1725, substantial lengths of major trunk road were badly maintained by local authorities. Turnpike trusts changed that by investing much more.<sup>12</sup> Trusts were formed through acts of parliament starting in 1663. By the 1720s trusts became common along the highways leading into London. Between 1750 and 1770 turnpike trusts diffused along most of the trunk road network, especially in the industrial areas of the West Midlands and the North. By 1840, around 1000 turnpike trusts managed 20,000 miles of main road<sup>13</sup>

All together there was a progressive development of coach design and improvements in turnpike roads, most famously those supervised by engineers such as McAdam and Telford.<sup>14</sup> This meant frequent, stage coaches usually carried four inside passengers and eleven outside passengers by the 1830s at speeds of 10 mph. The average fare was about three pence per passenger mile for inside passengers and half that for the less comfortable outside places.<sup>15</sup>

## Methodology

The trade directories listed in Table 1 are the primary sources on coaching services for 1680 to 1839. As a first step in our methodology, the London services listed in the directories were screened by a process we term ‘tabular matching’. The information on the inn, departure day, time and frequency are entered in a spreadsheet. Importantly, these characteristics were matched to consolidate potential duplicate entries where intermediate stops were listed or coaches calling at more than one London inn. Also, in eighteenth century directories, where summer and winter services differed, an average was used.

Table 1 *Directories used for scheduled coach services 1680 to 1839 for England & Wales*

Date published	
	<b>London Services</b>
1681	The Present State of London, Thomas de Laune
1705	The Traveler's and Chapman's Daily Instructor
1715	The Merchants and Traders Necessary Companion
1727	The Tradesman's Guide or Chapman's and Traveler's Companion
1738	The Intelligencer or Merchant's Assistant
1760	Complete Guide to all persons or concerns with the City of London
1770	Baldwin's New Complete Guide
1779	The Shopkeeper's and Tradesman's Assistant
1791	Universal British Directory (UBD) – Volume 2
1810, 1819, 1828	Cary's Road Book
1828	Pigot's London Directory
1828-30	Pigot's National Directories (individual southern counties for 1830, individual northern counties 1828, Sussex 1832 –(Kent, Essex & Surrey augmented with 1839))
1830, 1835, 1836, 1839	Robson London Directory (including Table of London licenses 1835/39)
	<b>Country Services.</b>
1793-4	Universal British Directory (UBD) – Volumes 3 & 4
1828-30	Pigot's National Directories (individual southern counties for 1830, individual northern counties 1828, Sussex 1832 –(Kent, Essex & Surrey augmented with 1839))
1835, 1836, 1839	Robson's London Directory (including table of Country licenses 1835/6/9)
1839	Robson's Directory for counties of Norfolk, Suffolk, Hunts, Cambs, Oxon, Beds, Bucks, Wilts, Hants, Gloucs, Dorset, Devon, Somerset and Birmingham/Sheffield

Note: The sources for these directories are listed in the appendix.

Digital or GIS mapping is a vital component of this study. Unlike earlier works, which relied on simple directional lines, we build on detailed data specifying each road through intermediate towns. The GIS turnpike road maps produced in the project 'Transport, Urbanization and Economic Development in England and Wales c.1670-1911' are the foundation.<sup>16</sup> Using our knowledge of the towns being connected, the service lines from tabular matching of the coach routes were plotted over the GIS turnpike road map for the nearest relevant year. More specifically, the data from the 1791 Universal British Directory (UBD) was used to create the initial set of GIS polylines which mapped the coach routes from London. The tabular data from the earlier directories was then plotted on this, working backwards in time, with the most appropriately dated main road map as base. Where data were consistent with an existing route line, this was used, otherwise new lines were drawn using the most plausible direct route on the map and maximising the use of existing turnpikes. The services advertised in the early nineteenth century directories were assigned directly to the pre-1800 network, adding new routes as necessary.

The Robson London Directories for 1830 to 1839 have the fullest descriptions of routes and were used as a more certain base to amend any ambiguous earlier entries. Robson listed the towns with advertised coach services and tabulated the coaches licensed to operate in London and another table of branch and other coaches licensed in the Country. The licensed stagecoach services listed in Robson's Directories of 1835, 1836 and 1839 were assigned to routes based on the nearest equivalent advertised services.

The final dataset of GIS polylines centred on London for the period 1681 to 1839 contained 90,800 miles of route in 980 service lines. Each line had fields for all the tabular data, holding information on (i) the terminus town, (ii) intermediate stops, (iii) route length and (iv) the number of services per week at each date for that line. Inevitably there is an element of judgement so the data is subject to some uncertainty, but the scale of the dataset allows trends to be identified with confidence.

