

Frontiers in Transportation - Social Interactions
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**Integrating discrete choice modeling with
social interactions to examine how
travelers react to uncertainty caused by
extreme weather conditions**

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Paper focus & contents

Based on London & Glasgow internet-based travel behaviour survey of 2,027 respondents in 2011/2012

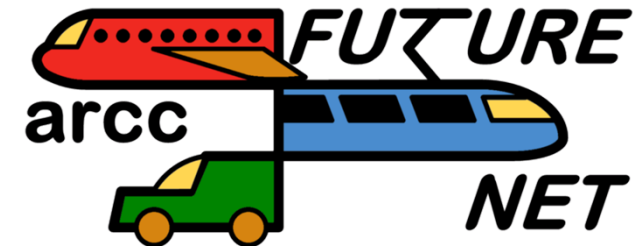
Paper examines links between travel behaviour under weather uncertainty & social interactions

Contents

1. Background: FUTURENET project, Survey content, SNA findings, Disruption experience
2. General travel: Social influence
3. Choice modelling & social interactions
4. Summary & Next steps

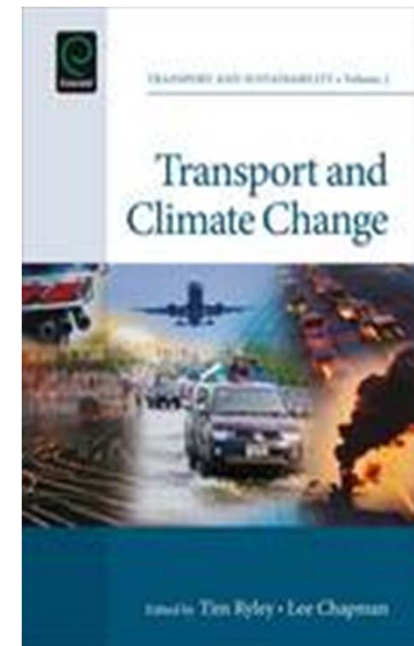
Background: FUTURENET project

FUTURENET (Future resilient transport networks) part of ARCC (Adaptation & resilience to climate change) Co-ordination Network (2009-2013)



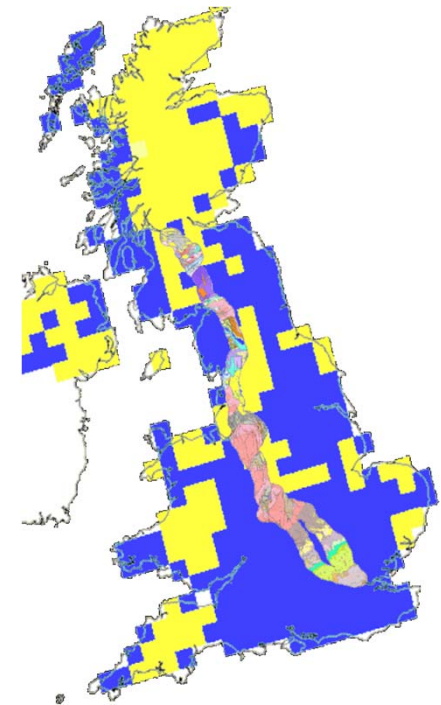
Examines impact of predicted climate change on the 2050 UK transport network & how to make the systems resilient

Ryley & Chapman (2012) *Transport and Climate Change*, edited book, Emerald



Travel behaviour survey content

- Background questions: quota, personal / household demographics, general transport information, environmental attitudes & previous travel London - