

2009 – UCL, London – Annual Conference

01 Plenary

Marsden : Are academics from Venus and politicians from Mars [University of Leeds]

ABSTRACT: A recent British Academy review found that “there remains considerable scope to improve the effectiveness of public policy making through increased use of humanities and social science research” (BA, 2008, pvii). This statement is difficult to disagree with but the reasons behind this issue are complex and wide-ranging. Are the ways in which research is commissioned conducive to good quality policy relevant research? To what extent should some of the research undertaken by academia be for direct adoption by policy makers? Do the funding streams, timescales and incentives structures in place for academics and policy makers support or challenge closer joint working? Do the skills exist to work across the academic-policy divide? This plenary presentation will explore the relationship between academic research and effective policy-making. In particular it will examine the role of the academic-bureaucrat-politician axis. It will draw on four main sources of evidence: 1. A review of the literature 2. Evidence from interviews with officials about how cities learn about effective policies 3. Interviews with a sample of leading academics from the UTSG community 4. The author’s own experience from working at the House of Commons between 2001 and 2003 The analysis will explore the key questions set out above and will try and understand the extent to which the gap is one of process or whether academics really are from Venus and politicians from Mars.

02A Road Pricing

Nikitas : Do older people hold different attitudes towards road pricing schemes than younger people do? [University of the West of England]

ABSTRACT: In an ageing society, older people have a growing influence in politics in general, and potentially on the acceptability of road pricing in particular. Older people’s attitudes to road pricing are of particular interest because they face particular types of risk of social exclusion on transport grounds. Moreover, according to the literature, older people favour, more than any other age groups, what is positively valued for society – a process described as ‘pro-social value orientation’. Hence in a transport context, older people may be more likely to express positive or negative attitudes to the acceptability of road pricing depending on whether they believe it would be good or bad for others, or society in general. The people most important to them may also have a particular influence on older people’s evaluations about road pricing – an influence that is assumed to be the ‘social norms’ influence. The paper develops our theoretical and empirical understanding of these issues, based on the findings of a primarily quantitatively-assessed survey of 491 post-back responses combined with secondary data analysis, all of them implemented to identify age-specific attitudinal differences with respect to road pricing. On the whole, some support is found for the view that attitudes to road pricing do vary with age as pro-social value orientations, social norms and their influence on attitudes also do.

Givoni : Re-examining the results of the London congestion charging scheme [Oxford University]

ABSTRACT: The London Congestion Charging scheme was introduced in 2003 along side a series of other changes to the transport system, most notably improved bus services. The results of the Congestion Charging scheme have been reported and evaluated since then in numerous reports and studies from which a consensus appears branding it a success. Following from that numerous cities

are now introducing or considering introducing similar schemes. Research on the effects of the London Congestion Charging scheme usually attributes (often implicitly) all the changes that took place in central London since 2003 to the congestion charging, while the effects of other factors, as well as the effects of trends over time, are not usually (explicitly) considered. In this context, the paper revisits the results of the London Congestion Charging scheme to examine to what degree observed effects (mainly changes in travel behaviour) can be fully or partly attributed to it. The paper also briefly discusses the cost-effectiveness of the congestion charging scheme. While there is no dispute over the theoretical rationale for introducing congestion charging, the London scheme reveals that questions can be raised with regard to its practical effectiveness. While the bundling together of congestion charging with other measures, such as improved public transport, is crucial, it is difficult to determine the direct contribution of each measure to the changes that took place after congestion charging was introduced. Unravelling the relative contribution of each measure and that of the congestion charging to travel behaviour in central London is especially crucial for other cities which might not have the resources, and degree of congestion, as London to justify congestion charging.

Musselwhite : Exploring the public acceptability of road pricing [University of the West of England]

ABSTRACT: This paper reports on a major study for the UK Department for Transport that has involved deliberative research to explore how public attitudes (and motivations for such attitudes) towards road pricing influence public acceptability. The research involved reconvened focus groups in a number of areas of the country that were considering road pricing. The first phase of fieldwork took place in eight areas (with a total of 446 participants) meeting twice. The second phase of research, involved the same participants from five (and latterly three) of the areas meeting for an additional three group discussions and a workshop with follow-up depth interviews. In the course of successive sessions participants were taken through a process from considering the problem and causes of congestion, through potential solutions to congestion, to general and then specific propositions for road pricing. The authors developed two conceptual models of road pricing acceptability that provided a research framework for the study – one concerning four sequential stages of acceptability at the individual level and the other addressing aggregate acceptability against time. The paper sets out these models, drawing upon the richness of empirical insight to reveal a number of key determinants of public acceptability and how acceptability can change. Key findings explored in the paper include the following: the public recognise that congestion is a problem for the country but many do not consider it a serious problem for themselves; there is scepticism over whether congestion is a soluble problem and following on from this that people may prefer to cope with it in their own way; and road pricing is initially viewed with widespread negative reaction but this reaction softens in some people as their understanding of the issues improves while in others negativity is hardened. Finally the heterogeneity of attitudes and acceptability suggests a corresponding selective and targeted approach to any communications strategy intended to impact upon acceptability.

02B Environment (I)

Banister : Carbon efficiency in transport: Backcasting from London [Oxford University]

ABSTRACT: Transport is a major user of carbon-based fuels, and is increasingly being highlighted as the sector which contributes least to CO₂ emission reduction targets. This paper reports on the findings of the current VIBAT London study (www.vibat.org) which considers the role of the transport sector in reducing CO₂ emissions in London. A backcasting study approach is used, testing the likely impacts of alternative images of the future for 2025. A transport and carbon simulation game (TC-SIM) is also developed for London. Within this, users are able to consider a series of potential policy packages – low emission vehicles, alternative fuels, pricing regimes, public transport,

walking and cycling, strategic and local urban planning, information and communication technologies, smarter choices, ecological driving and slower speeds, long distance travel substitution, freight transport, and international air – and select variable levels of application to help achieve headline CO2 emission reduction targets. The roles of two external “enabling measures” are also considered – carbon rationing and oil pricing. The paper considers an optimised future policy package for 2025. A deep reduction in transport CO2 emissions is theoretically possible, yet practically very difficult to achieve. The main perceived problem is in engendering an interest in the public to change consumer purchases and behaviours. The huge challenge now is to map out and discuss a variety of policy pathways to carbon efficiency in the transport sector, and then to enable and achieve a level of consumer and behavioural change consistent with strategic aspiration.

Carty : Urban form & transport energy consumption: can urban planning result in lower energy consumption? [University College Dublin]

ABSTRACT: Energy consumption and emissions from the transport sector continue to rise, adding to growing concerns about the environmental impacts caused by transport systems and related land-use patterns. Transportation and land-use are a function of one another, therefore it is often hypothesized that changing urban form will result in changes in transport energy consumption. This paper intends to explore further the relationship between urban form and transport energy consumption. It is hypothesised in this research that more compact neighbourhoods result in more sustainable communities, with lower transport energy consumption. The theory is to an extent premised on urban containment, to provide a concentration of socially sustainable mixed uses, that will concentrate development and reduce the need to travel, thus reducing transport energy consumption. Using the Census 2006 Place of Work - Census of Anonymised Records (POWCAR) Dataset it is intended to examine urban form factors in terms of their influence on journey to work energy consumption. To examine the hypothesis, the transport energy consumption of different urban forms will be found, thus allowing the most sustainable urban forms in the Greater Dublin Area to be identified. The results of this research can then be used to assess the transport energy consumption of future development plans and therefore allow greater transport sustainability to be achieved through improved design of the location and form of major new development.

Berridge (Smeed) : Modelling pathways for a hydrogen fuel Infrastructure system [Open University]

ABSTRACT: Hydrogen may act as one potential alternative to reducing current fossil fuel demand but only if the correct systems are in place. The work considers a variety of options using a ‘bottom-up’ perspective incorporating the production phase, the ‘delivery method’ (road tankers versus pipeline) and the final local conversion phase (gas or liquid use for end consumers). It is assumed that the ‘fuel’ (or more precisely energy carrier) produced will be for a fleet of ground vehicles and the default size is set at 100 buses which need to be fuelled daily. The model calculates both overall CO2 emissions, as well as an overall cost of production and delivery based on distance travelled. Results are compared to a baseline case, based on a conventional diesel bus system. Input variables include fleet size; fuel demand and economy, gas and electricity feedstock data, capital and operation costs for production equipment and transport, fuel delivery distance and pipeline installation cost as a function of terrain (urban or rural). Thus the main model steps can be summarised as: centralised or localised production; production output (gas or liquid); delivery method (‘tankers or pipeline’) and local conversion ‘method’ employed (again gas or liquid). For example one pathway might be centralised production via electrolysis to produce gaseous hydrogen, delivered by tanker (as gas) and used as gas at the filling station. Another different approach would be via Steam Methane Reforming (SMR) at the local level to produce gas which would be used in that state. The localised production methods do not involve any form of ‘delivery’ phase as they create the energy carrier at point of use, and some economic and emission savings might be expected. Initial results show these paths to be relatively more expensive when compared to other pathways. Hydrogen production is

calculated via three main methods offering the user a choice of SMR, biomass or electrolysis by centralised production (i.e. large scale) or localised methods (i.e. small scale). Certain pathways are not modelled due to physical constraints or infrastructure systems which are construed to be energy 'illogical' (e.g. produce as liquid but then transport as gas causing large overall energy increases in the supply process). The total number of pathways considered is 22, although there are many more, with a core of 11-13 being investigated in depth (including the diesel baseline case) as these are felt to have the highest potential in the marketplace. Although this work is designed to identify the best pathway for a very limited and specific set of circumstances it is flexible in that input variables include electricity generation costs and potential future emissions reduction techniques such as carbon sequestration and storage as well as using fuel cell powered trucks to deliver the hydrogen. It can also be expanded to cope with larger fleets or mixed vehicle fleets. Future work could investigate the potential to incorporate solid hydrogen pathways, or production at the lowest local scale using household generation systems.

02C Transport Planning

Roby (Smeed) : The development of workplace travel plans [Open University]

ABSTRACT: Workplace travel plans, which were originally conceived as a measure to 'green' commuter travel, have been running within the UK since the early 1990s. Much work has been done to identify best practice for implementing a travel plan in its early stages of development. This has resulted in guidance from the DfT, local authorities, private consultancies and the upcoming British Standard. Possibly the most influential of these documents was the DfT's 'Smarter Choices Changing the Way We Travel' in 2005, which claimed that initiatives such as travel plans could reduce peak urban traffic from between 5%-21% and nationwide cut traffic between 2%-11%. But travel plans are not static, and the factors determining their initial uptake may not be ones that sustain their long term development. Little work has been done in the UK on what sustains a travel plan in the long term. This research explores how travel plans evolve over time. It demonstrates that in some cases travel plans have developed from a parking or planning compliance tool to become more of a business management tool that helps an organisation work more effectively. This change in emphasis could be attributed to the change in motivations for a travel plan. The paper will first explore how these motivations for a travel plan have changed. This is based on the results of a survey of 25 travel planners within predominately private sector organisations, with travel plans that have been running for on average 5 or more years. The results reveal a shift from the original motivation of a planning consent, which was both externally imposed and compulsory, to more internally driven motivations. A planning condition was the original motivation for 68% of organisations surveyed. However, when organisations were asked what were the current motivations driving a travel plan, there was a notable shift to internal motivations. Environment and corporate social responsibility (CSR) issues were the main motivation for 28% of organisations, with other internal motivations such as recruitment, business growth and access also given. A planning consent had dropped to be a motivation for only 12% of organisations. These results compare well with those of a survey undertaken by Center of Urban Transportation Research, University of South Florida, which surveyed members the Association of Commuter Transport in America. The findings show that as travel plans mature, the regulatory agenda becomes less important. This research has further explored this shift through a series of in depth interviews with UK employers, indicating that travel plans are impacting on organisations in a much wider way. Travel plans are being incorporated into CSR agendas and wider environmental policies. Links are also developing into Human Resources to help an organisation become an employer of choice and deepen the labour market. In some cases there is an understanding of the need to address travel jointly from a business and commute perspective, as the two are closely dependent upon each other. This has led to a more holistic approach that not only considers the mode of travel, but the place of work and ways of working. A common explanation of the benefits of these working practices is to empower staff in the times,