For Country routes the number of service trips per week was entered for all towns listed in the Provincial/Country volumes of the Universal British Directory or UBD 1793-4. A sample set of 50 hub towns was selected based on the most frequently mentioned towns in the “Cross-Country or local stage coaches” section of services for 1836 compiled by Bates.<sup>17</sup> These captured at least 95 per cent of the service lines for 1793-4. The map assignment method was used to select suitable routes from this base network and assign service frequency for scheduled coach services listed under each of the sample towns in Pigot’s National Directories 1828-30. Finally, all the service routes in the Country license list of Robson’s Directories for 1835, 1836 and 1839 were mapped. Hubs were treated in alphabetical order so that duplication of earlier entries could be ruled out. The resulting dataset of GIS polylines for Country services in the period 1790 to 1839 comprised 84,700 miles of route in 2,195 service lines.

## Mapping London Coaching Services

When combined with GIS, the services data can be represented in digital maps. This spatial information gives a clear perspective on the areas served by coaches, patterns of development over time, and the relationship between service routes and the turnpike network. We will deal first with the coach services from London at dates that are representative of the main phases of development revealed by the directories in Table 1.

Figure 1 plots the 1760 service routes on top of the 1705 routes for England and Wales. Some towns are shown on each map to allow orientation. The 1705 routes are dashed and the 1760 routes are black. Dashed routes with dark outlines represent services present in 1705 and 1760, and therefore, black lines are new routes between 1705 and 1760. Finally, the fine lines are turnpike roads in 1760. Several patterns are evident. First, there was a persisting radial distribution of services, which inevitably means towns close to London are on, or close to, many services, whereas most towns in the provinces are less well served. Second, the spatial overlap between turnpike roads and London coach routes is moderate. Our calculations suggest 33 per cent of turnpike roads overlapped with

a London coach route in 1760. However, most of the turnpike roads near to London carried a coach service. This accords with the view that pressures from stage coaches were factors in some early turnpiking. Third, there was a modest entry of new services between 1705 and 1760; notice the black lines to Manchester, Norwich, Margate (north of Dover) and Taunton. There were some exiting services as well; these are shown as dashed lines without a dark outline. For example, services to Bridgnorth (west of Birmingham) and Hull exited. Overall, there was a modest extension of the spatial distribution of London coaching services between 1705 and 1760.

Figure 1 *Comparison of advertised London stage coach routes for 1705 and 1760 on the 1760 turnpike map.*

Figure 1 here

Sources: see text.

Notes: Dashed lines represent routes of London coaches in 1705, black lines represent routes of London stage coaches in 1760, a dashed line without a black border (say from Ipswich to Norwich) is a route with a service in 1705 but not in 1760. Thin lines are turnpike roads in 1760

Figure 2 maps London coaching services in 1760 and 1790. Again, the earlier routes (1760) are dashed and the later routes (1791) are black. The fine lines are turnpike roads in 1790. London coach routes grew significantly by 1791 with services to the largest English towns and onwards to key towns in Scotland and to ports in Wales, and hence Ireland. There were new extended service routes to the Channel coast, to North & South Wales, the Midlands, the North-west and Cornwall. Several of these long-distance routes are Mail coach services which had been introduced in 1784; these are particularly significant in the North-west and Wales.<sup>18</sup> Many of these extended routes followed the new turnpikes created during the 1770s. Nevertheless, there were still substantial lines of turnpike road in the north and west of England and in Wales that carried no London services by 1791. Calculations show that 35 per cent of turnpike roads in 1790 overlapped with a London coach route. In 1760 this figure was 33 per cent.

Figure 2 *Comparison of advertised London stage coach routes for 1760 and 1790 on the 1790 turnpike map.*

Figure 2 here

Sources: see text.

Notes: Dashed lines represent routes of London coaches in 1760, black lines represent routes of London stage coaches in 1790, a dashed line without a black border (say to Plymouth) is a route with a service in 1760 but not in 1790. Thin lines are turnpike roads in 1790

Figure 3 illustrates changes in London routes between 1791 and 1836 using the same dashed and black lines. Here, the London coach services listed by Robson for 1836 form the base map. When the 1791 network is laid over this, it shows the evolution of a denser network over much of the country. There are new routes to the South-west and East Anglia and the new Holyhead road through North Wales (shown in black). Also many new routes were near London and industrial towns in the North-west. Services were lost from London to East Yorkshire and along the North Wales coast. There was also a marked absence of direct London services to central Wales and the North above Leeds.

Figure 3 *Comparison of advertised London coach routes for 1791 and 1836 on the 1830 turnpike map.*

Figure 3 here

Sources: see text.

