ANIMATING THE SEAMLESS PUBLIC TRANSPORT JOURNEY IN 2030 INSTRUMENTAL AND AFFECTIVE FACTORS

Dr Robin Hickman, Dr Iqbal Hamiduddin, Professor Peter Jones, Professor Peter Hall, Colin Osborne, University College London
r.hickman@ucl.ac.uk
Birgitta Hosea, Steve Roberts, Central Saint Martins College of Arts and Design

ABSTRACT

This paper considers the possibilities for the development and animation of the future seamless public transport journey in 2030, drawing on the SYNAPTIC project (Synergy of New Advanced Public Transport Solutions Improving Connectivity in North West Europe, http://www.synaptic-cluster.eu), funded by the EU INTERREG IVB programme. Investment in public transport and other transport modes tends to be based largely on travel as an instrumental experience, i.e. we seek to speed travel up, make more convenient, or try to change the cost of travel. The quality of the journey, particularly the affective factors (such as the enjoyment or productivity of travel, happiness, 'stress' and wider experiential factors), are less understood in terms of their importance to travel. We see the development of the positive affective experience as critical to the future public transport journey. An animated journey from Preston (UK) to Delft (the Netherlands) is produced to illustrate the possible future public transport travel in 2030.

Keywords: public transport, interchange, instrumental, affective, animation

INTRODUCTION

The quality of the public transport journey experience – from the door-to-door and user perspective – seems critical to the future use of public transport and the achievement of greater sustainability in travel behaviours. This includes the quality of the journey link and interchange, and the access at either end of the 'main' public transport journey. Improving this experience can potentially contribute positively towards aspirations such as city and regional development, reducing carbon dioxide (CO_2) emissions from transport, and even achieving greater equity in travel. Instead of viewing the time spent in travelling as an inconvenience, and the transport interchange as 'a penalty', perhaps these can be viewed as opportunities. The quality of a journey can hence matter more than its length and, on occasions, its speed. Across Europe, the evidence is that car use has peaked: travellers are increasingly avoiding congested highways in favour of high-quality public transport as the primary mode of travel. Drawing on the findings of the SYNAPTIC[1] project, and also wider

---

[1] SYNAPTIC ('Synergy of New Advanced Public Transport Solutions Improving Connectivity in North West Europe') is an EU-funded INTERREG IVB cluster of four North West European transport projects: RoCK (Regions of Connected Knowledge), BAPTS (Boosting Advanced Public Transport Systems), SINTROPHER (Sustainable Integrated Tram-Based Transport Options for Peripheral European Regions), and ICMA amobilife

related work concerning the potential improvement of public transport interchanges (Green and Hall, 2009), we put forward three key principles that have quite fundamental implications for project definition, appraisal, investment and implementation:

- The focus for improving public transport should be on the overall door-to-door journey, not just the individual elements. Journeys need to be conceived as coordinated, integrated, enjoyable and easy to use, with 'points of friction within and between different stages removed or reduced.
- The supporting factors for major infrastructure investment are critical, often having a large impact on the perceived success of the project. These can include issues of urban planning and design (at different scales – from interchange design, to surrounding areas masterplan, to city-region development); information and ticketing.
- The traveller will only see the 'tip of the iceberg' in mobility management; while the delivery of transport services involves considerable underlying complexity for providers, it should be simple for travellers to use.

This focus on the experiential factors seeks to expand on a growing literature which points to the importance of affective factors in travel journey satisfaction. Instrumental factors are related to the practical aspects of travelling, where cost, efficiency and flexibility are of significance. Affective factors refer more to feelings that are induced by travel, and include enjoyment, pleasure, stress, boredom and control, drawing on the theory of affect (Russell and Snodgrass, 1987; Anable and Gatersleben, 2005). A person's stable long term tendency to respond consistently to emotionally arousing situations is seen as 'emotional disposition' and the 'affective disposition' as attributing an affective quality to a thing, event or place. Within this paper we view this affection in terms of the public transport journey experience.

Previous research on travel behaviour, and most often concerning private car usage, has historically been explained though instrumental factors; notably speed and convenience. This has had a very important influence on project appraisal and modelling, and hence project investment, where increasing traffic volume, throughput and speed, and 'saving time' on travelling have been the primary objectives. Most of the conventional understanding has assumed that travel is a 'cost' to be lessened and travel decisions concerning route choice and mode are based on the rational weighting of different instrumental factors. Mokhtarian and Salomon (2001) however highlighted that travel can be 'more than a derived demand', where travel may, on occasions, have its own positive utility. More recently other symbolic and affective factors have been demonstrated to play an important role in the satisfaction with travel (Steg, 2005; Anable and Gatersleben, 2005; Stradling et al., 2007; Ettema et al., 2010b; Ettema et al., 2010a). Though instrumental and affective factors are often separated in the research, little empirical evidence exists of their relative significance, and indeed they are likely to be closely interrelated. Anable and Gatersleben (2005) found that instrumental factors have more importance for work journeys, whereas for leisure journeys equal importance was given to both affective and instrumental factors. Given the often 'voluntary' nature of leisure travel, where the travel is undertaken to improve the well-being or quality of 'life activity', it is perhaps expected that affective factors might have a higher relative importance. The emphasis on experience and emotion in transport is critical: when travel is

WCTR, July 2013 – Rio de Janeiro, Brazil

agreeable, it is likely to be continued over a period of time, and perhaps repeated (Ettema et al., 2010a).

At the heart of the debate is the neo-classical framework which underpins much of transport modelling, appraisal and investment. Transport is often analysed and planned from the perspective of the natural sciences (of moving an object from A to B) rather than the social sciences (the behaviour of humans) (Giddens and Dallmayr, 1982; Flyvbjerg, 2001). The latter, of course, tend to be much more complex and difficult to plan for. This rational behaviour understanding is increasingly being seen as simplistic and outdated. Central tenets are being revisited – that travel time might not always be minimised, that the user often doesn't maximise utility (travel time and cost), that some travel might actually be attractive or productive to the user (Jain and Lyons, 2007; Banister, 2011). People might not rationalise their travel choices in a manner that we would expect – they are not fully informed, are inattentive to information, and do not perfectly discriminate between options. There are important factors in travel choice such as context, judgement, practice, habit, trial and error, experience, common sense, intuition and bodily sensation; all of these excluded in our analysis of 'rational' travel behaviour (Flyvbjerg, 2001; Schwanen et al., 2012). Wider still, Kahneman (2011) contends that there may be a dual process of cognition in individual behaviours, with 'System I' behaviours being associated with automatic, intuitive responses to our environment; and 'System II' behaviours associated with more systematic, rational, effortful and consciously deployed actions. Both systems are susceptible to error, are inconsistent, and there are often resulting erroneous actions. This emerging understanding has fundamental implications for a changed view of travel and transport – including implications for transport analysis, planning and investment – but these are only beginning to be thought through.

APPROACH TO JOURNEY ANALYSIS

The SYNAPTIC project draws on this evolving context to consider the potential for enhancing the conditions for the use of public transport, including issues of intermodality (the capacity to combine different modes of transport in a flexible way) and 'seamless' door-to-door journeys (improving the ease of travel by public transport, with dimensions of interchange, information and ticketing).

Journey audits were undertaken of real journey experiences across Europe in 2012, from the perspective of the traveller (Hickman et al., 2012). The key message was that in most cases, the actual journey failed to meet the traveller's expectations; specifically:

- There was a strong lack of consistency in basic services and facilities at transport interchanges, across transport operators and a strong lack of consistency and quality in response to disruptions and unforeseen circumstances, across transport agencies and operators.
- The biggest deficiencies were instrumental issues, such as the cost and speed of the trip, but also there were major deficiencies among affective issues – the elements of journey quality we often ignore in the design of public transport systems. For example, there was a lack of Wi-Fi; the trip was perceived as inconvenient; it was poorly integrated, with too much waiting time; it was too busy, too overcrowded and travellers felt anxious and impatient, there was little chance for social interaction; they could not use their time productively; and there was insufficient protection against the weather.

All of these seem are fundamental problems with the quality of the public transport journey, and key barriers to increased usage.

Within the analysis, the public transport journey is conceived as a door-to-door journey ("Any A to any B") with a series of links (various forms of public transport, walk, cycle, taxi or private car) and nodes (typically the interchange) (Figure 1). The experience of each component of the journey is analysed using a journey audit and attitudinal survey analysis. The latter allows measurements of satisfaction to be developed and compared.

Figure 1: The Components of the Public Transport Journey
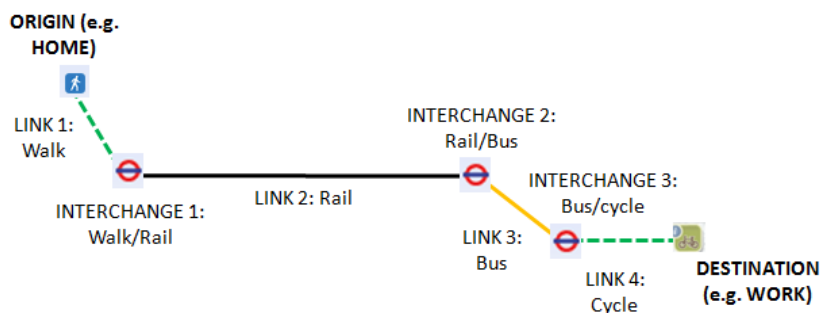
The journeys were selected to have issues of interest for the project, including:
- The use or need for digital technologies (home internet, mobile phones or other applications) to help access information, plan journeys and secure tickets, with special reference to those with less familiarity of new technologies;
- A range of different physical designs of vehicles on the journeys, constituting the seamless-web network (paratransit, taxis, buses, trams/tram-trains, trains) and their physical linkages, also with reference to the mobility needs of elderly people;
- A range of multi-modal PT hubs and connections on the journeys (physical infrastructure, ticketing and information);
- Spatial coverage of journeys across North West Europe.

Students and academics from University College London, the University of Aberdeen, NHTV Breda University of Applied Sciences, and Bergische Universität Wuppertal (Wuppertal University) were recruited to undertake a selection of international and regional journeys. The journeys were carried out across North West Europe, with 13 respondents (usually two journeys each) and 13 regional and 12 international journeys (Figure 2). The journeys were carried out specifically for the study. Surveys were carried out for each journey stage; with 187 node surveys and 207 link surveys completed. Examples of the surveys are shown in the Annex, with a breakdown as below:

- Form A: User Type and Journey Classification
- Form B: Journey Preparation
- Form C: Link (Walk, Cycle, Car, Taxi)
- Form D: Link (Public Transport)
- Form E: (Interchange)
- Form F: (Overall Journey)

The surveys (following Stradling et al., 2007) asked a series of questions, typically isolating instrumental and affective factors by journey component (Table 1), along the lines of:

"*When I use this mode/interchange, it is important that ...*" and compared to "*What was your experience of this mode/interchange ...*".

Answers were usually given on a Likert scale, ranging from strongly disagree (score 1) to strongly agree (score 5). 'Negative' factors, such as stress, were reverse scored, as it was assumed that less of them is a good thing, though of course this can be disputed.

Table 1: Example Instrumental and Affective Variables

Instrumental	Affective
The journey is quick	I feel safe and secure
The journey is convenient	The journey is attractive with lots of interest
The journey is good value	I can people watch
I arrive punctually	The journey is fun

Though the number of respondents and complete journeys was small, the focus of the analysis was to compare link and interchange experience, hence the number of node and link surveys is larger and provides a useful sample size. The survey results are not representative of any wider population, indeed this was not the intention of the research, but instead provide a rich and detailed picture of the particular user perceptions of a selected sample of international and regional journeys.

Weaknesses we found whilst carrying out the surveys were the extent of time needed to fill in the surveys for each link and interchange and the repetitive nature of questioning. These could perhaps be improved in any follow up research. There is also an important issue in that respondents answer very differently to similar experiences and questions. We handle this later in the analysis by comparing 'expected' against 'realised' experience, rather than absolute responses, but it is noted that this is an imperfect science for comparison. Ethnographic approaches to surveying experience may also prove useful in any follow up work. A heavy reliance on survey results can fail to identify the actual experience, causes and consequences of given problems – defining, labelling and counting the rate at which issues occur can often miss the rich understanding of experience of 'what actually happens' (Flyvbjerg, 2001). On the other hand, universal generalisations are difficult from more qualitative approaches. It is recommended that a balance of approaches is required, and this is what was attempted.