places and ways of working, which was felt led to greater levels of motivation and productivity. The research has noted a large variation in practices and management support for travel plans, so as part of the process of explaining why travel plans work better in some organisations than others, aspects of Roger's 'Theory of Diffusion' have been used. These areas include the 'Attributes of an Innovation', with particular interest in the compatibility of the travel plan initiatives with the roles and working practices of staff, and the extent to which travel plans match the culture of the organisation. What has become clear is that initiatives such as bus service improvements and car share schemes are likely to work better within functions with regular working patterns, but receive poor uptake in less structured roles. This type of role tends to respond better to more flexibility in working practices that address the need to travel in the first place. This suggests that a travel plan needs to be also integrated into the development of new working patterns rather than being a separate activity that just develops travel initiatives. This is a very different process to that which happens in the early stages of a travel plan. The other area of Rogers considered was the 'Process of Innovation in an Organisation'. This process involves the stages of agenda setting, matching, redefining, clarifying and routinising. Rogers shows this as a linear process, but it has become clear in this research that it is a dynamic iterative process. For travel plans to survive and become embedded, they need to move dynamically and iteratively through this process, by constantly adapting to meet the new business challenges for an organisation; whether it is growth and expansion, re-location and consolidation, or adapting to more flexible working practices to meet global demands and greater efficiencies. This constant adaptation increases the likelihood that a travel plan will graduate from purely a car parking or planning tool to become a business management tool that is valued and sustained. The research demonstrates that the motivations that drove a travel plan to be implemented initially are unlikely to be those that sustain them now or in the future. Perhaps planning and policy is too focussed on the early stages and not enough on growing and maturing travel plans, with the result that travel plans are too narrow, concentrating on parking issues or a planning application. There is a danger that policies and the emerging British Standard will be built around this 'Kindergarten' view of travel planning. But unless travel plans do get past these early stages, they will not yield the transport benefits that 'Smarter Choices' indicated, nor offer the business benefits required to sustain them.

Budd : Fighting the flights: Airspace expansion and community protest in the United Kingdom [Loughborough University]

ABSTRACT: The growth of commercial aviation is becoming an increasingly emotive subject. Rising demand for air travel is driving the development of new airports, runways, and air routes, but this process is highly controversial, with communities on the ground articulating opposition to any changes to existing flightpaths that would result in low-flying aircraft operating above their homes and communities. Drawing on the example of an anti-flightpath protest at East Midlands Airport in the UK, this paper explores why and how the production of airspace is being challenged by communities on the ground, and seeks to bring a depth of analysis to an issue that has often been dismissed as merely reflecting the attitudes of a group of middle-class 'Not-In-My-Back-Yard' NIMBYs. It is hoped that an appreciation of the ways different airspaces are produced and experienced will lead to a better understanding of the multiple tensions that exist in the field of UK aviation policy between national political imperatives and local community concerns and will also suggest ways in which these tensions might be addressed.

Martin : Views of public realm professionals on the implementation of shared space principles in the South West of England [University of the West of England]

ABSTRACT: Alternative approaches to street design are challenging established principles in the UK. This paper assesses experience with the implementation of shared space street design in England. It is based on a review of design guidance and standards, professional journal literature and

supplemented by stakeholder interviews with practitioners working in street design and management in the South West of England. The interviews investigated experiences, opinions and attitudes of shared space schemes and involved professionals concerned with transport planning, highway safety, highway development control, maintenance, heritage and regeneration. It is concluded that while some barriers are evident to the implementation of shared space schemes these are not due to any particular stakeholder group but due to difficulties of contradictory legislation and as a result of the guidance that is currently available not being widely read and used to its full potential. Improvements in partnership working, especially the early involvement of all stakeholders would increase the amount and quality of shared space schemes. Furthermore, the guidance available should be treated as such. The particular characteristics of individual streets should be used to create locally relevant schemes, or there is a risk that a new standardised approach to highway design will be fostered. Finally, stronger evidence on the effectiveness of shared space schemes in achieving changes in street use in a UK context would provide impetus to this approach.

02D Travel Behaviour (I)

Avineri : APPLYING BEHAVIOURAL ECONOMICS IN THE DESIGN OF TRAVEL INFORMATION SYSTEMS [University of the West of England]

ABSTRACT: Providing information about transport-related attributes such as travel time, travel costs or carbon emissions might be seen not only as a service to the public, but as also an instrument to change their travel behaviour. While rational man theory suggests that individuals base choices on the attributes of the choice set (information content), the way information is being presented (information context) has also a strong effect on travellers' behaviour. "Choice architecture", through the design and incorporation of small features in the environment of choice making ('nudges'), could help individuals to overcome cognitive biases, and to highlight the better choices for them - without restricting their freedom of choice. This paper sketches a few of the more interesting among insights from behavioural economics, and suggests examples of how they might be useful for influencing travel behaviour through the design of travel information and help promoting desired travel options.

Safour : Analyse activity patterns using hazard-based duration models [Newcastle University]

ABSTRACT: Abstract This study aims to contribute to the area of activity-based travel modelling by investigating individual journey-to-work patterns using hazard-based duration models. Recent studies have shown that hazard models could be a powerful tool for activity modelling. The model presented here use data from the Tyne and Wear household travel survey conducted annually between 2003 and 2007. The database consists of activity duration, including the journey-to-work trip, and individual and household information. Parametric hazard models are chosen to analyse the data and their performance is evaluated using adjusted Anderson-Darling test statistics and correlation coefficients. The study is conducted to capture the changes in the characteristics of journey-to-work trips in each of the four years of the survey. The analysis focuses on the comparison of the hazard functions of different durations of journey-to-work trips and addresses the changes on the patterns of journey-to-work trips over the study period and the changes in journey-to-work patterns by different mode and gender. The outcome of the analysis explains that during the study period the travellers are more likely to use cars for shorter durations trips for travel to work than bus and females are more likely to make shorter trips for travel to work than males.

Mamun : The importance of public transport attributes in explaining mode choice behaviour in Dhaka [Loughborough University]

ABSTRACT: Traffic congestion and pollution are widespread in the urban centres of developing countries, adversely affecting economic growth, development and sustainability. High levels of traffic congestion in Dhaka, Bangladesh are a serious concern to policy makers. It is expected that public transport can play an important role to address the problem through improving key attributes of the existing system to respond positively towards users' needs. Five focus groups were conducted in August 2008 to deepen understanding of public transport mode choice behaviour through exploring attributes that influence public transport demand in Dhaka. It is found that bus stop facilities, journey time reliability, priority seats for females and users with special needs, frequency of service and crowding inside the bus are the key attributes that influence public transport demand. Inside crowding and the poor boarding and alighting system are potential barriers for females, elderly and disabled people. It is also found that users put higher importance on those attributes which they are more dissatisfied with. Attributes identified through the focus groups will be used to design stated preference experiments to determine users' willingness-to-pay for the improvement of those attributes of a public transport system in Dhaka.

03A Environment (II)

Bell : Automatic evaluation of environmental impacts of Traffic Demand Management Strategies [Newcastle University]

ABSTRACT: This paper describes a new framework being developed at Newcastle, in the context of the EPSRC project MESSAGE (Mobile Environmental Sensing System Across Grid Environments), which is designed to evaluate automatically the impacts on congestion and the environment of TDMS (Traffic Demand Management Strategies). Performance measures will be based on a combination of data from pervasive sensors and legacy systems including SCOOT (Split Cycle Offset Optimisation Technique), traffic detector, roadside and background pollution, noise and meteorological conditions. The proposed framework has been evaluated using a case study area in Gateshead. Analysis and calibration of data from static (located on street furniture) and mobile (in cars) pervasive sensors, called "motes", will be presented. The validation process will take place within a real-time database, using statistical analysis by comparing mote with precision data. Next the mechanism by which the mote data are used to validate parameters of traffic simulation models (flows, queues, travel times, etc) across the urban network will be shown. The paper continues to elaborate on how the models will interface with the UTM compliant database infrastructure enabling the evaluation of the urban network performance using the mote data and the models themselves. The systems architecture will be described along with an explanation of how the Gateshead results will be transferred to Leicester and used for the evaluation of the impacts of TDMS implementation. Results presented in this paper will highlight the benefits of pervasive sensors and how they can complement legacy systems through their flexibility in covering detection gaps in existing urban networks. In this way the proposed new framework will have the capacity to evaluate the changes caused in previously unmonitored areas, resulting in more realistic assessments of the impacts of transport policies and strategies.

Rhys-Tyler : Understanding the significance of variability in driver behaviour on tailpipe emissions of a Euro IV spark ignition passenger car [Newcastle University]

ABSTRACT: This paper presents the results of an independent analysis of real-world vehicle tailpipe emissions data, and highlights the significance of variability in driver behaviour on the resultant levels and types of pollutants generated. Real-world tailpipe emissions and vehicle metrics were monitored simultaneously across a sample of 40 drivers, navigating a pre-defined 0.6km route for ten repetitions each, with fuel consumption, tailpipe emissions, and vehicle data being collected at 1Hz. The research investigated the defining characteristics of environmentally 'efficient' and 'inefficient' drivers. Relationships between vehicle speed, vehicle acceleration, engine speed, fuel

consumption, and emissions were investigated using statistical techniques and graphical analysis. The analysis indicates that significant variation in tail pipe emissions and fuel consumption can be observed across drivers, with the same vehicle on the same route, with comparable ambient traffic conditions. This highlights the importance of driver choices and driver capabilities as explanatory variables in predicting vehicle tailpipe emissions. This has implications for model specification, driver training, and for future intelligent transport system applications.

North : Use of high-resolution mobile environmental sensing data in urban traffic management
[Imperial College London]

ABSTRACT: The management of urban air quality is a significant problem in many cities around the world and, with road traffic remaining one of the major sources of pollutants such as Particulate Matter (PM) and Nitrogen Dioxide (NO₂), there is increasing interest in the management of urban traffic to satisfy environmental objectives. To do so requires relevant environmental metrics to be incorporated into the traffic management process. Metrics may include measurements and estimates of the emissions from the vehicle fleet operating in the area, as well as direct measurements of ambient atmospheric conditions and pollution levels. Traditionally such metrics have been provided in a highly aggregated manner, with relatively sparse air quality monitoring networks being complimented by modelling systems built upon highly aggregated datasets. This has hindered the development and adoption of environmentally-motivated traffic management schemes. The EPSRC and DfT-funded MESSAGE project led by Imperial College London is working to improve this through the integration of wireless pollution sensing networks with advanced techniques for distributed data processing and modelling. This combination opens the possibility of incorporating high-resolution, near real-time environmental metrics into urban traffic management systems. This paper describes the development and implementation of the MESSAGE data capture and processing system, with a particular focus on the use of data from high-resolution, mobile environmental sensors in complementing existing measured and modelled datasets.