Notes: Dashed lines represent routes of London coaches in 1791, black lines represent routes of London stage coaches in 1836, a dashed line without a black border (say from Chester to Holyhead) is a route with a service in 1791 but not in 1836. Thin lines are turnpike roads in 1830

Next, we decompose the growth of London services into new and existing destinations and into different distance categories. A destination is the last town visited. For example, a service might first arrive at town A but drive onwards to end in town B. We consider B the destination. Table 2 shows the decomposition for the two phases of rapid expansion in London services (1760-1791 and 1791-1836). In both periods, more growth was due to new destinations than to existing destinations. Also in both periods, the greatest increase was in services to destinations less than 10 miles from London, whereas the increase was least for services over 80 miles. The two phases were distinguished by a relatively higher growth of services to new locations at all distances in the first period but a relatively higher rate of growth to existing locations less than 10 miles coupled with high growth to new intermediate locations (over 10 miles) in the second period. The decline in long distance services to existing destinations in the later phase reflects, in part, extension of routes to new final destinations further along the road (i.e. it is not a reduction in the number of coaches serving these intermediate towns).

Table 2 *Change in the number of London services per week during phases of rapid growth*

Destination distance (miles)	1760 to 1779	1791 to 1835
existing under 10 *	675	3618



existing over 10 & under 80	321	76
existing over 80	40	-277
<b>Total change to existing</b>	<b>1035</b>	<b>3417</b>
new under 10	884	2373
new over 10 & under 80	422	1517
new over 80	317	531
<b>Total change to new</b>	<b>1623</b>	<b>4421</b>

Source: Calculations made by the authors using directories listed in Table 1. Each service counted only once for the final destination.

The counties to which the number of London coach services increased between 1791 and 1835 are highlighted in Figure 4. The greatest growth was to destinations in counties close to London, with secondary growth to final destinations in Lancashire and Norfolk. On the surface, these patterns make sense. London's influence was mainly felt on towns in the east. Also, Lancashire grew with industrialisation, and hence had higher demand for travel to London

Classifying destination types gives a deeper understanding of how London travel was related to broader trends in mobility and the economy. We classify 375 London destinations over 25 miles into seven exclusive types: port, military, inland resort, coastal resort, industrial, county town and other (mainly market towns). Although these classifications obscure the fact that intermediate towns of a different category benefitted from a service<sup>19</sup> and towns are forced into single categories,<sup>20</sup> some interesting general conclusions can be drawn.

Figure 4 *Counties where the number of destinations for London coach services increased between 1791 and 1835*

Figure 4 here

Source: see text.

Notes: Shading categories are an increase of over 20, 30, 50 and 100 services per week.

There were 30 port destinations, all of which had passenger packet ship services by the nineteenth century. The three ports with the most services in 1828 were Dover, Bristol, and Holyhead. There were five military destinations defined by army or naval complexes. Blackwater, Brompton and Chatham had the most services in 1828. Devonport and Plymouth had fewer. There were five inland resort destinations. Bath and Tunbridge Wells had the most services. Great Malvern, Harrogate, and Leamington had fewer. Among the 17 coastal resort destinations, Brighton accounted for the most in 1828, followed by Southend. There were 19 industrial destinations. The new manufacturing towns of Birmingham and Manchester account for most services in 1828. 39 destinations are

classified as county towns, if they had an assize (a court which sat at intervals in each county to administer the law) and had not already been categorised as port, military, resort, or industrial. Oxford, Reading, and Salisbury were the county towns with the most services in 1828. Finally, there were 260 London destinations categorised as other. Some like Windsor, Maidenhead and High Wycombe had substantial services in 1828.

Table 3 reports the number of London services to all destination categories and the annual growth rate over various sub-periods. Total London services are in the last column. There are several interesting patterns. First, London coach services to resort destinations grew strongly from the mid-eighteenth century. Prior to 1727, direct services to inland resort destinations were absent. Afterwards they increased at a rate of 6.1 per cent up to 1760, much more than total services. More remarkable is the growth to the coastal resorts after 1760. They increased at twice the rate of the total, and after 1800 exceeded inland resorts overall. Brighton accounts for much of this change. In 1830, Brighton was a destination for 115 of the 257 services to coastal resorts. The rapid increase is consistent with the popularity of Brighton in the Regency period.<sup>21</sup>

Table 3 *Number of London coach services per week to categories of destination (more than 25 miles distant)*

Year	Port	Military	Inland resort	Coastal resort	Industrial	County town	Others	Total
1681	21		0		1	83	102	207
1705	23			1	7	81	84	196
1715	42			1	4	84	146	277
1727	37	6	2		6	90	122	263
1738	34		9		1	83	108	235
1749	43	6	12	1	8	85	139	294
1760	50	1	14	3	18	115	115	316
1770	123	25	38	18	42	238	371	855
1779	190	30	42	38	66	301	430	1097
1791	317	54	33	38	82	445	347	1316
1810	368	94	27	141	94	404	461	1589
1830	401	104	42	257	174	393	698	2069
1835	413	91	66	344	154	464	798	2330
<b>Growth %/a</b>								
1681-1760	1.1		6.1		3.7	0.5	0.2	0.5
1760-1791	6.1	13.7	2.8	8.5	5.0	4.5	3.6	4.7
1791-1835	0.6	1.2	1.6	5.1	1.4	0.1	1.9	1.3

Source: services taken from directories described in Table 1. The 25 miles limit avoids interference from commuter traffic.