Figure 2: International and Regional Journeys
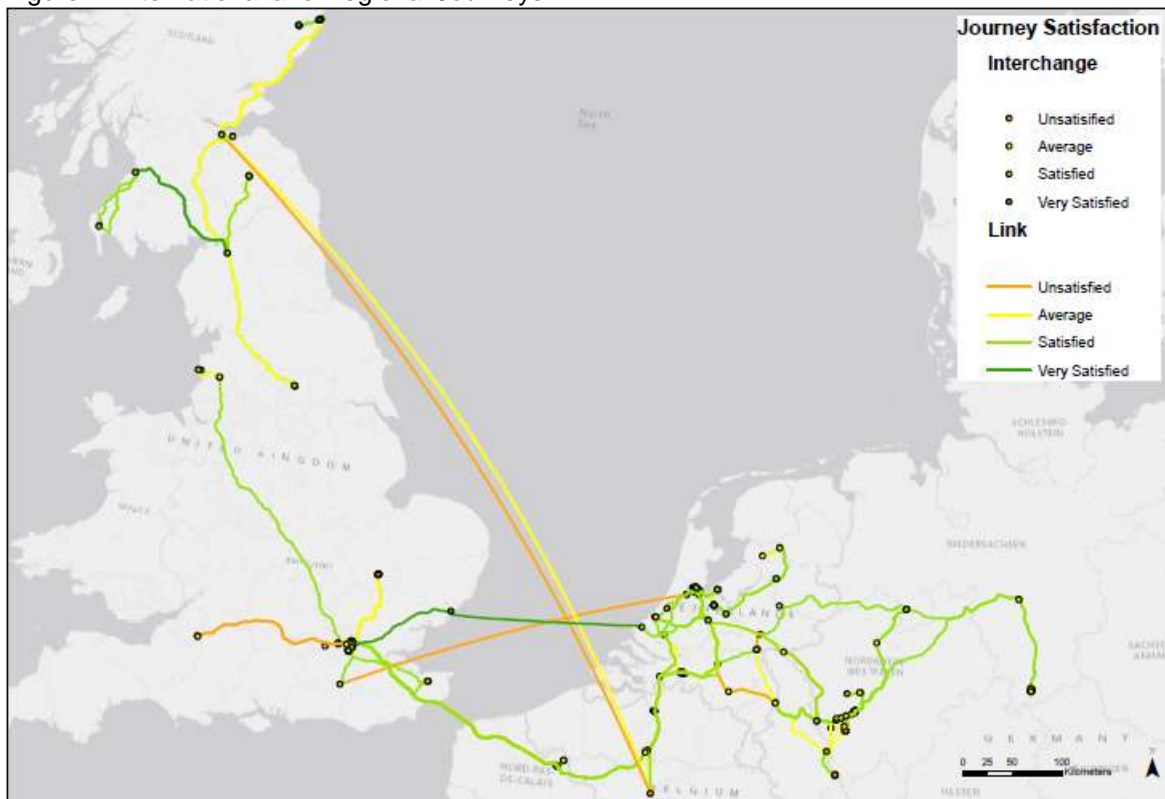

(Hickman et al., 2012)

JOURNEY COMPONENT ANALYSIS: INSTRUMENTAL AND AFFECTIVE FACTORS

The results of the attitudinal surveys are presented below, comparing expected and observed satisfaction ratings for link and interchange stages of the journey. The different journey stages are compared as below:

- Link (Walk, Cycle, Car Driver, Car Passenger, Taxi), which tends to be the start or end of the public transport journey (Figure 3)
- Link (Bus, Rail, Tram, Underground, Ship, Air), which tends to be the 'main mode' element of the journey (Figure 4)
- Interchange (Rail, Bus or Multimodal Hub) (Figure 5)
- Overall Journey, a view of the whole journey (Figure 6)

There is perhaps some overlap in definition between instrumental and affective factors (some issues can perhaps be seen as covering both, and perhaps instrumental contributes to the affective experience). However the disaggregation shows how affective factors perform less well against expectation relative to instrumental, i.e. there is a much greater dissonance and perhaps disappointment for the user. An initial (and important) finding is also the damning underperformance against expectation, for both instrumental and affective factors. There are very few indicators where the realised journey exceeds expectation.

Figure 3: Experience of the Journey Link (Walk, Cycle, Car Driver, Car Passenger, Taxi) (Form C)
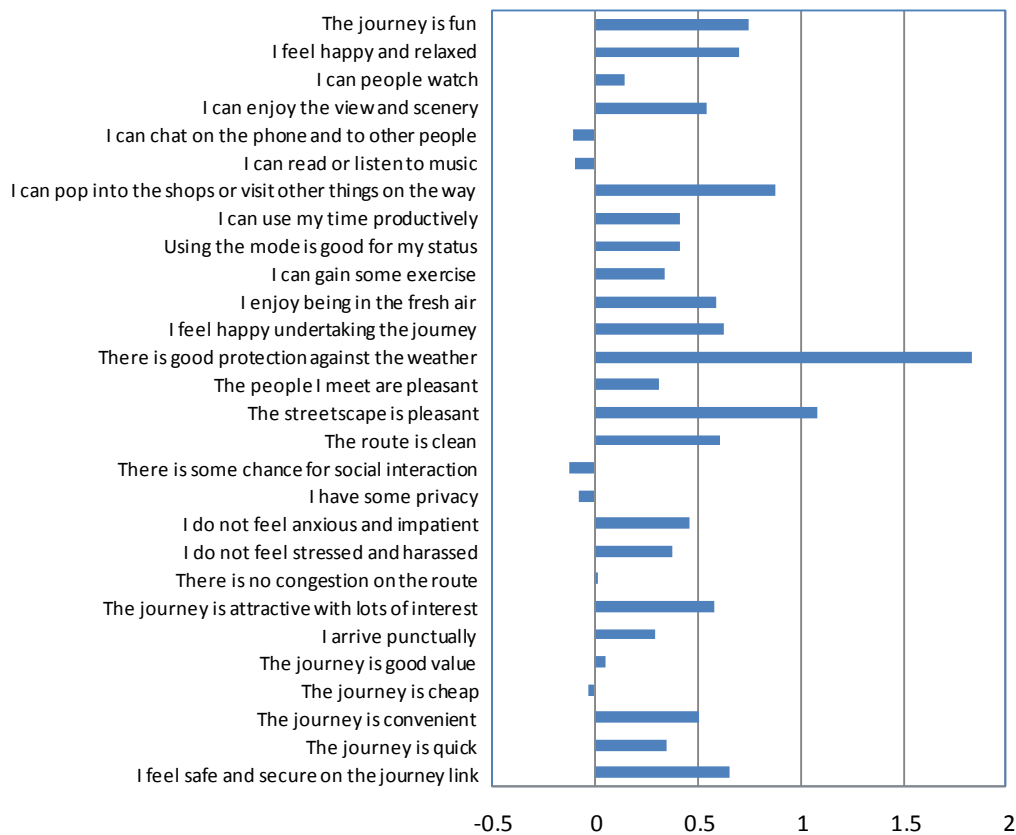
(SYNAPTIC data, link n=207)