03B Modelling (I)

Evans (Smeed) : Comparison of Optimal Airline Network Routing to Operations in the United States
[University of Cambridge]

ABSTRACT: This paper presents a comparison of an optimal flight routing network, including flight frequencies offered on that network, to the existing network operated by airlines in the United States in 2005. The routing networks, flight frequencies, and airline system profitability of the respective systems are compared. The optimal flight routing network was generated by minimising airline system costs whilst constraining true origin-ultimate destination (O-D) flight frequencies to model airline competition – a different approach to typical airline network optimisation approaches, which optimise individual airline networks. The flight routing network optimisation was run for three cases with varying constraints applied. In the first case no constraints were applied apart from those essential to model airline operations and competition. In the second case constraints were applied to reproduce the distribution of traffic between airports in multi-airport systems, the distribution of connecting itineraries between hub airports, and load factors. In addition to these constraints, the third case also constrains the types of aircraft operated. The latter two cases were run in order to capture effects that the network optimisation model does not capture directly, including airline constraints to operate at specific airports in multi-airport systems, at specific hub airports, with specific load factors, and with specific aircraft types. The results of the comparison suggest that airline system profitability could be improved by increased use of hub and spoke operations. The results also suggest that airlines profitability is limited by constraints on the composition of their aircraft fleet, the hub airports from which they operate, the airports within multi-airport systems at which they operate, and the load factors operated. Finally, the results presented in this paper also

suggest that airlines compete more by frequency than required by the competition model run, suggesting that profitability may be improved by reduced frequency from all carriers. The total decrease in system profitability resulting from sub-optimal flight network routing ranges from \$1.08 Billion to \$3.80 Billion (2005 US Dollars) for the 10 city/16 airport system analysed in the paper.

Connors : A smoothing approach to Wardrop traffic equilibrium problem [University of Leeds]
ABSTRACT: A smoothing formulation is presented for the Wardrop traffic equilibrium problem, and contrasted to conventional 'pairwise' smoothing methods of mixed complementarity problems. It is shown how the smoothed problem belongs to a class of network problems, allowing a range of existing algorithmic devices to be exploited for its solution.

Haji Hosseinloo : Hyperpath-based traffic assignment: Route choice [Imperial College London]
ABSTRACT: The main idea behind this work comes from incorporating the notion of strategies in the context of traffic assignment. Traditional traffic assignment models are based on the assumption that flow is distributed along the paths with respect to current (flow-dependent) travel delays (Wardrop, 1952). It is proposed here that in some cases road users must be able to alter their routes depending on certain events happening which can unfold after they have set upon their journey. As a result, users must develop a set of strategies which would allow them to alter their route at a further point in the journey, if a certain route becomes unavailable or unattractive. Such behaviour requires more sophisticated modelling techniques which can be achieved using the concept of hyperpath with an objective to minimize expected travelling time. The concept has already been applied in the realm of transit assignment where a set of elementary paths (known as hyperpath, first used by Nguyen and Pallattino in 1988) are chosen which when used can minimize total travelling time. Spiess and Florian (1989) were the first to propose a model of assignment in transit networks based on the concept of strategy. It states that passengers develop a set of so-called strategies if more than one transit line leads to their destination from their current location. The probabilities of taking a path are then estimated by line frequencies. A hyperpath-based traffic assignment will be formulated which acts as an enhancement to existing models. This is done with an aim to allow users to alter their onward journey at a given node, if they need to do so. The hyperpath algorithm developed by Spiess and Florian (1989) is used as a starting point and modified to incorporate aspects of traffic assignment following the approach of Bell (2008). This involves replacing frequencies with maximum link delays and replacing the "take whichever line arrives first" strategy with a "minmax exposure to delay" strategy. Numerical examples are provided to illustrate the method.

03C Measuring Utility

Calvert : Who wants to commute more and why? Exploring the positive utility of the commute [University of the West of England]

ABSTRACT: It is a tradition in transport that travel is a derived demand: It is an activity undertaken and endured purely for the sake of reaching a destination. However in recent years there has been a growing body of work that has claimed that there are positive utilities within the experience of travel itself. This study adds to the work done by Mokhtarian and colleagues through looking at commute times at a disaggregate level. The first stage of this study is based on a quantitative analysis of a dataset drawn from a survey of 1900 residents in San Francisco. The analysis particularly focuses on a group of respondents who stated they would ideally commute for longer than they actually do. One hypothesis about what may motivate this desire is that there are positive utilities within the commute. Some hypotheses are further explored in some primary interview-based and questionnaire based research.

Adnan : A model for integrating home-work tour scheduling with time-varying network congestion and marginal utility profiles for home and work activities [University of Leeds]

ABSTRACT: The existing literature in the activity-based modelling have emphasised the fact that individuals schedule their activities keeping whole-day activity pattern in their mind. Several attempts have been made to integrate this with the network congestion; however, for explicit explanation of travel behaviour of individuals, further improvements are inevitable. In this paper, a combined model is proposed that deals with the scheduling of the home-work tour with time-varied network congestion in a fixed point problem framework. Marginal utility profiles that represent individual time-of-day preferences and satiation effect of the activities are incorporated for the measurement of utility of activity engagement along with the disutility of travel. It has been noticed that consideration of only time-of-day dependent marginal utility profiles of activities in the utility function does not appropriately integrate the activities and travel within the tour. The proof of this has been shown analytically and numerically. This finding contradicts with the earlier researches that have been done to integrate morning-evening commutes together with the network congestion. Additionally, two numerical experiments are conducted and the results are presented in the paper. In the first experiment, an arbitrary dynamic tolling strategy is assumed and then a detailed analysis is performed to show the variation in the balance of trade-offs involved in the process. The second experiment is conducted to assess the sensitivity of the combined model through incorporation of different dynamic traffic loading models. Some meaningful observations are drawn from these experiments and are discussed with the identification of avenues for future research.

Hu (Smeed) : A new approach to measure the utility of an activity [Imperial College London]

ABSTRACT: Using utility to represent individual satisfaction associated with activity participation has a long history in a variety of disciplines. Existing models can be classified into two broad groups: explicit models in microeconomic literature and activity-based models in transport literature. Microeconomic models pursue the classical economic question of long-term decisions based on how people allocate time and goods between different activities, while activity-based transport models focus on the short-term activity scheduling and rescheduling decisions in the course of a day or a week. In this paper we propose a new approach to measure the utility of activity participation based on the idea of activity production. We show how it can be extended to deal with activities performed in electronic and mobile contexts in a straightforward manner. A stated choice exercise was undertaken to obtain the data necessary to estimate models. Theoretical and empirical implications are identified and discussed.

03D Psychology

Farag : Explaining public transport information use through attitude theory: An empirical investigation [University of the West of England]

ABSTRACT: Despite recent investments in and growing availability of various public transport information sources, levels of apparent non-use (of particular services) across the population remain high. Policymakers and information service providers could benefit from a better understanding of factors affecting information use. The goal of this paper is to provide more insight into the (non-)use of public transport information by applying attitude theory. Looking up public transport information can be classified as a goal-directed behaviour: people consult information as a means to an end. The Extended Model of Goal-directed Behaviour (EMGB) is founded on the notion that behaviours are selected because of their perceived usefulness in achieving a goal. Individuals develop a motivation to act (behavioural desire, here: a desire to consult public transport information) which is affected by: attitudes (towards consulting public transport information), past experience (concerning

information use), perceived behavioural control (an individuals' confidence in being able to consult information), and subjective norms (perceived encouragement by important others to consult information). The EMGB is applied and extended with other factors to account for constraints, such as trip context and habitual travel behaviour. A postal survey was sent to a random sample of 10,000 households in Bristol and Manchester, UK. The response rate was 13% (n=1327). Respondents were questioned about an uncertain journey they were going to make. Structural equation modelling has been used to investigate interdependencies among the factors studied. The results show that the desire to consult public transport information for an uncertain journey is affected by attitudes, subjective norms, past experience, and perceived behavioural control. These social-psychological constructs are in turn affected by other factors such as travel behaviour and trip context.

Bartle : Word-of-mouth travel information: who tells what to whom, and what difference does it make? [University of the West of England, Bristol]

ABSTRACT: The use of "formal" travel information pertaining to costs, routes, journey times, or real-time transport disruptions, and its role in travel behaviour (for example, choice of mode, route or departure time) has been widely studied, but much of this work has focused on the outcome of decision-making rather than generating a richer understanding of processes which lead to it. In particular, little is known about the part played by "informal" information, shared through word-of-mouth amongst friends, family, colleagues and other social networks, in relation to everyday travel behaviour (although the role of word-of-mouth information-sharing has been studied in fields as diverse as consumer studies, health and tourism). This study used a qualitative methodology to explore the characteristics of informal information and its diffusion through word-of-mouth, seeking to improve understanding of the processes whereby attitudes and intentions are formed which might lead to particular travel behaviours. Interview and focus group participants elucidated both the active seeking and giving of informal advice about specific trips (both pre-trip and en route), and the sharing of personal travel experiences within everyday social interactions. These interactions were often thought to have influenced elements of a trip, such as trying out a new route, or, occasionally, choice of mode or destination, but in other cases were consciously disregarded. Most participants considered that the propensity to act (or not act) on informal information was affected by social and psychological factors such as identifying with or empathising with the other person, but more important was the other person's local knowledge and the consequent trustworthiness of their information. This was consistent with the observation that most participants viewed themselves as rational decision-makers, preferring to assess informal information alongside the formal and always in the light of their own experience and travel preferences.

Goodwin : Public attitudes to transport: scrutinising the evidence [University of the West of England]

ABSTRACT: The authors and colleagues undertook a substantial review of available research evidence on public attitudes to transport in the UK, drawing upon academic journals, studies commissioned by government and data tables from five major repeated cross sectional national surveys. The full review revealed how people's attitudes reflect both the value of the opportunities that modern transport provision brings them, and a growing acknowledgement that the benefits come at a cost. Although a common motivation for generating evidence is to identify 'the public view', one of our own conclusions is that this phrase is misleading: on every issue of importance there is a range of different views, and this remains true even within quite small and well-defined groups chosen to show variation in attitude due to age, gender, socio-economic group, car ownership or region. Four themes are selected from the main review report for attention in this paper in which the common point of interest is that they show differences in view, disagreements, apparent inconsistencies between different sources, and varying strength of support or opposition to transport policies. These themes are: (i) evidence that a majority of people say that traffic

congestion is a major problem for the country as a whole, but do not see it is a major problem for themselves and their families; (ii) a marked grouping of policies when arranged in order of their apparent popularity, such that improvements to public transport, reductions in speed, and restrictions on traffic in residential areas command quite large majority support, while other policies, notably road building and road pricing, are divisive and controversial; (iii) evidence on people's attitudes to changing their behaviour for reasons of global climate change, revealing a gradation of willingness according to different types of behaviour; and (iv) the special case of providing for growth in air transport where the evidence seems to be very much more dependent on context, questionnaire design or framing than in any other area, such that large majority support is cited by both sides in current acrimonious policy discussion. In all these cases a simple description of 'the public view' would at best miss the point, and potentially risk misjudging the acceptability of policy initiatives. The evidence now collated together is rich and covers a wide range of topics, but there still remains a critical evidence gap, in understanding why people hold the attitudes that they do and how and why attitudes change, as distinct from describing what they are. The link between attitudes and behaviour is complex, and it may be that understanding the processes by which attitudes change at the level of the individual is the key missing link in informing policy formulation.

04 Plenary

Jones : The influence of different paradigms in shaping the transport research and policy agendas over the last 50 years [University College London]

ABSTRACT: The prevailing paradigm adopted by specialists working in an area has a strong influence on the kinds of problems that are identified, how they are diagnosed and the solutions that are generated. The paper shows how the development of successive paradigms in transport have left their mark in shaping the research and policy agendas over time; however, rather than the classic 'paradigm shift' found in many scientific disciplines, where one set of concepts replaces another, in transport we can more observe a process of accretion, where later paradigms add additional dimensions to the perspectives provided by previous ones. Five such paradigms are identified, which are characterised as being: first, vehicle-based, then trip-based, followed by activity-based, dynamics-based and finally attitude-based. Each poses its own research questions and lines of enquiry, and frames the policy debate in a different way. Each also places different demands on data collection and analysis, and leads to different requirements for modelling and evaluation. However, there have been major lag effects, so that most modelling is still trip-based, and scheme evaluation still carries a legacy of being grounded within the vehicle-based paradigm first developed over half a century ago. Note that the emphasis throughout the paper is on cars, car traffic and person movement; while some of the same arguments could be applied to the movement of goods traffic, this is not considered here.