Notes: The inland growth rate before 1761 starts in 1727. The military growth rate before 1791 states in 1749.

Other notable patterns in Table 3 concern military, industrial, and port destinations. Military destinations increased substantially from 1760 to 1810. The timing makes sense because of the overlap with the Seven Years

War, the War of American Independence, and the Napoleonic Wars. Frequent communication between the capital city and naval complexes was obviously crucial during a period of regular war. The data also show that industrial destinations increased at a slightly higher rate than the general trend, especially in the early 1700s. However, industrial destinations made up just over 8 per cent of the total in 1830 and their annual growth rate was not especially high. One might have expected more business travel to the Capital necessarily followed from the industrial revolution. While that may be true, the rapid growth in port destinations from 1760 to 1810 does indicate that business travel related to trade and commerce did follow from the economic changes associated with the industrial revolution.

County towns provide a contrast. They were the main destination for London coaches in 1681 and 1705. Their growth did not keep pace with the total after 1791. Perhaps this is not surprising, since the population of county towns generally increased at a slower rate compared to industrial, port, and resort towns in the late 1700s.<sup>22</sup> Also some county towns were the destination for a stagecoach service in the early 1700s, but then became intermediate stops on longer distance journeys to other destinations.

More long-distance services inevitably increased traffic density on roads close to London. Added to this, there were more London services with destinations to suburban villages and small dormitory towns less than 10 miles from London. How much did scheduled coaching traffic increase near London? Figures 5(a)-5(d) show the growth of all passenger traffic into London, both short and long distance. Passenger traffic is evenly partitioned between the main radial roads between 1681 and 1760, and density did not rise dramatically on the approach to London, reflecting the preponderance of longer distance scheduled coach services into London during the early eighteenth century.

By 1791 and especially by 1836, there was heavy traffic on the roads through Kew and New Cross. They arose from the large number of short-stage services to the new residential areas of West London and the parishes on the Surrey and Kent banks which had benefitted from the building of the new Thames bridges in the 1820s.<sup>23</sup> These short-stage services used the same roads as the long-stage coaches, which resulted in a step change in traffic volumes over the final five miles into the City. If account is taken of short-stage traffic, there were potentially 1319 services per week by advertised coaches passing Kew Bridge junction in 1836 and 2337 at Knightsbridge (equivalent to 360 daily journeys each way allowing for some Sunday services).

Figure 5 The increase in *advertised coach traffic on roads from London*

Figure 5(a), 5b, 5c, 5(d) here

Sources: see text.

Notes: Line width is proportional to numbers per week. The scale has 18 increments up to 2400 services per week. Enumeration is at five mile intervals or major junctions.

## Mapping Provincial Coach Services

We now turn to coach services that did not originate in London. Figure 6 plots Country service routes c.1830 as hollow grey lines and for comparison London coach services are shown in black.<sup>24</sup> Strikingly, Country service lines look just as extensive as London services. There were several prominent regional hubs which were relatively close, so that radial services from each interconnected and formed a network. London services ran to these individual hubs, crossing some arms of the provincial routes and incorporating the isolated terminals of London services into an integrated national network. Notice also that many Country services have distinct routes from London services, especially around the industrial towns like Manchester and Leeds as well as to seaside towns in the north and southwest. The latter illustrate the early development of these resorts with services from provincial hubs, pre-dating the rise of mass travel after railways were built.<sup>25</sup>

Figure 6 *London and Country coach services ca 1830*

Figure 6 here

Source: see text.

Notes: Black lines represent routes of London stage coaches in 1830, thick grey lines represent routes of Country coaches in 1828/1830, a line through in the middle of the thick grey line represents a Country route on a turnpike road. Open grey lines are Country coach routes not on a turnpike (eg North Yorkshire Moors and NE Norfolk). Thin lines are turnpike roads in 1830.

How does the combination of London and Country services relate to the turnpike network? We estimate that 92 per cent of coaching routes were on turnpike roads in 1836 and 90 per cent were on turnpike roads in 1791. These figures suggest that coaching services were almost necessarily on turnpike roads. But, at the same time, many turnpike roads did not have scheduled coaching services. We estimate that only 50 per cent of turnpike roads in 1791 had a London or Country coach service on its road and about 60 per cent had one by 1836. While increasing in importance by 1836, stage coaches were not necessary for all turnpike roads.

The distribution of services within the network is illustrated using the number country routes *through* the main towns or hubs. Country through services are shown in Figure 7, with the darker circles reflecting higher numbers of provincial routes through a town. Notice that connections between provincial towns are relatively few through eastern England, whereas many provincial routes pass through the towns in western England creating an interconnected network.