- Affective issues do particularly badly, e.g. "*there is good protection against the weather*" (nearly a two point difference in realised against expected score out of five)
- Other poorly performing affective issues: "*the streetscape is pleasant*", "*I can pop into the shops or visit other things on the way*", "*the journey is fun*", "*I feel safe and secure on the journey link*", "*I feel happy and relaxed*"
- Followed by instrumental issues: "*the journey is convenient*", "*the journey is quick*", "*I arrive punctually*"

Figure 4: Experience of the Journey Link (Bus, Rail, Tram, Underground, Ship, Air) (Form D)
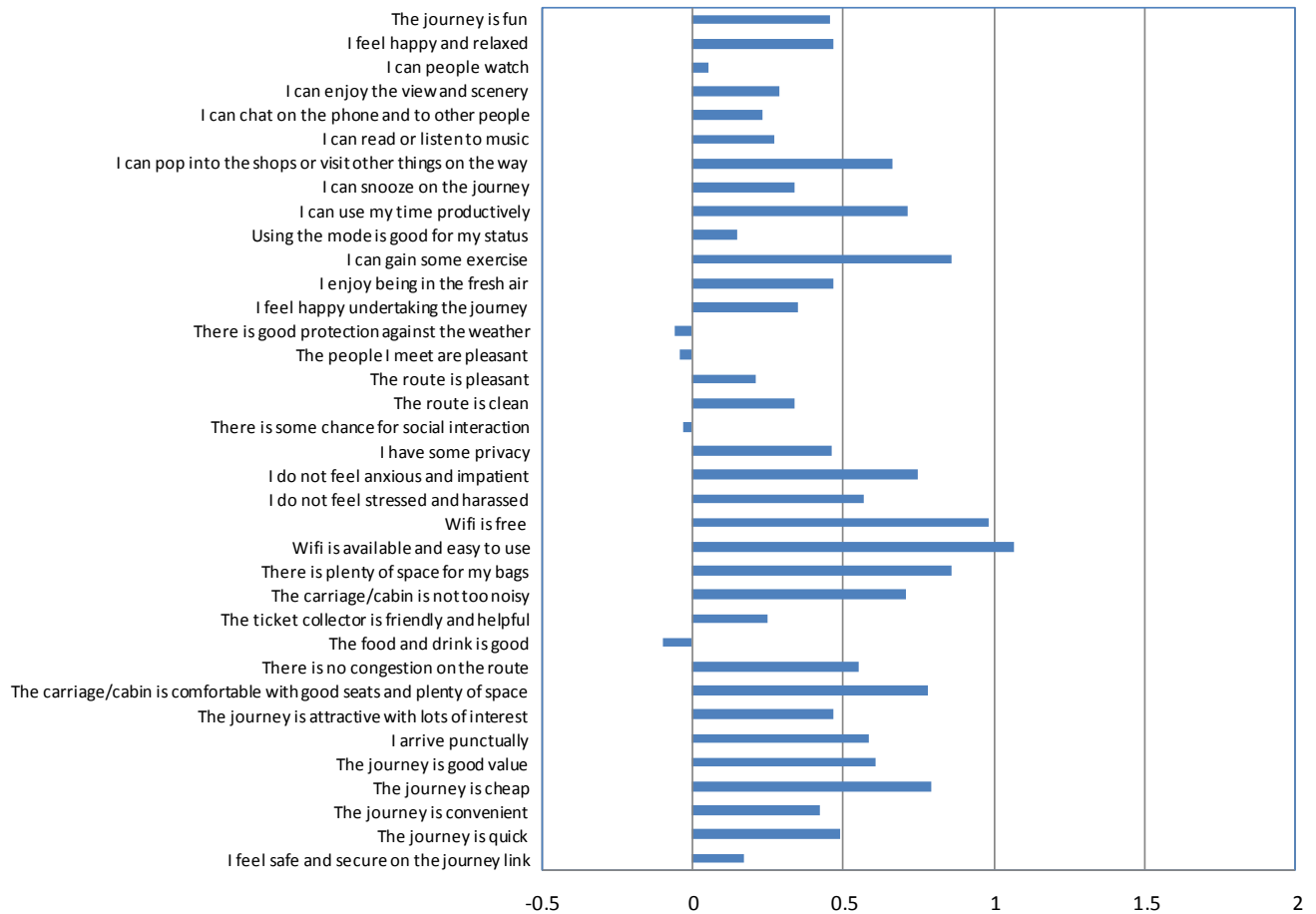
(SYNAPTIC data, link n=207)

- Poorly performing affective issues: "*Wifi is available and easy to use*", "*Wifi is free*", "*I can gain some exercise*", "*there is plenty of space for my bags*", "*the carriage/cabin is comfortable with good seats and plenty of space*", "*I do not feel anxious and impatient*", "*I can use my time productively*"
- Instrumental issues: "*the journey is cheap*", "*the journey is good value*", "*I arrive punctually*"

Some of these results seem very significant in that the standard of service –including some very fundamental issues such as comfort, safety, lack of anxiety, and the ability to use time productively – are much less in the realised journey than expected.

Figure 5: Experience of the Interchange (Form E)

(SYNAPTIC data, interchange n=187)

- Poorly performing affective issues: "*Wifi is free*", "*Wifi is available and easy to use*", "*the electronic timetable information mean I know where to go*", "*there are facilities and entertainment for children*", "*the signing steers me to the next transport stage*", "*I can use my time productively*", "*the interchange is pleasant*"
- Instrumental issues: "*the services are well integrated and there is little time to wait*", "*the interchange is convenient*", "*the interchange is quick and simple*"

The only experience where the realised performs better than expected is also instructive: "*the signing steers me towards the retail and other consumer opportunities*". This, again, is an important point reflecting that many interchanges are nowadays designed as much for the commercial gain as the journey experience, if not more, and this is not necessarily what the

user expects or desires. Perhaps this is not what the operator should be providing, e.g. some transport authorities (such as NS/Prorail) prioritise passenger information over commercial.