05A Modelling (II)

Maher : Robust estimation of regression to the mean [University of Leeds]

ABSTRACT: Estimations of the effectiveness of remedial treatments in road safety analysis are frequently bedevilled by the problem of regression to the mean (RTM). The number of accidents x observed at a site in the "before" period is a "noisy" quantity: x is Poisson distributed about an (unknown) true mean m for that site, so that $x = m + e$. Sites selected for treatment tend to have a positive random error component e , which will on average be zero in the "after" period, even if no treatment is applied. Methods for estimating RTM usually require some assumption about the underlying (prior) between-site distribution of the true means $f_0(m)$: for example, in the empirical Bayes method, a gamma distribution is assumed. The paper considers the impact of different assumptions for this distribution and indeed, whether any distributional form needs to be assumed.

The paper also considers a separate, but parallel, problem arising in the use of Monte Carlo simulation models (such as Paramics) to evaluate x , the performance index (PI) of a solution (eg signal timings), and the problem of finding the optimal solution from a large set of options. Again x is noisy, and the estimation of the true mean PI m for the best solution(s) from the set is affected by RTM, and requires an assumption of the form of $f_0(m)$, the between-solution distribution of the true PI values. In both these problems, the basic problem is one of trying to take out the noise and “go backwards” from the distribution of observed values $f(x)$ to the prior distribution $f_0(m)$, in order to estimate the value of m , conditional upon the observed value x . The paper investigates both the effect on the RTM effect of different assumptions for the prior and whether it is possible to make estimates without assumptions about the prior distribution.

Al-Obaedi : Examining the limitations for visual angle-car following models [University of Salford]

ABSTRACT: Visual angle car following models assume fixed values (thresholds) for the angular velocity ($\Delta\theta/\Delta t$) over which the driver of the following vehicle is affected by the leading vehicle. This paper explains the advantages and limitations of such models and provides possible solutions for these limitations. Sensitivity analysis has been carried out for these purposes as a part of this paper. It was found that the main advantages of using visual angle models are their simplicity and ability to represent the effect of the widths of different types of vehicles (e.g. heavy goods vehicles, cars and motorbikes) on space headway (i.e. the clear distance between leading and following vehicles). Also, these models are simply capable of including the effect of driver's reaction time as a function of traffic density, relative speeds between leading and following vehicles and the action/behaviour of the leading vehicle (i.e. accelerating/decelerating following a change in local traffic conditions). However, the main concern in using such models is related to the appropriate choice of the threshold values. The paper will illustrate that using a fixed threshold value for the angular velocity will be illogical since it eliminates the effect of variations in speed of the following vehicle for the same given relative speed between the leader and follower (ΔV). Moreover, other limitations are related to the effect of leader's width on the acceleration/deceleration rates of the follower. Finally, and in order to deal with the above limitations and advantages that visual angle models have, an alternative car following model has been proposed. The proposed model will then be tested against data from sites to examine its applicability.

05B Land Use & Transport

Jones : Towards a more comprehensive and balanced approach to urban street planning and design [Centre for Transport Studies, UCL]

ABSTRACT: Urban streets provide the setting for a wide range of activities, but the requirements of motor traffic have, in general, taken priority over those of other street users, often resulting in urban street environments that are considered unattractive and not 'fit for purpose'. Recent publications, such as the DfT's Manual for Streets, have sought to redress this imbalance by encouraging professionals to give more attention to 'place'-related activities, but there is little guidance on how this might be done – particularly outside quiet residential areas. It is argued that the root of this imbalance lies in the long established quantification of traffic requirements by traffic engineers and transport planners, in contrast to the more qualitative treatments by land use planners and urban designers. This is evident from the way in which urban streets are formally classified in terms of their road hierarchy (traffic) functions, that there are detailed design standards for vehicle-related activities and that scheme benefits for vehicles can be quantified and monetarised. Nothing similar exists for non-traffic street uses. The paper describes a new framework for street planning and design, which can assist in developing a more comprehensive and balanced approach. It involves classifying streets in a two-dimensional matrix, which takes into account the relative importance of both the Link (movement) and Place functions of each part of the street network. This provides a

basis for determining design and street maintenance requirements, and for deciding on how to prioritise street space allocation among competing demands in different situations. Case study examples are provided from London and the West Midlands. Finally, the paper identifies remaining research gaps that need to be addressed before a quantified assessment of all street user needs can be provided, leading in turn to a balanced and comprehensive appraisal of different street design options.

Christodoulou (Smeed) : Modelling the impacts of new metro lines on urban development
[University College London]

ABSTRACT: New metro lines can have significant impacts on urban areas beyond the direct transport changes. Transport for London (TfL) is funding this research to develop a model to simulate the interactions between transport and urban development, focussing on the impacts of metro lines. The Jubilee Line Extension (JLE) will be used to validate the model. The main objectives are to understand and model the dynamics of the impacts of a new metro line on development. The model being developed contains three sub-models: the development, the business and the population sub-models. These sub-models should be able: to model interactions over time, to model choices of individuals and companies considering behavioural attributes, and to represent the impacts of transport policies. In this paper the business and development location models and the part of the population model that deals with the demographical changes and with the formation and dissolution of households are discussed.

05C Travel Behaviour (III)

Susilo : Do you really want to travel one hour just for a glass of milk? A travel time ratio study in the Netherlands [University of the West of England / Utrecht University]

ABSTRACT: Using the Dutch National Travel Survey 2005 and TTR (travel time ratio) index, this paper explores the acceptable travel times in relation to duration times of various activities in the Netherlands. The results show that the value of individual travel time ratio depends on the type of the activities, individual commitments, available travel mode, and activity locations. Each activity has unique trade-off relationship between their activity duration and their travel time. Each activity also has its own turn-over point (a point where increased activity duration will lead to less instead of more travel time). The analysis also shows that TTR value is not only influenced by individual's activity commitments, resources and constraints, but also by the trade-off within households.

Khorgami : Tour travel behaviour: Evidence from Great Britain National Travel Survey [University College London]

ABSTRACT: Daily trips of travellers as recorded in travel diaries can be reasonable proxies for the out-of-home activities of individuals and households since they were recorded as sequences of characters representing out-of-home events and their contexts during the day. The Great Britain National Travel Survey (NTS), as a one week out-of-home activity dataset, can be considered to be the results of individual decision making in undertaking activities and their scheduling. Due to the difficulty in establishing and analysing all of the possible trip chain types, the majority of developed researches on trip chaining have appeared to focus on work travel only. However, work related travel does not generally represent the majority of out-of-home activities undertaken and, for some life cycle groups, does not represent any travel at all. The analysis of trip chaining behaviour of Great Britain travellers, using NTS 2002-4, has shown a complicated and varied pattern of tour types within different life cycle groups. In this paper, complicated and varied patterns of complex tours in the sample are presented and the variation in types of complex tours by weekdays and weekend, gender, and life cycle groups are examined. Moreover, out-of-home activities of different groups

have been compared to investigate underlying reasons for the differences in complex tour formation between life cycle groups.

05D Freight (I)

Shen : Forecasting Great Britain road freight demand with univariate time series models [University of Leeds]

ABSTRACT: Accurate forecasting of freight demand plays an important role in freight planning and policy making for both the government and business sectors. Although univariate time series models have been widely used in other economic fields, applications in the freight sector are still rare. This paper aims to fill the gap in the freight literature. It evaluates the relative forecasting accuracy of alternative univariate time-series methods applied to the analysis of road freight demand in Great Britain (GB). The four time-series methods examined in this paper are: the naïve model, the exponential smoothing model, the traditional autoregressive integrated moving average (ARIMA) model, and the basic structural time series model (BSM). Annual data on GB road freight demand at both aggregate and disaggregate (commodity) level, measured in billion tonne-kilometres, are obtained from DfT (1986, 1996, 2007). Individual models are estimated for each commodity group, as well as for total road freight demand, over the period 1974-1998, and forecasting performance is assessed using data for the period 1999-2006. The latter assessment is based on the mean absolute percentage error (MAPE). The empirical results suggest that no single modelling method is superior to all others across all situations, since the forecasting performance of the different models tends to vary across different commodity groups. As far as the overall forecasting accuracy is concerned, the ARIMA model outperforms the other models, followed by the Naïve model. This empirical study is being conducted as part of the 'Green Logistics' project funded by EPSRC.

El-Nakib : Can Egypt enhance freight logistics with COMESA? [Liverpool John Moores University]

ABSTRACT: Freight logistics plays an important role in supporting trade for all nations which directly impact economic growth. Transport routes have now become more congested and limited in some cases, in addition to the rising concern about the role of transport movements in accelerating climate change. Transportation is considered as one of the main challenges for Egypt to approach the Common Market for Eastern and Southern Africa (COMESA) market. Egypt is one of the fastest growing emerging markets in COMESA as it has high export potential in a large number of sectors due to the competitive advantages in many manufacturing industries and its lucrative geographical location. However, there is little detailed understanding of the nature of Egypt's freight logistics system. Therefore, this paper examines the freight logistics process from Egypt to three proposed Regional Distribution Centres (RDCs) in COMESA. These three RDCs are selected based on 16 location decision criteria. An examination of the barriers facing the freight logistics movement have been examined to point out the barriers of the freight journey from the Egyptian seaports to the destination i.e. the proposed RDCs in COMESA market. It was imperative to highlight the barriers that face the freight logistics movement starting from Egyptian seaports to the proposed RDCs in COMESA market. In addition, this study is verified by a survey of more than 200 traders from Egypt and COMESA to outline the factors affecting the transport process competitiveness of Egyptian freight logistics to COMESA countries. Finally, the paper concludes with the identification of the challenges involved in the enhancing the freight logistics to COMESA and the recommendation of actions to be considered among the freight logistics activities that are involved in international trade.

06A Modelling (II)

Queen : A graphical dynamic approach to forecasting and monitoring road traffic flow networks [The Open University]

ABSTRACT: Many roads now have induction loops implanted into the road surface providing real-time traffic flow data. These data can be used in a traffic management system to monitor current traffic flows in a network so that traffic can be directed and managed efficiently. Reliable short-term forecasting and monitoring models of traffic flows are crucial for the success of any traffic management system. In this paper we shall use a model called the Linear Multiregression Dynamic Model (LMDM) for forecasting traffic flow. The LMDM is a multivariate, dynamic model which uses a graph in which the nodes represent time series of flows at the various data collection sites, and the links between nodes represent the conditional independence and causal structure between flows at different sites. All computations in the LMDM are performed locally, so that model computation is always simple, even for arbitrarily complex road networks. This allows the model to work in real-time, as required by any traffic management system. LMDMs can also readily accommodate changes in traffic flows. This is an essential property for any model for use with traffic management systems where series often exhibit temporary changes due to congestion or accidents, for example. Finally, LMDMs are often easily interpretable by non-statisticians, making them easy-to-use and understand. We shall show examples based on data from two separate motorway networks in the UK.