The pattern emerging by the 1830s (shown in Figures 6 and 7) was of two overlapping networks with different structures. The towns of south-eastern England were served by a London-centric network with almost no intra-regional links. North and west of London there was a dense network connecting major hubs in Birmingham, Manchester, Leeds and Bristol, with lesser hubs on the periphery such as Norwich, Shrewsbury, Oxford, Southampton and Exeter. These were well connected to each other and were on the London radial network. They did not have strong direct links to towns in the Home Counties, around 50 miles from London. The Country network provided the bulk of the routes to the remoter parts of Northern and Western England and Wales.

Figure 7 *Number of provincial coach routes through individual towns advertised in 1828/30*

Figure 7 here

Sources: see text.

Notes: Grey scale from 80 to 10 routes for large circles, 10 to 1 routes in hollow circle, no provincial routes in small circle.

Population was a factor in the importance of a Country hub, but it was not the whole story. Towns within 40 miles of London were relatively small, but even allowing for this, the towns from London to Norfolk had few provincial connections ( e.g. Buckingham, Ipswich, and Chelmsford). In contrast, the medium-sized towns of western England have a high provincial connectivity for their population size (e.g. Gloucester or Dorchester). Although in absolute terms the very large conurbations have high Country connectivity, based on population they are less connected than the medium-sized towns of the Midlands and Northern England. Through-traffic tends to boost the route numbers for these intermediate towns.

The composition of country services by distance is shown in Table 4 for all hubs. The 12, 70 and over-70 mile categories were chosen to separate local traffic, intra-regional traffic, and inter-regional traffic. The Figures

demonstrate the size and extent of the coach networks around the five major hubs of Manchester, Birmingham, Leeds, Newcastle and Bristol. Just over 50 per cent of all Country services in 1830 were from these five hubs.

The number and loadings of advertised services from London that passed through or terminated at the hub are listed in columns 4, 5, and 6 of Table 4. Country services (between 12 and 70 miles) were several times greater than the London stage coach services (compare column 2 and 4). Therefore, the number of passengers carried to or through these towns from places over 12 miles distant far exceeded the numbers from London. In the case of Halifax and Manchester, the ratio is more than an order of magnitude, so even if some of these were smaller coaches the contrast is large. In the West of England and South Wales, local travellers exceeded London travellers by more than a factor of two. See for example Bristol, Worcester, Gloucester, Bristol and Swansea. Conversely, London travellers dominated arrivals at Brighton, Winchester and Portsmouth and in East Anglia for Kings Lynn, Ipswich and Cambridge. Geography inevitably affected the nature of the hubs. There were no large towns to serve further along the Dover, Norwich or Brighton roads and the journey time from London to hubs such as Manchester and Exeter (ca 20 hours) might have been at the limit of endurance for all but the dedicated traveller.

Table 4 *Scheduled coach services per week originating or passing through provincial hubs in 1835*

1	2	3	4	5	6
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Hub	coach services up to 12 miles	coach services 12 up to 70 miles	coach services over 70 miles	London Stage coaches	London Mail coaches	proportion of London services terminating here
<b>Northern England</b>						
Carlisle	7	21	19	0	14	1.0
Halifax	0	131	10	7	0	1.0
Hull	62	56	0	6	7	1.0
Lancaster	0	42	25	0	7	0.0
Leeds	145	150	50	28	7	1.0
Liverpool	254	93	41	20	7	1.0
Manchester	1431	392	78	41	7	0.9
Newcastle	531	199	53	7	7	1
Sheffield	32	142	26	20	7	0
York	0	112	39	21	7	0.5
<b>Midlands</b>						
Birmingham	502	311	135	114	21	0.6
Leicester	15	64	19	70	7	0.1
Northampton	6	22	6	77	14	0.1
Nottingham	7	132	23	40	7	0.3
Oxford	6	66	3	122	14	0.2
Shrewsbury	0	87	43	27	7	0.8
<b>East Anglia</b>						
Cambridge	0	36	12	60	7	0.6
Ipswich	0	38	0	34	14	0.1
Kings Lynn	2	48	6	9	0	1.0
Norwich	2	72	6	27	14	1.0
<b>Western England</b>						
Bristol	29	309	73	48	14	0.9
Cheltenham	66	133	45	48	7	0.1
Exeter	31	77	67	33	14	0.9
Gloucester	69	112	59	24	7	0.6
Plymouth	148	35	0	0	7	1.0
Salisbury	0	51	20	39	14	0.2
Taunton	12	35	42	12	7	0.6
Worcester	13	129	53	25	7	0.8
<b>Southern England</b>						
Brighton	90	63	6	150	7	1.0
Canterbury	37	169	0	91	13	0.5
Chatham	226	7	0	130	13	0.2
Maidstone	27	64	0	47	0	0.9
Portsmouth	3	28	7	52	7	1.0
Southampton	0	78	31	64	7	0.9
Winchester	6	25	6	64	7	0
<b>Wales</b>						
Brecon	0	9	22	0	0	0
Swansea	0	24	3	0	7	0

Source: based on authors' calculations from Robson's Directory list of licensed coaches 1835.

Manchester and Birmingham are worth a closer study since they had the largest numbers of Country passengers a week. By 1830, coaches could reach Birmingham in only 12 hours from London and with a Midland location, it became a hub for both intra and inter-regional services fed by many London services. Manchester was at least a 20-hour journey from London and had fewer London services, but was well placed as the large hub for intra-regional routes to industrial towns. Figures 8 (a) & (b) illustrate the character of the networks centred on Manchester and Birmingham. The dashed lines are coach services in 1793. A dash without a double line is a service

that exited after 1793 (e.g. Birmingham to Chester in 8 (a)). A service with no dashes entered by 1830 (e.g. Birmingham to Shrewsbury in 8 (a)). A service running at both dates is shown as a double line enclosing dashes (e.g. Birmingham to Leicester).

Figure 8 (a) & (b) *1793 and 1830 Country coach services from and through Birmingham and Manchester*

Figure 8a, 8b here

Source: Authors depictions from *1793 from UBD and 1830 from Pigot Regional Directory*.

Notes: Dashed lines are routes in 1793, wide grey lines are routes in 1830, London services in 1830 are thin grey lines. Open grey lines are sections of 1830 Country coach routes not on a London service route (e.g Chester to Welshpool).

We see that Birmingham was at the centre of a symmetrical web of long-stage routes, while Manchester had a larger number of shorter regional routes heading northwards into industrial Lancashire and West Yorkshire. Both hubs had a basic long stage-network established by 1793, but service frequency increased and new routes to secondary destinations were established by 1830. There were 15 Country services per week between Manchester and Birmingham in 1793, but this only grew to 18 direct and 19 through-services by 1830. However, services from Manchester to Leeds grew from one per week in 1793 to 42 in 1830 and Manchester to Sheffield from three to 27. In general, this growth was lowest on routes which duplicated sections of London service roads and much greater on routes that linked to hubs on other London radials.

Although London had a much larger number of long-distance services, only about 10 per cent of the London services connected to industrial towns (see Table 3) whereas a very large proportion of the Manchester services were to other industrial towns. Hence the scale of commercial travel from the northern hubs may have been of similar magnitude to that of London. Figures 8 (a) & (b) illustrate how the Country network was actually a mosaic of interconnected networks around large hubs. Regional coach masters controlled important distributor routes and were competing for business on the sections of the London routes close to their hub. Thus, passenger journeys to London in the 1830s may have involved a regional coach to a hub such as Birmingham, and then a London operated coach from there to the City, rather than the single London coach service that had been the only option in the eighteenth century.



In summary, the emergence of the provincial coach network appears to be a late eighteenth-century phenomenon. There is no evidence in directories for sustained Country services before 1760<sup>26</sup> and detailed studies of individual hubs, like Bristol have already noted this.<sup>27</sup> However, once regional services were established, they grew at a faster rate than the London services after 1790 to achieve a similar overall size to the well-established London market by the mid-1830s. Importantly, this was multipoint growth that developed a dense network of services. As a final illustration, Figure 9 shows the national coach network (i.e. London and Country services combined) in the early 1790s as dashed lines.<sup>28</sup> The national network in 1836 based on stagecoach licenses is shown in black lines. There were many more routes in 1836, the majority of which start from provincial hubs (contrast with Figure 3 which shows just London services for similar years). The new Country routes increased in a band running northwards from Bristol, through Birmingham to Manchester and Leeds. This western corridor complemented the eastern routes along the line of the Great North Road from London. Travellers between provincial towns could avoid going into London and then out again on another radial route. Passengers were fed into the larger hubs with London services, but some of these services inevitably ran along the axis of the London route. This Country network was more easily extended outwards by these local operators increasing the overall growth rate and perhaps out-competing the longer London services at their extremities.

Figure 9 *London and Country coach services in 1791/93 plotted above London and Country coach services in 1836*

Figure 9 here

Source: see text.

Notes: Black lines represent routes of London and country stage coaches in 1836, dashed lines represent routes of London and country coaches in 1791, a dashed line without a black border (say in the North between Lancaster and Stockton) is a route with a service in 1791 but not in 1836. Thin lines are turnpike roads in 1830.

## Conclusions

Combining directories with GIS, we have displayed the actual roads used at particular time points during the 150 years when scheduled stage coaches grew to dominate inland public passenger transport. GIS has allowed us to (i) map or visualise the actual routes taken by coach services, (ii) count the number of services on each section of road, and (iii) document the relationship between turnpike roads and coach routes.

Our route maps show how London stage coach services grew in number and reach between 1760 and 1835. This growth was disproportionately into the counties of southern England and included many new destinations. The exceptionally large increase in coastal resort destinations suggests an increasing portion of these services were for recreational travel. The greater increase in destinations with military facilities or with ports suggests political and trade purposes for travel also increased disproportionately.

While we establish some new facts about London stage coaches, our paper is more novel in documenting the rapid transformation in Country coach services. They underwent substantial growth between the early 1790s and early 1830s. We show that within the regions, an interconnected network emerged which linked the diverging lines of London services. This depended on a few regional hubs with substantial independent, long distance services, linking towns that would never warrant a direct service to London. Manchester, Birmingham, Leeds, Newcastle and Bristol were the largest regional hubs, accounting for just over 50 per cent of all Country services in 1830. A closer examination of Manchester and Birmingham shows when and how these hubs grew. Both had a basic long stage-network established by 1793, but service frequency increased dramatically by 1830 and so did the number of destinations. Many of their new destinations were industrial towns, suggesting the purposes of stage coach travel were quite different in regional hubs, like Birmingham and Manchester.

This article also documents that by the 1830s a new market for short-stages had emerged around London. It provided daily commuter services along the radial roads close to the capital. These services were concentrated in certain areas and led to high volumes of scheduled coaches near nodes such as Kew Bridge, Knightsbridge and New Cross by the 1830s.

The findings in this article have broader implications. First, it provides evidence that English transport underwent a 'revolution' in service quality and cost before railways. At the start of this period in 1680, those who could afford to travel would generally make long journeys on horseback. By the end of our study in the 1830s, they would generally travel between towns in a shared coach, drawn by horses.<sup>29</sup> The full national network that emerged by 1830 demonstrated the potential travel market for the coming railways and would be adapted to complement the railways as they grew. Second, road improvements under the turnpike trusts have been highlighted as a key factor in the development of travel during our period, but it is unclear to what extent the turnpike roads and stage coach services were related. Our analysis reveals that approximately 90% of London and Country coaching services map onto

the turnpike network in 1836, but many turnpike roads do not have coaching services at the same date, especially in the provinces. This suggests scheduled coaching cannot easily explain the turnpiking of many miles of provincial roads. Third, and more generally, this article illustrates a new methodology for studying the history of mobility. We combine GIS tools with a traditional source, the trade directory. Future research could apply GIS to other sources to develop new insights.

## **Appendix: Directory sources**

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No Author. "The Intelligencer: or, Merchants Assistant", (London, 1738).

No Author. "A Complete Guide to All Persons Who Have any Trade or Concern with the City of London, and Parts Adjacent", (London, 1760).

No Author. "Baldwin's New Complete Guide to All Persons who have any Trade or Concern with the City of London", (London, 1770).

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J. Pigot & Co. "Pigot and Co.'s National Commercial Directory for 1828-9 : comprising a directory...of the merchants, bankers, professional gentlemen, manufacturers and traders in the cities, towns...and principal villages in...Cheshire...Shropshire...and the whole of North Wales", (London, 1828).

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## End Notes

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<sup>1</sup> Jackman, W.T., *The Development of Transportation in Modern England* (Cambridge UK, 1916); Copeland, J., *Roads and their Traffic 1750-1850* (Newton Abbot, UK: David & Charles, 1968); Austin, B., "The Impact of the Mail Coach on Public Coach Services in England and Wales, 1784-1840", *Journal of Transport History* 2:1 (1981), 25-37. Chartres, J.A. & Turnbull, G.L., "Road Transport", in Aldcroft D. & Freeman M (ed.) *Transport in the Industrial Revolution* (Manchester: Manchester University Press, 1983), 64-99; Gerhold, D., *Carriers & Coachmasters; Trade and Travel before the Turnpikes* (Chichester, UK: Phillimore & Co, 2005); Gerhold, D. "The Development of Stage Coaching and the Impact of Turnpike Roads 1653-1840", *Economic History Review* 67: 3 (2014), 818-845; Turvey, R. "Horse Traction in Victorian London", *Journal of Transport History* 26:2 (2005) 38-59.

<sup>2</sup> Dickinson, G.C., "Stage Coach Services in the West Riding of Yorkshire between 1830 and 1840", *Journal of Transport History* 4:1 (1959), 1-12; Freeman, M.J., "The Stage Coach System of South Hampshire, 1775 – 1851", *Journal of Historical Geography* 1:3 (1975), 259-281; Herson, J., "Estimating Traffic; a Case Study of the Chester Sub-region in 1827-30", *Journal of Transport History* 29 (2002), 113-146; Gerhold, D., *Bristol's Stage Coaches* (Salisbury, UK: Hobnob Press, 2012);

<sup>3</sup> This research program is directed by Leigh Shaw-Taylor, Amy Erickson, and Tony Wrigley. See <https://www.campop.geog.cam.ac.uk/research/occupations/>.