Figure 6: Experience of the Overall Journey (Form F)
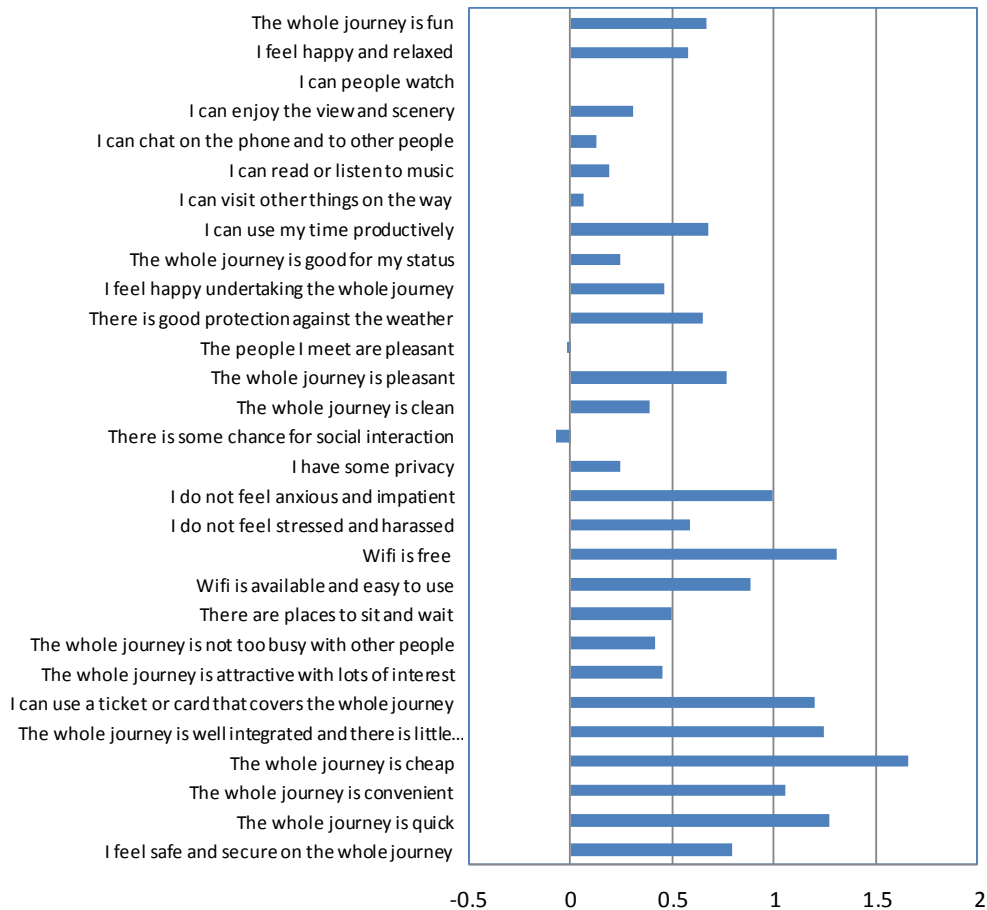
(SYNAPTIC data, overall journeys n=13 regional, 12 international)

Here the results are slightly different insofar as instrumental factors become more important in terms of realisation against expectation.

- Poorly performing affective issues: "*Wifi is free*", "*I do not feel anxious and impatient*", "*the whole journey is pleasant*", "*I can use my time productively*", "*the whole journey is fun*", "*I feel happy and relaxed*"
- Instrumental issues: "*the whole journey is cheap*", "*the whole journey is quick*", "*the whole journey is well integrated and there is little time to wait*", "*I can use a ticket or card that covers the whole journey*"

Again, the standard of realised service, across the range of factors, seems very poor relative to that expected.

A further element of the attitudinal survey was to compare satisfaction ratings for particular parts of the journey and also relative to satisfaction with life and day. Figure 7 highlights an

important point – that interchanges generally are the weakest link of the door-to-door journey, with a satisfaction rating of 3.47/5 (1 very unsatisfied; 5 very satisfied) compared to 3.66/5 for links. This tends to be where the problems such as poor interchange, wasted time in waiting for connections and poor waiting facilities tend to occur. Journey cost also scores very poorly at 3.17/5.
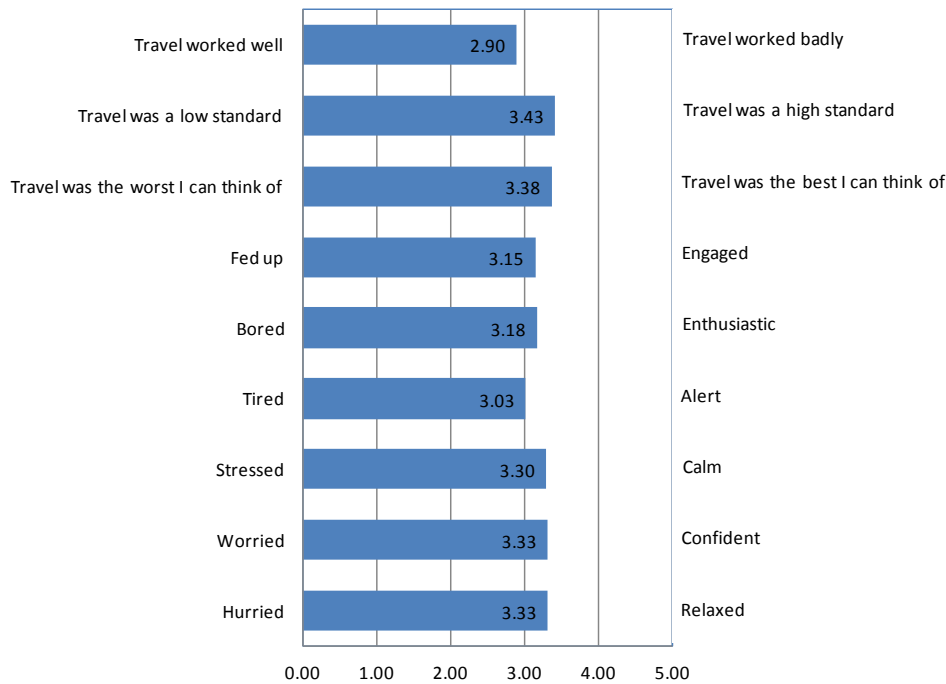
Figure 7: Satisfaction with Interchange, Link, Cost and Time
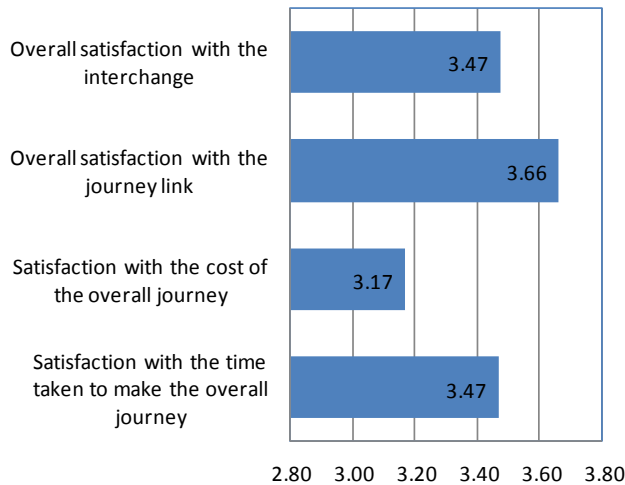
(SYNAPTIC data, link n=207; interchange n=187; overall journeys n=13 regional, 12 international)

Similarly, satisfaction with the overall journey can be rated (Figure 8). The semantic scale rates as 1 very, 2 moderate, 3 neutral, 4 moderate, 5 very, against each polarity. Most of the scores are marginally positive, but certainly there is no affirmative support for high quality journeys. The more positive responses are for "*travel was a high standard*", "*travel was the best I can think of*", "*confident*", "*relaxed*", "*calm*"; whereas the more neutral, but still positive, findings are "*alert*", "*engaged*", "*enthusiastic*", "*travel works well*".

Figure 8: Satisfaction with Overall Journey

	Score	
Travel worked well	2.90	Travel worked badly
Travel was a low standard	3.43	Travel was a high standard
Travel was the worst I can think of	3.38	Travel was the best I can think of
Fed up	3.15	Engaged
Bored	3.18	Enthusiastic
Tired	3.03	Alert
Stressed	3.30	Calm
Worried	3.33	Confident
Hurried	3.33	Relaxed

(SYNAPTIC data, overall journeys n=13 regional, 12 international)

A SCRIPT FOR 2030

To help respond to some of these issues and to visualise what a seamless public transport journey might look like in 2030, we develop the following visualisation as a script and an animation. The latter is available to view at:
http://www.youtube.com/watch?feature=player_embedded&v=AZnA5RlRAIY

TITLE SEQUENCE: European Journey 2030
Text explanation of the SYNAPTIC project focus, including the change in emphasis from designing for individual parts of the journey, to the door-to-door journey, the consideration of affective as well as instrumental factors in travel, and the centrality of the user perspective.

Part 1: Tulketh Heights
[SCENE 1: TULKETH HEIGHTS, MORNING, FADE IN]
View from the front of Tulketh Heights, an old mill that has been converted into modern flats / offices. The roof of this building, and the roofs of the houses that surround it, are covered in solar panels and wind generators.

[ZOOM IN, TO CLOSE UP OF ONE OF THE WINDOWS]
NARRATOR: Suravi Dumill-Douze lives with her family in Tulketh Heights, a converted mill on the edge of the University of Central Lancashire campus, where she has a part-time lecturing position in architecture. This morning, she is leaving for a seamless journey to Delft in the Netherlands. She uses an integrated mobility service to get to a business meeting and conference, taking her 4-year old daughter with her.

[FADE IN, SCENE 2: INTERNAL KITCHEN, MORNING]

Luxury kitchen with view indicating that this is in a penthouse flat. Suravi is reading a newspaper from 2030 on a tablet device.

[CUT TO SCENE 3: CLOSE UP, NEWSPAPER ON TABLET]
The headline reads, "1000s of new green transport jobs created in Preston and Liverpool".

[CUT TO SCENE 4: MID SHOT, AT THE TABLE]
She is distracted by the sound of her 4-year-old daughter. She tries to get her daughter to finish her breakfast.
SURAVI: Come on. Hurry up! We're going all the way to Delft today!
The daughter eats her food faster.
SURAVI: Come on, come on; I better check us in now. Hello, Brain+, what's the best route from Preston to Delft?
Suravi consults her voice activated Brain+ (which is a tablet-like device).

[CUT TO SCENE 5: CLOSE UP, BRAIN+]
Brain+ is used to search for the best route and train, showing how can then book the door-to-door ticket from the (fictional) European travel planner website – eTicketEurope.com. Her credit card is automatically charged and the Brain+ also acts as the ticket.

NARRATOR: Responding to voice recognition, a through ticket across Europe is provided, with the cheapest, quickest and best route automatically given. The service is like going to a good restaurant – look at the menu, specify what you would like, sit back and have an enjoyable time. Suravi's credit card is charged for the journey and her device acts as the ticket.

[CUT TO SCENE 6: LONG SHOT, KITCHEN, MORNING]
SURAVI: We're in such a rush, I am grateful that I was able to send all my display materials as high-speed freight on the overnight express train last night! Oh, what have you done now?
Suravi wipes the food from her daughter's face and clothes. A beeping noise attracts her attention.

[CUT TO SCENE 7; CLOSE UP, BRAIN+ DEVICE]
The device tells her that the bus is approaching the stop outside her flat. The screen shows a dotted line approaching her position and a flashing countdown graphic indicates 'your bus is due in 5:00 minutes, 4:59 minutes ...'

[CUT TO SCENE 8: LONG SHOT, KITCHEN, MORNING]
She grabs the child and her small hand luggage and heads for the front door.

Part 2. BRT to Preston International Station
[CUT TO SCENE 1: BUS STOP, MORNING]
Suravi and her daughter wait at the bus stop while the bus approaches. It is a tubular bus stop based on designs from Curitiba in Brazil. The BRT bus pulls up and they get on. The bus design is based on the Nantes BRT bus. She swipes her mobile phone over a reader, similar to an Oyster card reader.

[CUT TO SCENE 2: CLOSE UP, MOBILE PHONE]

The device reports there are no delays to her journey so far today and that interchanges have plenty of time – there are timed departures every 15 minutes.

[CUT TO SCENE 3: BRT BUS WINDOW, MORNING]
Suravi can be seen inside the bus looking out of the window with her daughter by her side.

[CUT TO SCENE 4: MODERN ROAD TUNNEL, UNIVERSITY OF CENTRAL LANCASHIRE CAMPUS, MORNING]
A BRT bus emerges from a road tunnel. The bus has its own lane so passes a row of stationary traffic.

[CUT TO SCENE 5: CLOSE UP, MAP OF THE JOURNEY]
A dotted red line travels across a map of her journey. The line starts at her home and stops at an 'X' indicating a stop at the University of Central Lancashire Campus. It then continues to the final 'X', Preston International station.

Part 3. Preston International Station
[SCENE 1: PRESTON INTERNATIONAL STATION, MORNING]
Suravi and her daughter walk into the station, through a new glass and steel entrance on Fishergate attached to the old Victorian station facade.

[CUT TO SCENE 2: CLOSE UP, PLANS FOR THE REDEVELOPMENT OF PRESTON STATION]
An illustrative masterplan is shown for the station's redevelopment, based on the existing main station at Malmö. It shows new developments to the station including a new city square with cycle parking underground and cycle hire/café. There is now a new deck inside the old station building, offering a warm location to wait, buy a coffee or browse in the shops. A dotted red line running through a plan view of the station indicates Suravi's walk through the station to the platform.