Krishnan : Short-term traffic prediction: Revisiting the generic themes [Imperial College London]

ABSTRACT: Vehicle trips are generated on a road network due to the demand for mobility of the population in the area. The demand for mobility is usually captured as a dynamic Origin-Destination (O-D) demand matrix, which is known to follow patterns based on the time-of-the-day and day-of-the-week. Thus, traffic flow and other variables observed at a point on the road network are recurrent in nature in line with the dynamic O-D demand. However, the traffic variables observed on any given day may be different from the expected recurrent pattern due to a number of supply-side and demand-side factors. The common demand-side factors include day-to-day variability in demand, special events such as football matches and exhibitions and external factors influencing demand such as the weather. Traffic variables on a given day could also be different due to supply-side factors such as incidents or road works and changes in network capacity due to inclement weather. Traffic prediction models should account for the recurrent nature of the traffic variables and their day-to-day variability due to the above factors. In addition, traffic flow is a spatio-temporal process, and traffic variables observed at upstream and downstream locations can be used to enhance the quality of the prediction of traffic variables at a given point. All short-term traffic forecasting models try to capture the recurrent pattern of traffic variables in some form, and some models also leverage the spatio-temporal relationship among traffic variables observed at multiple locations. The use of a number of different machine learning tools such as statistical regression, the k-Nearest Neighbour algorithm and neural networks to characterise the dynamics of this recurrent process for a given road network and their subsequent use in forecasting has been documented in the literature. Many of such studies seem to focus on the apparent superiority of one machine learning tool over the other when applied to the short-term forecasting problem. However, an explicit acknowledgement of the nature of the underlying process that is modelled and an insight into why a given method might be superior to another are often lacking in such studies. Moreover, the accuracy of the prediction using a given model depends not only on the choice of the machine learning tool, but also on the model specification in terms of the information supplied through its input variables. Given this background, this paper applies different machine learning tools to forecast traffic flows on a corridor in central London. Moreover, a number of different model specifications are used for each machine learning tool. The predictive accuracy of forecasting models using different machine learning tools and model specifications is compared. It is concluded that the accuracy of the forecast increases as more pertinent information is supplied through the explanatory variables for each of the machine learning tools used. Hence, traffic engineers should ensure that the information used by the model specification is able to fully capture the recurrent spatio-

temporal traffic process with random disturbances regardless of the choice of the machine learning tool, in addition to spending effort to configure the tool in the most appropriate manner. The question of what is being modelled is more pertinent than the choice of the tool used for forecasting.

Cai : Adaptive traffic signal control using approximate dynamic programming [University College London]

ABSTRACT: This paper presents a concise summary of a study on adaptive traffic signal controller for real time operation. The adaptive controller is designed to achieve three operational objectives: first, the controller adopts a dual control principle to achieve a balanced influence between immediate cost and long-term cost in operation; second, controller switches signals without referring to a preset plan and is acyclic; third, controller adjusts its parameters online to adapt new environment. Not all of these features are available in existing operational controllers. Although dynamic programming (DP) is the only exact solution for achieving the operational objectives, it is usually impractical for real time operation because of demand in computation and information. To circumvent the difficulties, we use approximate dynamic programming (ADP) in conjunction with online learning techniques. This approach can substantially reduce computational burden by replacing the exact value function of DP with a continuous linear approximation function, which is then updated progressively by online learning techniques. Two online learning techniques, which are reinforcement learning and monotonicity approximation respectively, are investigated. We find in computer simulation that the ADP controller leads to substantial savings in vehicle delays in comparison with optimised fixed-time plans. The implications of this study to traffic control are: the ADP controller meet all of the three operational objectives with competitive results, and can be readily implemented for operations at both isolated intersection and traffic networks; the ADP algorithm is computationally efficient, and the ADP controller is an evolving system that requires minimum human intervention; the ADP technique offers a flexible theoretical framework in which a range of functional forms and learning techniques can be further studied.

06B Travel Behaviour (III)

Mackett : Why is it so difficult to get people out of their cars (and is it all our fault)? [University College London]

ABSTRACT: The car bestows many benefits on users, but there are reasons to consider whether the growth in car use can be reduced. This paper examines why it is so difficult to encourage people to use alternatives to the car. It starts by showing how car use has grown in Britain while walking, cycling and bus use have declined over the past sixty years. The barriers to switching to the alternatives are considered under three headings: lack of motivation, lack of time, and difficulty in walking, cycling and using the bus. It is shown how many households have adopted a lifestyle that is car oriented; in some cases people have chosen to live in locations where their needs can only be met by using the car. The methodology used to forecast and appraise new transport schemes is examined. It is found to be biased towards the car, mainly because it uses 'economic efficiency' as the overriding criterion. It is argued that other factors such as social, environmental and health should be given equivalent weighting when assessing transport schemes. Transport professionals have been responsible for the development and use of this methodology which has not changed significantly in forty years. The paper concludes by calling upon transport researchers to lead a paradigm shift so the transport schemes are developed using a methodology that is more appropriate for the 21st Century, by taking into account a wider range of factors reflecting various aspects of quality of life.

Metz : Sustainable Travel Behaviour [University College London]

ABSTRACT: Data from successive British National Travel Surveys show that personal daily travel behaviour is remarkably stable. Over a thirty year period there has been little change in average travel time, journey frequency, nature of destinations, and proportion of household income devoted to travel. The one factor that has changed significantly is distance travelled, as people have taken advantage of growing incomes to travel faster, thus gaining access to a greater choice of destinations. However, this growth of access and choice may be approaching saturation, which is helpful in relation to concerns about sustainability.

Howarth (Smeed) : Addressing unsustainable travel behaviour: The use of information on climate change [University of Southampton]

ABSTRACT: Climate change is the most serious threat facing mankind in the 21st century; it has been linked to human activities and the impacts of global climate change will persevere for years to come. The transport sector is responsible for a quarter of global greenhouse gas emissions linked to climate change and it is the only sector with rising emissions. Public awareness of the impacts of transport on climate change appears to be high, and a high degree of concern on environmental issues is expressed. However this is not reflected in corresponding lifestyle choices implying the existence of an attitude-behaviour gap. A series of postal questionnaires on climatic awareness and attitudes were distributed to a random population in an area of the UK. A representative sample of the UK population was obtained in terms of demographic and socio-economic characteristics, transport use, availability of public/private transport options, and views on climate change and travel behaviour. Respondents showed an underlying belief that a change in travel behaviour would be too disruptive to daily lifestyles especially as the majority believe that such a change would be too insignificant to impact on climate change. Respondents fell into one of three distinct groups: those who believe climate change is man made, those who are unsure of the causes and those who believe climate change is a natural process. Three age groups were also found to characterise these views: (i) young people (less than 25 years old), (ii) middle aged (25 to 54 years old), and (iii) older people (more than 55 years old). Middle aged respondents appear to have been reached, however the younger and older individuals do not appear to be receiving sufficient information to ensure they are aware that climate change has human causes. Information on climate change was found to be perceived as too impersonal in order for individuals to fully relate to and that information on local air pollution would instigate a higher motivation for change. Existing policies and information are addressing the 'information' issue but have not yet managed to affect cognitive and affective attitudes sufficiently to induce behavioural change. Information targeted at the aforementioned groups could increase the level of awareness thereby ensuring the majority of the population would have the same baseline knowledge. This paper shows that the role of information on climate change needs to change. Providing more tailored information has significant potential in providing the type of information required and encouraging sustainable travel behaviour. Attempts to increase public awareness of climatic issues now need to be re-focused on encouraging people to act voluntarily on their attitudes, values and beliefs.

06C Safety (I)

Wang : Road safety and traffic congestion: An analysis of the M25 [Loughborough University]

ABSTRACT: Traffic congestion and road accidents are two external costs of transport and the reduction of their impacts is often one of the primary objectives for transport policy makers. The relationship between traffic congestion and road accidents however is not clear and requires further study. It is speculated that there may be an inverse relationship between traffic congestion and road accidents, and as such this poses a potential dilemma for transport policy makers. This study aims to explore the impact of traffic congestion on the frequency of road accidents using a spatial analysis

approach, while controlling for other relevant factors that may affect road accidents. The M25 motorway, divided into 70 segments, was chosen to conduct this study and relevant data on road accidents, traffic and road characteristics were collected. A robust technique has been developed in order to map M25 accidents onto its segments. Since existing studies have often used a proxy to measure the level of congestion, this study has employed a precise congestion measurement. A series of Poisson based non-spatial (such as Poisson-lognormal and Poisson-gamma) and spatial (Poisson-lognormal with conditional autoregressive priors) models have been used to take account of the effects of both heterogeneity and spatial correlation. The results suggest that traffic congestion has little or no impact on the frequency of road accidents on the M25 motorway, and all other relevant factors have provided results which are consistent with existing studies.

Law (Smeed) : The sources of the Kuznets relationship between road fatalities and economic growth [Imperial College London]

ABSTRACT: This paper reports the results of an empirical analysis of the Kuznets curve relationship between per capita income and road fatalities across 63 countries over the period 1963 to 2004. This relationship hypothesizes that the number of road fatalities increases with increasing motorization in the early stages of economic growth. Eventually, due to advances in technical, policy and political institutions, it declines as per capita income increases. The quality of political institutions as well as improvements in medical care and technology are hypothesized to impact road fatalities. Results indicate evidence of a Kuznets curve relationship between per capita income and road fatalities for both highly developed and less developed countries and support our hypothesis that changes in institutional quality and medical improvements underlie the Kuznets relationship. The evidence presented in this study suggests that lowering corruption levels as well as improvements in medical care and technology would help to reduce road fatalities.

Heslop : Driver boredom [Newcastle University]

ABSTRACT: Driver boredom is an area of driver behaviour that has received very limited attention. This study explores the factor structure underlying driver boredom and investigates age and gender differences in the experience of driver boredom and preferred driving speeds. A self-report questionnaire was designed to investigate driver boredom and its effect on road safety. The questionnaire includes measures of driver boredom, personality (including proneness to boredom) and driving experience. A principle components analysis suggests that driver boredom consists of 8 dimensions: dislike of driving, driver boredom, driver error, driver speed-seeking, driver stimulation-seeking, driver control-seeking, driver challenge-seeking and driver social interaction-seeking. Analyses also show age and gender differences in scores on these dimensions as well as in preferred driving speeds. It is concluded that drivers' goals are important determinants of their behaviour and the experience of driver boredom. It is further concluded that drivers' goals and behaviours show demographic differences.

06D Active Travel

Broadstock : The cost of cycling, 1948-2005 [University of Surrey, University of Portsmouth]

ABSTRACT: Sustainable modes of transport, such as walking and cycling, suffer the unfortunate consequence of being difficult to value, largely because their costs of use are far less tangible than for methods such as cars, motorcycles and public transport use which have far more visible costs of usership such as taxes, insurance and fuel costs. However, it is still logical to assume that these modes of transport are normal goods, and that there is a price (measured in terms of generalised cost) attached to their use. This study presents a means of elucidating a historic (generalised cost based) price index for cycling in the UK for the period 1948-2005 using annual data on cycle use. The

method relies upon a Hicksian separable demand function and the application of a recursive econometric method to delineate the price effect. The results provide for interesting consideration and make two distinct contributions; Firstly a price index for cycle transport is derived, which when compared with observed demand patterns, generally conforms with economic theory. Another interesting finding is that the results imply a skewed income expansion path for cycling compared to other goods and services, thereby suggesting that cycling is an inferior good. That said, the latter finding may have emerged as a by-product of the econometric specification given that cycling is a mode more prevalent in the upper and lower income brackets and seemingly less prevalent in the middle range income brackets.

Raymond : Developing walking and cycling indicators applicable to Milton Keynes [Loughborough University]

ABSTRACT: Designated as a new town in 1967, the 1970 design of Milton Keynes was a car-oriented low-density land use pattern served by a high-speed one-kilometre topology sensitive grid of dual carriageway roads. More sustainable transport modes have suffered as a result of the urban design and car dominance. Walking and cycling have low usage, although the infrastructure allows for 320km of dedicated walking and cycling routes that are segregated from the high speed grid network. To change transport use in Milton Keynes, there needs to be further development of sustainable transport options, including indicators with which to measure and enhance walking and cycling in the new town. This paper proposes and applies a methodology to develop walking and cycling indicators, which can then benchmark the case study town of Milton Keynes against other new towns. Following a review of appropriate methodologies, systems theory is applied to the development of sustainable transport indicators for Milton Keynes. The indicator selection process includes weighting according to the environmental, economic and social pillars of sustainable development, and the 'driving force', 'state' and 'response' framework. The resultant sustainable transport indicators for Milton Keynes are presented and discussed. Those relevant and applicable to the analysis of walking and cycling in Milton Keynes are also highlighted. The development of walking and cycling indicators for Milton Keynes represents the first stage of a PhD research study. The research will then progress to examine the attitudes of transport stakeholders and members of the public in Milton Keynes. In addition, the benchmarking of Milton Keynes with respect to other similar towns will indicate where and how a modal shift to walking and cycling can be achieved.