<sup>4</sup> For discussions of the transport revolution in Britain, see Bagwell, Philip. *The Transport Revolution 1770-1985* (London, 1988) and Dan Bogart, "The Transport Revolution in Industrialising Britain", in Roderick Floud, Jane Humphries, Paul Johnson (eds.), *The Cambridge Economic History of Modern Britain, Volume 1* (Cambridge: Cambridge University Press, 2014), 368-391.

<sup>5</sup> Albert, W., *The Turnpike Road System in England 1663-1840* (Cambridge: Cambridge Press, 1972). Pawson, E., *Transport and Economy: the Turnpike Roads of Eighteenth Century Britain* (London: Academic, 1977).

<sup>6</sup> Pawson, *Transport and Economy*.

<sup>7</sup> Two examples are Guldi, J. "Topic Modeling the History of Infrastructure in Nineteenth-century Great Britain" *Technology and Culture* (forthcoming 2019) and Atack, J. "On the Use of Geographic Information Systems in Economic History: The American Transportation Revolution Revisited", *Journal of Economic History* 73:2 (2013,) 313-338.

<sup>8</sup> Gerhold, D. "The Development of Stage Coaching and the Impact of Turnpike Roads 1653-1840".

<sup>9</sup> Gerhold, D., *Bristol's Stage Coaches*, Gerhold, D. "The Development of Stage Coaching and the Impact of Turnpike Roads 1653-1840".

<sup>10</sup> Gerhold, D., *Bristol's Stage Coaches*.

<sup>11</sup> These figures are based on Directories described below.

<sup>12</sup> Dan Bogart, "Did Turnpike Trusts Increase Transportation Investment in Eighteenth-century England?", *The Journal of Economic History* 65:2 (2005), 439-468.

<sup>13</sup> W. Albert, *The Turnpike Road System in England 1663-1840*.

<sup>14</sup> Guldi J., *Roads to Power* (Harvard, 2012).

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- <sup>15</sup> Hart, H.W., "Some Notes on Coach Travel, 1750–1848", *Journal of Transport History* 3 (1960), 146-160; Gerhold, D. "The Development of Stage Coaching and the Impact of Turnpike Roads 1653-1840".
- <sup>16</sup> For details on the Transport, Urbanization and Economic Development in England and Wales c.1670-1911 Project see <https://www.campop.geog.cam.ac.uk/research/projects/transport/>. Data on turnpike roads were created by several authors. A description of the dataset can be found in Bogart, D., Rosevear, A. and Satchell, M., 'Turnpike roads of England and Wales 1667-1892 GIS shapefile documentation.' The documentation for the data can be found at: <https://www.campop.geog.cam.ac.uk/research/occupations/datasets/catalogues/documentation/> The actual data is attributed to Rosevear, A., Satchell, M., Bogart, D., Shaw Taylor, L., Aidt, T. and Leon, G., 'Turnpike roads of England and Wales, 1667-1892', 2017.
- <sup>17</sup> Bates A., *Directory of Stage Coach Services, 1836* (Newton Abbot: David & Charles, 1969)
- <sup>18</sup> Austin, "The Impact of the Mail Coach."
- <sup>19</sup> e.g. coaches bound for Bristol passed through Bath and those bound for Leeds passed through Leicester.
- <sup>20</sup> e.g. Exeter is classed as a County town not as a manufacturing town.
- <sup>21</sup> Hembury, P., *The English Spa 1560-1815* (London, 1990); Allen, L., *The Georgian Seaside – The English Resorts before the Railway Age* (Milton Keynes, 2016).
- <sup>22</sup> Clark, P., *The Transformation of English Provincial Towns*. (London, 1984).
- <sup>23</sup> Chartres, J.A. & Turnbull, G.L., "Road Transport".
- <sup>24</sup> London services from Robson's Directory of 1830; Country Services from Pigot National Directories of 1828-30. See appendix for description of sources.
- <sup>25</sup> Travis J. "The Rise of the Devon Seaside Resorts, 1750-1900" (Liverpool, 1993); Walton J.K., *The English Seaside Resort: a Social History 1750–1914* (Leicester, 1983).
- <sup>26</sup> Though nothing can be found in Directories there are newspaper adverts for services from Bath to Exeter and to Oxford in the 1750s and occasional references to earlier service that do not seem to have been sustained.
- <sup>27</sup> Gerhold, D., *Bristol's Stage Coaches*.
- <sup>28</sup> The 1791 London services and 1793 Country services combined from Universal British Directory; 1836 London and Country Services from Robson licenses list.
- <sup>29</sup> Pawson, E., *Transport and Economy*.