[CUT TO SCENE 3: PRESTON INTERNATIONAL STATION CAFÉ, MORNING]
Suravi and daughter stop for a coffee and smoothie in the warm waiting area, sitting in the new cafe. The Brain+ device alerts her that her train is coming.

[CUT TO SCENE 4. PRESTON INTERNATIONAL STATION, MORNING]
They travel on the escalator down to the platform (enclosed like King's Cross St Pancras Eurostar) as the train arrives.

Part 4. High Speed Rail to Delft via Rotterdam
[SCENE 1. HIGH SPEED RAIL PLATFORM, PRESTON INTERNATIONAL STATION, MORNING]
The High Speed Europe train draws into the platform. The train design is inspired by the Shanghai-Beijing HSR and Eurostar. Suravi and her daughter get on board.

Clockface departure scheduling is explained to illustrate how integrated train and bus scheduling might work at Preston, based upon the Swiss examples.

NARRATOR: Preston International interchange now works with timed 'pulse' departures, where trains leave every 15 minutes around the Preston and East Lancashire region, tram-train to Blackpool and the Fylde coast, HSR to London and mainland Europe, National Rail

to various destinations around the UK, bus to Preston and surrounds.

NARRATOR: An international Eurostar train direct to Brussels, Rotterdam and Amsterdam, which departs from Preston every hour, stopping at London Western Gateway and London Olympic International.

NARRATOR: Suravi's e-ticket is automatically checked. Since the UK remains outside the EU Core Area, which came into existence in 2020, security software automatically recognises her as a 'reliable' passenger needing no passport check into the EU.

[CUT TO SCENE 2. MID SHOT, EUROSTAR TRAIN BUSINESS COMPARTMENT, MORNING]
Suravi is sitting in her large, luxurious seat with her 4 year old daughter. There is a digital display at the back of the carriage which indicates that the train is going at 350 km/hour. She holds her Brain+ device up to the window to get an augmented reality map showing their position.

SURAVI: Look... we've just past Manchester. Would you like me to read you a story? Once upon a time...
Suravi starts reading to her from the tablet.

[CUT TO: SCENE 3. LONG SHOT: EUROSTAR TRAIN TRAVELLING THROUGH COUNTRYSIDE]
SURAVI: Shall I take you to the play carriage now?

[CUT TO: SCENE 4. MID SHOT: EUROSTAR TRAIN]
Suravi plays with her daughter in the play carriage.

[CUT TO: SCENE 5. CLOSE UP: ANIMATED MAP]
An animated diagram shows the map of the journey from Preston to Rotterdam with a red dotted line indicating that they have reached Kent.

The narrator speaks over shots 6,7,8,9.
NARRATOR: Suravi's train travels on HS2 (High Speed Two), the main north-south high-speed UK line from London to the Midlands and North of England, which opened in 2028. Controversial in 2013, it is now accepted as a key element in the European public transport network. It is Europe's fastest, with trains travelling at up to 400 kilometres an hour – as fast as possible, but also as fast as necessary to compete with short-haul air trips from the UK to mainland NWE airports, which have virtually disappeared since it opened. Transiting London via a short special link to the older (and slightly slower) HS1, it passes through the Channel Tunnel and runs non-stop through France and Belgium.

[CUT TO: SCENE 6. LONG SHOT: EXTERNAL, EUROSTAR TRAIN TRAVELLING THROUGH COUNTRYSIDE]

CUT TO: SCENE 7. MID SHOT: INTERNAL, EUROSTAR TRAIN]
Suravi is having a snooze in the comfortable reclining seat.

CUT TO: SCENE 8. LONG SHOT: EXTERNAL, EUROSTAR TRAIN TRAVELLING THROUGH COUNTRYSIDE

CUT TO: SCENE 9. MID SHOT, INTERNAL INT. EUROSTAR TRAIN]
Suravi talks to a colleague via video conferencing on her Brain+ device. Her daughter is by her side reading.
SURAVI: We're nearly there. Yes, thanks, it's been a great journey. I'll give you the latest version of my report when we meet later. Oh, better go now, we're just approaching Rotterdam and I'm not sure where to get my connection to Delft...

[CUT TO: SCENE 9. CLOSE UP: ANIMATED MAP]
An animated diagram of a map with a red dotted line going all the way from Preston to Rotterdam.

Part 5. Interchange at Rotterdam
[SCENE 1. INTERNAL, ROTTERDAM STATION, MID-DAY]
Suravi is on the platform looking around, a bit confused as to which direction she needs to go in. Her luggage is at her feet. She holds her child with one hand and her Brain+ with the other hand.

[SCENE 2. CLOSE UP, STATION LOUDSPEAKER]
There is an announcement in Dutch that there has been a delay.

[CUT TO: SCENE 3. INTERNAL, ROTTERDAM STATION, MID-DAY]
Suravi looks at her device.

[SCENE 4. CLOSE UP: BRAIN+]
Brain+ gives her a translation of the Dutch station announcement. It informs her that her connection to Delft is delayed by 20 minutes and that her replacement service is on platform 4, carriage 12, seats 24 A and B.

Hand-drawn diagrams illustrate the following alongside narration:

NARRATOR: No traveller is left behind, even where there are disruptions. There is always help at hand personally in the main stations, or users can use their mobile devices to access the latest information.

NARRATOR: Since the 15 Minute Guarantee is broken, Suravi automatically receives compensation, direct to her bank account (without the need to claim). On return, her travel bill is automatically and directly charged and itemised, including business travel and compensation claims – there is no form filling nowadays.

Part 6. Delft Interchange to TU Delft
[SCENE 1. INTERNAL, DELFT STATION. PLATFOM CONCOURSE, MID-DAY]
Holding her daughter's hand, with her luggage at her feet, Suravi looks up and down the concourse. She is talking to her daughter.
SURAVI: At last, we're here in Delft. Where's that automated car I booked?

She spots the automated car waiting for her nearby.
SURAVI: *(To the car)* Oh there you are you clever thing, you knew exactly which train I was on!
They open the car door and prepare to get inside.

[CUT TO: SCENE 2. EXTERNAL, DELFT HOTEL, EARLY AFTERNOON]
The automated car drives up to a hotel and stops. Suravi and her daughter get out and head towards the hotel entrance with their bags.

SURAVI: *(To her daughter)* Right, now, let's get these bags dropped off at the hotel and then I can take you to the crèche to meet some new friends.