Sherwin : Who chooses to bike-rail integrate? Lessons for rail and cycle policy [University of the West of England]

ABSTRACT: An increase in cycle access to a railway station - bike-rail integration – to replace car journeys or motorized access to the rail network has the potential to bring environmental, economic and health benefits but there are practical, social and psychological barriers. The paper reports the findings of face-to-face surveys of 135 bike-rail integrators (BRIs) conducted at two stations in Bristol (UK) along with those from semi-structured interviews and observations to explore the motivations, cycling histories and existing behaviour of BRIs. The main motivations were found to be saving time or money and taking exercise. Cycle trips to or from the stations were on average 3.7km. For many the alternative access mode would be to walk. BRIs had experimented with different methods of bike-rail integration and moved in and out of cycling through their life course. These findings are discussed in the context of behaviour change theory to inform interventions to promote bike-rail integration.

07 Plenary

Hounsell : Traffic management: Challenges [University of Southampton]

ABSTRACT: With minimal new highway capacity being constructed, emphasis in recent years has been on the use of traffic management, supported by Intelligent Transport Systems, to make best use of existing roadspace. This is proving successful - up to a point - with improved traffic control, navigation, parking management, variable speed limits, bus priority etc. However, these developments are creating their own challenges: How should we use roadspace?; how can we cope with a 'saturated' system when incidents occur?; how can we manage and maintain increasingly sophisticated systems? - where are the skills? Finally, are we now just getting diminishing returns when we need more drastic measures to respond to energy shortages and climate change? This paper will seek to discuss these issues, through first tracing the emergence of increasingly advanced traffic management systems to the present day. A critical reflection will then be provided of where we are now, what the road transport challenges are and the role of traffic management in addressing them in the coming years.

08A Travel Behaviour (IV)

Clark : Understanding the dynamics of car ownership: some unanswered questions [University of the West of England]

ABSTRACT: This discussion paper arises from the first year of a PhD study into household car ownership decisions. It begins by summarising explanations for the past (aggregate) increases in car ownership, reviewing research from the fields of economics, urban and transport planning, and social psychology. Car ownership trends have been examined in terms of consumer behaviour; changing land use patterns; changing social norms and the life-course. Though there are convincing explanations for past increases in car ownership at the aggregate level, the paper goes on to draw together evidence suggesting that there are significant and perhaps counter-intuitive underlying variations. Previous analysis of the British Household Panel Survey by Dargay and Hanly has revealed that there are only a slightly larger number of households increasing car ownership (8.2 per cent) than there are households reducing car ownership (7.6 per cent) each year. Similarly, at the local level, a comparison for this present paper, of the 1991 and 2001 censuses reveals that car ownership levels per capita were either maintained or reduced in 8.6 per cent (688) of the electoral wards in England. Indeed, a significant minority – 6.2 million households in Great Britain, either choose, or are constrained to continue living without a car. This underlying variation in (changing) car ownership levels has important implications for transport policy, and the paper concludes by posing a series of questions which may benefit from further research. While it seems that car ownership levels naturally tend to increase, are there (predictable) conditions under which the demand for privately owned cars might be reduced? If so, do these relate to macro or micro-level factors, to spatial planning or the transport system, or to the physical or the social environment? The paper explores such questions.

Le Vine : An analysis of car club participation and its environmental effects [Imperial College London]

ABSTRACT: Transport economists have long theorised about a paradigm shift in the automobile's pricing structure towards an average-cost model. Proposals for road pricing and pay-as-you-drive insurance are two examples, as is de-coupling car use from ownership. This last issue is today manifested in the form of car clubs, which currently have upwards of 50,000 members in the UK and 350,000 globally. Members pay relatively low fixed costs and high marginal costs for their car club travel. Clients make reservations via phone or the internet, and self-access vehicles which are distributed in neighbourhoods. This paper discusses the application of stated adaptation surveying techniques to investigate the consumer market for car clubs. Results are presented from a very small sample of the ongoing research. Findings are presented regarding people's consideration of car

clubs, their overall mobility patterns, and a rudimentary estimate of the net effects on pollutant emissions.

08B Safety (II)

Dissanayake : Stated preference discrete choice model to investigate the determinants of public willingness-to-pay for road casualty risk reduction in Thailand [Newcastle University]

ABSTRACT: Delivering road safety policies along the lines of public needs is a challenging but important undertaking to maximize the societal benefits from such policies. This subject has not been explicitly researched within the global transport community thus far, even though it has been fundamental to the successful delivery of road safety policies. This study, recognizing the scale of the road safety problem in Asian countries, attempts to elicit public preferences for the reduction in risk of road casualties, considering the city of Bangkok in Thailand as a case study. The intention of the study is to reveal how the society appreciates road safety, and the factors that influence public willingness to pay for the reduction in risk of road safety. The state-of-the-art Discrete Choice modeling technique is employed to model the willingness to pay data collected through Stated Preference Contingent Valuation experiment and to investigate the determinants of and the attitudes to willingness to pay for road safety. Accordingly eight Discrete Choice models were developed for car and motorcycle casualties by taking into account four severity classes, for instance slight, serious but no permanent disability, serious with permanent disability, and fatal, to investigate the determinants of public willingness to pay for the reduction in risk of road safety. The analysis conducted shows that the level of education and the vehicle ownership have significant relationship with public willingness to pay. In addition, it is found that there exists a very strong correlation between the past casualty experiences and the willingness to pay.

Tolouei : Reinvestigation of the relationship between relative injury risk and mass ratio in two-car crashes using Great Britain road casualty data [University College London]

ABSTRACT: Vehicle mass is a key design variable as it affects both fuel consumption rate and safety performance of a vehicle. The two aspects of vehicle safety influenced by mass are vehicle secondary safety performance and vehicle aggressivity. For example, in a two-car crash, the injury risk of occupants in the lighter car is higher than that of the heavier car due to the greater change in speed during the collision which is the result of the relatively greater mass of the other vehicle. The effect of vehicle mass on relative injury risk in two-car crashes has been studied intensively in the past. Most of these studies have resulted in the injury risk ratio (R) of a lighter to heavier car to be a power function of mass ratio (m) of the heavier to the lighter car ($R=m^u$). This paper critically reviews the existing methodology used to estimate the relationship between injury risk ratio and mass ratio and proposes a preferred alternative methodology based on a logistic regression model which overcomes the disadvantages of the existing methodology. The effect of mass ratio on relative injury risk of drivers in a two-car crash is estimated using both methodologies based on Great Britain road casualty data and the results are compared. Two types of crashes are analyzed based on the injury level of the driver: "all injuries" crashes and Killed or Seriously injured "KSI" crashes. Results from the developed logistic regression model confirmed that increasing mass ratio decreases the probability of driver injury in the heavier car relative to that in the lighter car in both "all injuries" crashes and "KSI" crashes. For both types of driver injuries, frontal impact was found to have the greatest effect on relative injury outcome. Modelling results showed that relative injury risk for a given mass ratio is not significantly different between different driver types in "KSI" crashes; however, older female drivers in the heavier cars were shown to have a greater risk of injury in "all injuries" crashes.

08C Freight (II)

Wilmsmeier : Determinants of maritime transport costs - A panel data analysis for Latin American trade [Napier University]

ABSTRACT: This paper analyses the determinants of transport costs for intra-Latin American trade over a period of six years (1999-2004). The data refer to yearly disaggregated (SITC 5 digit level) maritime trade flows on 277 trade routes. With this data set, a transport costs equation is estimated using linear regression analysis in a panel data framework. The first contribution to the literature is to exploit the greater variability present in the data and to control for unobservable heterogeneous effects. The second is to investigate the influence of open registries on the variability of maritime transport costs. To the authors' knowledge this has not been done previously. Three groups of explanatory variables are considered. Firstly, time variant variables: use of open registries and trade imbalance. Secondly, variables related to liner shipping network structures: number of liner services, shipping opportunities, deployed ships and deployed TEUs. Finally, product related variables such as volume of shipment, value of product and special characteristics of the cargo (i.e. refrigerated cargo). The results allow to quantify the effect of the explanatory variables on international maritime transport costs and to compare the obtained elasticities with previous cross-section analysis. In particular, estimating the impact of the use of open registries on transport cost is a new contribution in this field that could provide policy makers with valuable information to be used in the implementation of economic policies.

Arunotayanun (Smeed) : Modelling of freight shippers' mode choice behaviour accounting for supply chain structures [Imperial College London]

ABSTRACT: This paper addresses a number of current shortcomings in modelling the behavioural responses of freight suppliers, in particular those associated with accommodating the complexities of supply chains, the insufficiency of data, and the use of inappropriate model forms. The data source used in this work come from the 2004 French shipper survey (ECHO), enriched with the information of physical and flow characteristics of individual shipments, characteristics of shippers and transport operators and especially organisational supply chain structures. These data provide a unique opportunity for some of the theoretical models of supply chain influence to be implemented and tested. The analysis focuses on shippers' choice of modes using multinomial logit (MNL), nested logit (NL) and cross-nested logit (CNL) models. The results show the structural advantages of the CNL models and indicate the presence of correlation structures in the dataset for the basic model specifications. However, after incorporating detailed explanatory variables, it turns out that almost all of unobserved correlation in utility across alternatives can be captured by observable characteristics of the shipment. Given that, apart from the significant effects of cost and time, the analysis is able to reveal a major impact and substantive results of various demand characteristics on freight mode choice. To explore the influence of supply chain structures, two separate NL model structures were then developed; one is to account for the heightened correlation between transport modes sharing the same supply chain structure and another is to account for the correlation between supply chain structures sharing the same mode. The CNL model was also used to account jointly for the correlation along these two choice-dimensions. The results indicate that some gains in model performance can be obtained in the nesting by supply chain structure. The use of the CNL model also leads to some further gains in model fit. Moreover, through each stage of our analysis, the effects of different model specifications and of the use of models accounting for inter-alternative correlations were revealed via the changes in the trade-off between cost and time and via the estimations of market elasticities. The results show that the CNL models provided more realistic evaluation of the cross-elasticities of choice.

08D Monitoring

Wilson : Modelling driver behaviour on motorways: A new data resource [University of Bristol]

ABSTRACT: This paper describes ongoing work on the M42 motorway which has a uniquely high coverage of inductance loop detectors. The spacing of detectors is sufficiently small for one to use individual vehicle data to follow single vehicles down the highway. The paper gives a brief outline of the data collection work and sketches how the vehicle re-identification algorithms work. Further information and sample data sets are available on application from the project web-site <http://www.enm.bris.ac.uk/trafficdata>

Han : On the estimation of space mean speed from inductive loop detector data [Imperial College London]

ABSTRACT: Travel time is an important indicator of network performance used in traffic operations and management. It is also a measure that is easily understood by transport professionals as well as the general public. Hence, models that can be used to estimate travel time using data from existing traffic sensors are attractive. Inductive Loop Detectors (ILDs) that can measure spot-speed, flow and occupancy are commonly deployed on the highway network in the UK and elsewhere in the world. However, the ILDs measure the time-mean-speed, whereas an estimate of the space-mean-speed is required to calculate the travel time on a given section of the roadway. A well-known relationship between the time-mean-speed and the space-mean-speed was derived by Wardrop (1952). However, this relationship cannot be used in practice to estimate the space-mean-speed from the time-mean-speed as it requires a knowledge of the variance of the space-mean-speed. The variance of the space-mean-speed, and indeed the space-mean-speed itself, is not measured by the ILDs and is not available in practice. A novel formulation is presented in this paper to estimate the space-mean-speed using time-mean-speed and other variables available from the commonly deployed ILDs. An attractiveness of this formulation is that the proposed approximate relationship between the space-mean-speed and the time-mean-speed can be easily implemented in real-world scenario for traffic engineering applications. In addition, it is illustrated that the relationship between the space-mean-speed and the time-mean-speed varies depending on the traffic state. Hence, a more refined formulation is presented where the traffic state is segmented based on the flow and occupancy values obtained from the ILDs. The basic and the refined models are testing using the data obtained from the ILDs on the highways in England through the DATEX-II feed disseminated by the National Traffic Control Centre (NTCC). The travel time data used for calculating the accuracy of the proposed models are also obtained from the NTCC feed from the links equipped with Automatic Number Plate Recognition (ANPR) cameras. The results demonstrate that the proposed formulation can estimate the space-mean-speed, and hence the travel time, accurately using real-world data.

09A Economics

Finn : Developments in market structure and regulation of urban bus services in developing countries and countries in transition [University of Newcastle]

ABSTRACT: The market for urban passenger transport has experienced major change in many developing countries in Africa, Asia, and the Middle East for a variety of reasons, and due to fundamental political and economic transition in the Commonwealth of Independent States (CIS) and China. Such changes have included planned opening of the market to private operators and/or new entrants; unplanned opening of the market by the entry of unlicensed operators, especially where the licensed services had become inadequate; privatisation and other changes to the ownership base of large public-sector transport companies; emergence of large-scale minibuses and paratransit; national and urban policies and programs to upgrade the transport supply and quality. This paper considers the extent to which the regulatory framework and institutions were suited to

the new requirements and identifies where these had not functioned effectively and the consequences of this. This paper is illustrated by a range of cases from Africa, Asia and Middle East, along with the CIS and China together with in-depth illustrations from China, Ghana and Kazakhstan. It identifies a range of relevant developments, and clusters them according to changes in the role of the regulator and market structure; changes in the structure of the operator and of private sector participation; and changes in the transport supply. The cases presented in this paper indicate a very wide range of contexts and mechanisms. Some have clearly been successful than others, but each has been implemented with the objective either of strengthening the sector, or of making a practical response to challenges within the prevailing constraints. In many cases, but not all, the emergence of a strong minibuses/paratransit sector has provided vital transportation capacity, but has subsequently needed to be regulated and assisted or forced to improve its quality and organisational structures. The paper concludes by identifying the critical factors leading to change in the urban transport sector, the factors which can be identified with a successful outcome and issues associated with the development of the minibuses, para-transit and informal sector which have played such a large role in the urban transport sector of developing countries and countries in transition.

Galilea : Influence of national political and economical factors on the success of public-private partnerships in transport [University College London]

ABSTRACT: Since the emergence of public-private partnerships (PPPs) in the 1980s, there has been a structural change in the way countries now finance and provide public infrastructure. Although national governments apparently encourage PPPs, and many have succeeded, some others have failed. Using data from transport sector projects for 72 low- and middle-income countries from the Private Participation in Infrastructure Project Database of the World Bank, we investigate the role of three main factors in the success of these transport PPPs: national experience, the presence of private investors, and the influence of multilateral lenders. The results of the study highlight the importance of the foundation provided by national experience. Not only does national macroeconomic experience appear to have a relevant role, but so also does its past experience (either positive or negative) of transport PPP projects. An interesting finding of the analysis is that the perception of a country's level of corruption and democratic accountability has significant bearing on the final outcome of a PPP project. Also, the region and subsector of the PPP project seem to play an important role in its success.

Cowie : The impact of reform on the provision of ferry services in the Clyde Estuary and Western Isles [Napier University]

ABSTRACT: Ferry services in Scotland have seen considerable organisational reform since 2000. This period has seen the division of the nationalised operator Caledonian MacBrayne into two publicly owned companies and the whole network put out to competitive tender in line with European Union regulations. The paper outlines the overall structure of the Scottish ferry sector and details the industry restructuring brought about by the European Union legislation. Productivity and cost efficiencies in the period immediately prior to the running of the new structure are then estimated to look for evidence of Boussofiene's 'anticipation effect'. This was originally found by Boussofiene et al (1997) and occurs where the refocusing of a nationalised company towards more market driven principles in the run up to the introduction of competition is a sufficient condition on its own to produce efficiency improvements. All methods consistently find that the impact of reform on the industry has been to have little or a negative effect on productivity and costs, and thus there is no evidence of an anticipation effect. There is stronger circumstantial evidence however that reforms may have increased the cost of operations compared to that achieved under the previous structure.

09B Traveller Information

Carreno : Mode, mood and trip management: A qualitative analysis of the effects of RTPI on bus user behaviour and attitudes [Edinburgh Napier University]

ABSTRACT: implemented along a Quality Bus Corridor (QBC) in Edinburgh, UK, a household survey was conducted with residents living alongside the route, 4 months after the system was installed. Respondents were asked, inter alia, to state in an open-ended question the effects of the RTPI system on their behaviour and attitudes towards local bus use. Whilst only a small change in actual bus use was reported, many users reported changes in their attitudes in terms of reduced waiting time, perceived security, stress reduction, satisfaction with bus services and facilitation of journey planning. Analysis of responses supported a typology of three main effects of RTPI on: respondent's modal choice (Mode Management), respondents state of mind whilst waiting for and using bus service (Mood Management) and ease of journey planning (Trip Management).

Balampekou (Smeed) : The potential of handheld traveller information devices to influence travel behaviour in urban areas [University of Southampton]

ABSTRACT: Planning and following an efficient route to any destination constitutes a source of difficulty for many road users regardless of the mode of travel they use. As a result there has been an increase in the development of navigation systems and their use from road users, car drivers in particular, while similar systems for pedestrians and public transport users are still in their infancies. The fact that the increased use of navigation systems by car drivers facilitates the use of the private car making it even more attractive generated the idea that the development and use of navigation systems for pedestrians and public transport users might result to a similar sequence and encourage a shift towards sustainable travel modes. This paper describes results from the first phase of public trials that were organised in Reading, UK in order to test an on-foot navigation system that also provides real time public transport information retrieved from the Urban Traffic Management Centre (UTMC), evaluate its performance, and investigate its potential to influence travel choices in the urban environment.

Habib Pathan : Travellers' choice of information sources: A modelling framework [University of Leeds]

ABSTRACT: This paper proposes the modelling framework developed to study the travellers' choice of information sources and their subsequent travel mode choice decisions. The motivation behind this research is to investigate the factors that people do mind to consider in selecting different sources of information in today's information rich atmosphere of travel. The goal of this study is to develop a comprehensive choice model that can capture the information acquisition process by predicting the choice of information sources together with its effects on travel choices of the travellers. Information acquisition process for the travel decisions is considered especially when a user first decides to acquire the information and is not satisfied with his present level of knowledge/belief. It is important to explicitly model the abstract terms involved in the whole process of information acquisition and subsequent travel decisions. A Stated Preference experiment is developed based on the complicated decision making process and an interactive CATI questionnaire is designed to cope with it. Utility function is formulated in the Nested Logit Model framework. The pilot surveys revealed that the ownership of the source; type of information; search time; presence of advertisements; updating of information; and subscription cost were important attributes in the selection of the information sources.

09C Rail (I)

Blainey (Smeed) : Modelling local rail demand in South Wales [University of Southampton]

ABSTRACT: The majority of the recent work which has been undertaken on modelling the absolute demand for rail travel has focused on inter-urban trips, meaning that local and suburban travel has been somewhat neglected. This paper describes the development of flow-level absolute demand models based on LENNON ticket sales data for 85 local rail stations in South Wales. A range of log-linear regression models were calibrated on a dataset of 2,440 flows, incorporating a variety of station-specific and flow-specific independent variables. Subsets of this dataset were used to test models which incorporated measures of intermodal competition and the presence of intervening opportunities. GIS were used extensively in data processing and integration, and allowed flexible station catchment definition methods to be tested, including flow-specific catchments where population units were allocated to stations by minimising total travel time to the destination in question. To allow these methods to be validated a survey to collect information on actual station catchments was carried out on the Rhymney line and the results compared to the theoretical catchments. The flow level model predictions did not correspond with either observed or forecast station trip totals and in an attempt to give consistency between predictions, methods were developed to constrain the number of trips predicted for each flow based on the total trips observed or predicted from origin stations. Constrained flow level predictions were first obtained by using observed trip end totals to scale the results from unconstrained models. This was not entirely successful, so probabilistic trip distribution models were also calibrated using both linear and nonlinear regression. These gave better results and also explicitly incorporated the effects of intervening opportunities in the model form.

Jackson : Appraisal Methods for Rural Railways [University of Leeds]

ABSTRACT: Rural rail services in the UK have received comparatively little attention from researchers since the large scale closures of the 1960s and 70s. However in recent years there has been a renewed interest from policymakers who are trying to reconcile the problems of the high costs of operation of these routes with the need to provide alternatives to the car for the resident population and visitors alike. The research undertaken has aimed to provide specific guidance about demand issues relating to rural and community railways. A range of characteristics have been examined where it was felt that these lines and the surrounding areas have characteristics that are at variance with the rail network as a whole. These included service quality aspects, modal substitution, and feeder traffic to the rest of the network. In addition, an attempt has been made to quantify the value of these services to the communities they serve in the form of option and non-use valuations, a comparatively new area of study in transport research. To provide a contrast the values for Public Transport can be compared to the values of Post Offices in these communities. To provide data for this research, stated choice surveys were undertaken on rail passengers on three routes in the north of England. In addition surveys were undertaken in 21 rural settlements around these routes to obtain non use and option values. This paper will present the background to the work as well as some results from the surveys and explain some of the difficulties surrounding this work.

Merkert : Benchmarking of train operating firms - A transaction cost efficiency analysis [University of Leeds]

ABSTRACT: Benchmarking of rail firms has become a matter of substantial interest and many authors have emphasised the importance of transaction costs in regard to assessing the desirability of vertical separation. However, due to data and methodological limitations transaction cost elements have never been explicitly subject to efficiency analysis. This paper builds on recent results in regard to transaction cost measurement (e.g. Merkert, 2008) and uses physical indicators of transaction costs in bootstrapped data envelopment analysis (DEA) to evaluate relative technical efficiency and

economies of scale of 43 Swedish, German and British train operating firms. This is followed by a second-step Tobit regression model while controlling for institutional (vertical separation and type of operation), environmental (competition) and transactional (monetary values of transaction costs) factors. The results of the analysis show that the relative level of transaction costs has the most significant effect on technical efficiency.

09D Social Exclusion

Kamruzzaman : Participation index: An improvement to the measure of transport related social exclusion? [University of Ulster]

ABSTRACT: Although transport related social exclusion has been identified through zonal accessibility measures in the recent past, the debate has shifted from zonal to individual level measures. One way to identify disadvantaged individuals is to measure their size of participation in society (activity spaces). After reviewing existing literature, this paper has found two approaches to measure the activity spaces. One approach is based on the time-geographic potential path area (PPA) concept. The size of the PPA has largely been used as an indicator to the size of potential activity spaces and consequently individual accessibility. The limitations of the PPA concept have been identified in this paper and it is argued cannot be applied as a measure of social exclusion. The other approach is based on individuals' actual travel-activity participation called actual activity spaces. The size of actual activity spaces possesses a good potential measure of social exclusion. However, the indicators to measure the size of actual activity spaces are multidimensional representing the different aspects of social exclusion. The development of a unified approach has therefore been found to be important. This paper has developed a participation index (PI) using the different dimensions of actual activity spaces encountered. A framework has also been developed to operationalise the concept in GIS. The framework, on the one hand, will visualize individuals' actual travel behaviour in real geographic space; on the other hand, it will calculate the size of their participation in society.