[FADE TO]: Suravi comes out of the hotel with her daughter.

[CUT TO: SCENE 3. EXTERNAL, ROTTERDAM STREET, EARLY AFTERNOON]
Suravi cycling through Rotterdam on a Bakfiets cargo bike, carrying her child. They are both laughing.

NARRATOR: Automated car, crèche and bicycle are all booked and paid for as part of the door-to-door eTicket.

Part 7. Suravi's Reflections
[SCENE 1. INTERNAL, TU DELFT BUILDING, AFTERNOON]
Inside the TU Delft building. As she heads towards her meeting, she meets a colleague.

COLLEAGUE: Hey, Suravi, good to see you ... how was your journey?

SURAVI: It was great. Really comfortable and so easy to manage the different interchanges ... I didn't even have to think about what would be the best route...

[SCENE 2. FLASHBACK SEQUENCE]
Flashbacks to snippets from her journey that we have already seen. We also see the animated diagram of the map with a red dotted line showing each phase of her journey. This time a graphic of the mode of transport used leads the animated line (e.g. bus, train, bicycle, etc).

NARRATOR: What an improvement from the bad, old days when public transport was often viewed as a joke, only for use as a last resort rather than our first choice! Suravi was able to buy a door-to-door ticket taking her all the way from Preston to Delft using an integrated mobility service. Tickets can be bought across all operators Europe-wide as part of eTicket Europe. Information about through journeys and particular stages of the journey is always easy to access. This seems simple to the user, but of course is quite complicated to deliver with the integration of many operators, all working together. There has been an incredible effort behind the scenes, to deliver best practice known in 2013, at the EU level, national and city levels, to ensure that the seamless public transport journey has been designed from the user's perspective.

The seamless public transport journey has also been central to the development of the sustainable city. Many stations have been redesigned as hubs for travel and interchange, and centres for their surrounding communities. Every city has excellent intercity and regional connections, with a range of high speed rail, tram-train, tram, bus rapid transit and bus options depending on location. The quality of the journey experience has been hugely improved and the user is at the centre. The productive journey is now little different to the rest of the day, in the office or at home – we can still access the activities and entertainment

we require or desire. And, of course, travel has been revolutionised in that it is now clean, electric travel, with very low energy consumption. Since all rail is now electrified and most power sources are renewable, travel is clean with very low energy consumption. Suravi's whole journey was virtually carbon free.

Part 8. Credits
SYNAPTIC project credits and close.

CONCLUSIONS

We have used the animated seamless public transport journey to show what might be possible by 2030; even for long distance, international journeys. There have been major improvements in the integration of public transport services, in vehicle technologies and design, in information and ticketing, and in using the interchange as the hub of activity within the urban centre. Some of this is possible now in 2013, and sometimes is being delivered in selective locations. By 2030, we would hope that much of this has become common practice in public transport service delivery.

In terms of our understanding of how and why people use public transport, and might be attracted to use it more, there is an emerging body of research that points to a complex set of factors, instrumental and affective – and perhaps many grey areas in between – that lie behind an individual's rationale for travel and means of travel. Affective factors appear to have significant associations with the satisfaction with journey stages and overall journeys, yet are poorly understood. Historically travel analysis has concentrated almost solely on the instrumental dimensions of travel, and this has shaped transport modelling, appraisal and investment. This seems a fundamental problem in transport planning and investment as it often leads to the 'wrong' projects gaining funding. The needs of the user are closely related to their enjoyment of the journey; hence we should be trying to understand these more emotive parts of the journey experience, and plan to improve them. Transport is often analysed and planned from the perspective of the natural sciences (perceiving transport as the movement of objects) rather than the social sciences (the movement of people). Planning for the behaviour of humans, of course, tends to be much more difficult and complex. The effective design of the door-to-door journey is often much more complicated than we imagine, and it may only be one small part – the weakest link – that lets down the whole journey. This is the case in many public transport journeys, particularly where they are regional or international in nature, including a complicated set of interchanges and connections. It is the interchange that is often the poorest in design terms.

REFERENCES

Anable, J. & Gatersleben, B. 2005. All work and no play? The role of instrumental and affective factors in work and leisure journeys by different travel modes. Transportation Research Part A: Policy and Practice, 39, 163-181.

Banister, D. 2011. The trilogy of distance, speed and time. Journal of Transport Geography, 19, 950-959.

Ettema, D., Gärling, T., Eriksson, T., Friman, M., Olsson, E. & Fujii, S. 2010a. Satisfaction with travel and subjective well-being: development and test of a measurement tool. Transportation Research Part F, 14, 167-175.

Ettema, D., Gärling, T., Olsson, L. E. & Friman, M. 2010b. Out-of-Home Activities, Daily Travel, and Subjective Well-Being. Transportation Research Part A, 44.

Flyvbjerg, B. 2001. Making Social Science Matter: Why Social Inquiry Fails and How it Can Succeed Again, Cambridge, Cambridge University Press.

Giddens, A. & Dallmayr, F. R. 1982. Profiles and Critiques in Social Theory, London, Macmillan.

Green, C. & Hall, P. 2009. Better Rail Stations: An Independent Review (presented to Lord Adonis, Secretary of State for Transport), London, Department for Transport.

Hickman, R., Hamiduddin, I., Sellmann, T., Hall, P., Jones, P. & Osborne, C. 2012. S-MAP 2030: Achieving seamless mobility in Europe. Technical paper, analysis of journey experiences across North West Europe London: University College London.

Jain, J. & Lyons, G. 2007. The gift of travel time. Journal of Transport Geography, 16, 81-89.

Kahneman, D. 2011. Thinking, Fast and Slow, London, Allen Lane.

Mokhtarian, P. L. & Salomon, I. 2001. How derived is the demand for travel? Some conceptual and measurement considerations. Transportation Research Part A: Policy and Practice, 35, 695-719.

Russell, J. & Snodgrass, J. 1987. Emotions and the environment. In: STOKOLS, D. & ALTMAN, I. (eds.) Handbook of Environmental Psychology. New York: John Wiley and Sons.

Schwanen, T., Banister, D. & Anable, J. 2012. Rethinking habits and their role in behaviour change: the case of low-carbon mobility. Journal of Transport Geography, 24, 522-532.

Steg, L. 2005. Car use: lust and must. Instrumental, symbolic and affective motives for car use. Transportation Research Part A: Policy and Practice, 39, 147-162.

Stradling, S. G., Anable, J. & Carreno, M. 2007. Performance, importance and user disgruntlement: A six-step method for measuring satisfaction with travel modes. Transportation Research Part A: Policy and Practice, 41, 98-106.