Solomon : Setting accessibility standards for social inclusion: Some obstacles [London Metropolitan University/University College London]

ABSTRACT: One of the principal rationales for accessibility planning in the UK is the potential reduction of social exclusion. Although there are multiple causes of social exclusion, transport and accessibility limitations contribute to a greater or lesser extent. It is in the light of this understanding the transport authorities are asked to devise policies which will promote inclusion. However, although the literature on social exclusion/inclusion is now quite substantial, and there are a number of Government documents available explaining the connections and their consequences, transport authorities are given little, if any, guidance by Central Government about the levels of accessibility to which they should and could reasonably be expected to aspire. This paper is based around research initially undertaken as part of an EPSRC-funded project – AUNT-SUE (Accessibility and User Needs in Transport for Sustainable Urban Environments) which aims “to develop and test sustainable policies and practice that will deliver effective socially inclusive design and operation in transport and the associated public realm from macro down to micro level.” As part of this project, accessibility benchmarks and standards appropriate to various socially-excluded groups have been, and are being, developed and tested using both existing data and field research. The paper discusses the progress of this work and the difficulties of arriving at solutions which can both adequately reflect the needs of the affected groups, as groups rather than individuals, and which can also be successfully modelled.

Bukhari : Mapping social exclusion and public transport network change in GIS: A case study of Belfast [University of Ulster]

ABSTRACT: The issue of the integration of location and travel is central to urban design and is a key policy objective in terms of measuring accessibility. Social exclusion is a function of accessibility to activity spaces. The public transport network in Belfast city has been transformed from 'City Bus' to 'Metro Service' by introducing quality bus corridors and night service for better service and connectivity. The aim of this transformation is to provide better access and target social need to minimize the effects of societal inequalities and communal segregation which the city has historically experienced. The role of the transport in social exclusion is important as it can either exacerbate social exclusion or can initiate the phenomena. Different methodologies and approaches used to measure social exclusion are reviewed and a methodological tool for transport and urban planners is provided to analyze the transport disparities. GIS based analysis integrating socio-economic, demographic data can be used to highlight deprived areas due to change in transport network, but to assess the impact of change in transport network in terms of trade offs made by social groups and penalties faced by them, a qualitative assessment is necessary. An integrated qualitative and quantitative approach is proposed to measure social exclusion and role of transport in social exclusion. Further more the paper looks at the application of the methodology in Belfast city.

10A Modelling (IV)

Cheung : Bayesian analysis for modelling uncertainty in toll road demand and revenue forecasts [Imperial College London]

ABSTRACT: Transport infrastructure projects, such as toll road schemes, typically rely on traffic demand and revenue forecasts to establish the business case for investment. Transport models which inform these traffic forecasts are built upon assumptions regarding the value of model parameters, other input data and their mutual relationships as embodied in model structures. There is uncertainty in all these aspects of model structure, parameters and data; this uncertainty propagates into uncertainty regarding the accuracy of model predictions. As a result, project sponsors and lenders normally require a risk assessment on forecasted traffic and revenue levels. Conventionally, such risk analyses are undertaken using sensitivity analysis. However, other techniques are available, and may offer superior insight into the structure of the underlying problem. In this paper, Bayesian belief networks (BBN), together with Monte Carlo Markov Chain techniques, are applied as an alternative method for modelling uncertainty in transport modelling and forecasting. The technique is applied to a simplified toll road case study in which we compute equilibrium solutions for traffic flow, travel time and speed for fixed demand and elastic demand problem formulations. The paper presents the results of BBN, compares this with a more conventional sensitivity analysis and discusses the relative merits of each approach.

Stewart : Optimising Network flows by Low-Revenue Tolling under the principles of Dynamic User Equilibrium [Napier University]

ABSTRACT: Previous work by Stewart (Stewart and Maher, 2006, Stewart, 2007) in a static stochastic environment has developed heuristics to determine low revenue tolls that produce good sub-optimal flow patterns where total network costs approach the system optimal. The heuristics developed have however assumed a static modelling environment and the proposed paper seeks to examine tolling solutions which reduce overall total network cost within a dynamic modelling environment. Dynamic Traffic Assignment (DTA) models extend the static concept of UE to DUE (dynamic user equilibrium) where the system is said to be in DUE where no user can unilaterally reduce their origin to destination travel time (or cost). Algorithms for DUE commonly iterate between two components; the Dynamic network loading (DNL) and route choice or path inflow reassignment. (e.g. Wu et al, 1998, Lo and Szeto, 2002). It follows that DSO (Dynamic System

Optimal) is where the total travel cost of all travellers through the network is minimised (over the time period under consideration). (Chow, 2007). This paper utilises existing DUE algorithms to investigate their ability to incorporate tolling scenarios and to present heuristics to produce low-revenue tolls to create desired flow profiles using network models. The well-tested software used by Malachy and Ge (2007) is used to produce numerical results. This paper investigates tolling strategies under different assumptions and determines toll sets which reduce (or minimise) total network cost under these assumptions. The scenario in this paper will investigate applying a fixed toll over the entire time period to reduce the total network cost, and this is investigated for a range of demand levels; in a two-link network this will result in the tolling of a single link, in a more complex network the iterative heuristic previously utilised in static models (Stewart and Maher, 2006) will be incorporated to assign tolls to links. Future work is planned to extend the formulation to incorporate time varying tolls.

10B Rail (II)

Shaw : Union renewal in the privatised rail industry [University of Plymouth, University of Glasgow, University of Aberdeen]

ABSTRACT: The British railway industry was privatised in the mid 1990s in order to achieve several policy goals. In addition to cutting subsidy and promoting competition, government ministers wished to undermine the strength of the main rail unions. In this paper we assess the fortunes of organised labour in the British railway industry since privatisation. We track union activity and show how the process of privatisation has created a new phase of employment relations. Of particular interest is the geography of employment relations, wherein unions have been forced to respond to the destruction of national collective bargaining and to the creation of a new fragmented industrial structure; one nationalised company was replaced by around 100 companies operating at and across a range of spatial scales, from commuter-based urban rail companies to national infrastructure companies. We have found that despite job losses and initial membership decline, unions have been broadly successful in maintaining a culture of organisation and collective action and have even witnessed some membership growth in recent years. At least in part this renewal is related to geographical restructuring and an ongoing embeddedness in the history and culture of the railway industry.

Thomas (Smeed) : Managing an underground rail project to avoid cost overruns [University of Southampton]

ABSTRACT: The need for transportation infrastructure is greater than ever with transport planners seeking to provide the solutions which are needed to satisfy this demand. This is often achieved through the development of very large transport infrastructure or megaprojects. Many existing megaprojects have experienced poor performance with severe cost and time overruns, the effects of which remain with the project long into its operating life. While technical failures remain the most common triggers for overruns, the causes have not typically been deficiencies in the underlying engineering principles. This research combines processes that enable designers to take proactive and reactive approaches to avoid cost overruns in an underground railway development. The value of this work is the balanced and complementary use of requirements and risk management frameworks and real options theory. The UrbRail project provides a case study with a scheme design for an underground station at High Street being considered in detail. Frameworks are developed which can be used to manage the interactions between project requirements and manage the relationships between project risks. Combining these two elements with a fuzzy logic process to evaluate risks external (e.g. resource or client risks) to a project's technical or programme risks provides a proactive approach to avoiding cost overruns. A reactive approach to cost overruns is demonstrated by the application of real options theory. The case study highlights how the optimum

design for an underground station at High Street can be procured for a set budget under dynamic cost, revenue generating, project risk and safety conditions. This is modelled by developing different design options within the case study and taking positions alike financial securities to minimise any losses realised through overruns. Future work will show how real options theory can be used in this context to ensure that no project party bears unreasonable risks or large cost overruns while also providing a method rewarding accuracy in the estimation of costs. Key words: overruns, proactive, reactive

10C Assessment

Carse : Assessment of transport quality of life in Manchester and Glasgow. An alternative appraisal technique for measuring passenger's experiences on public transport? [University of Glasgow]

ABSTRACT: Increases in congestion, environmental awareness and oil prices have put more pressure on the public transport networks. Yet there is still no definitive form of appraisal that can measure an individual's experience when they travel by public transport. This paper presents findings of a methodological tool that can assess appraise Transport Quality of Life (TQoL) on all modes of transport in one city. Quality of life (QoL) techniques were applied to the transport networks of Glasgow and Manchester to determine if this is a valuable alternative in transport appraisal. Effective assessment confirmed the validity of the method highlighting in both locations that fixed modes, particularly Light Rapid Transport, are providing a significantly better quality of life compared to the bus.

Campo : Intergenerational equity index for sustainability analysis: assessing long term land use and transportation policies' within Lisbon metropolitan area [University College London]

ABSTRACT: This paper describes the development of an intergenerational equity index (IEI) for the assessment of long term land use and transportation policies' impacts within Lisbon Metropolitan Area. After a series of key-expert interviews with scholars and government departments a set of indicators was selected to develop the IEI. The IEI is composed of the following indicators: (i) modal accessibility disparity; (ii) regional economic instability; (iii) accessibility to public amenities; (iv) road traffic emissions; (v) consumption of oil products from transport; and (vi) fragmentation of the metropolitan ecological structure. The sub-indices were used to evaluate the land use and transportation policies using data from the 1990s and the 2000s. The results show that despite the reinforcement of the spatial planning system in the 1990s, the governmental actions have not been effective in controlling the side effects of a rapid metropolitan growth visible on modal choices, consumption of natural resources and non-renewable energy sources, on leading to unsustainable mobility patterns, increasing road emissions, and significant social impacts.

10D Freight (III)

Woodburn : Wagonload rail freight in Britain: an investigation [University of Westminster]

ABSTRACT: Since the late-1960s, rail freight service provision in Britain has focused increasingly on direct terminal-to-terminal trainloads of bulk commodities and, more recently, unitised products rather than the movement of individual wagonloads between a dispersed network of terminals. This shift culminated in 1991, when British Rail withdrew its Speedlink wagonload network. Some of the larger flows transferred to trainload operation, but many of the small volume flows ceased that had survived until that time. In 1994, prior to rail privatisation, a new but limited wagonload network (originally known as Enterprise) was established, and this has been continued by English, Welsh and Scottish Railway (EWS) in the post-privatisation period. Specific official data relating to wagonload volumes is limited, and little attention has been paid in the literature to the fortunes of this network

or the role that it plays in today's rail freight market. This paper has three main objectives. First, trends in the wagonload market are identified, making use of original rail freight databases compiled annually since 1997 by the author due to the lack of official statistics. This analysis demonstrates the relatively small but significant role that wagonload services play, but gives little insight into the types of commodities carried. To remedy this, the second objective is to gain greater insight into the specific flows carried by the wagonload network, largely through the analysis of the findings from a survey of wagonload service provision conducted in summer 2008. Numerous interrelationships between wagonload and bulk services are identified, with significant interworking of flows between the two groups of services, together with evidence that only a limited number of truly wagonload flows actually exist. Finally, conclusions are drawn as to the importance of the wagonload network both in retaining existing traffic on rail and in attracting new flows.

Triantafyllou : Understanding the returns mechanisms of a dedicated shopping centre [University of Southampton]

ABSTRACT: Shorter product lifecycles, high on-shelf product availability, generous returns policies coupled to a general increase in on-line shopping have all contributed to increases in the volumes of unsold products, returns, packaging and waste produced by the retail sector. Stringent European legislation has meant that the recycle, refuse and returns in these streams now have to be sustainably managed using a range of recycling, repair, renovation, reprocessing and cannibalisation processes. These options, though appearing to be beneficial to the environment, may not reduce the overall carbon footprint of the process when the transport burden associated with the numerous logistics activities are considered. Using a substantial database of retailer logistics operations collected from a large dedicated shopping centre, this paper reviews a range of cost and legislative pressures to assess their impact on the organisation of the current systems to manage product and recycle/waste returns produced by competing supply chains operating in the shopping complex.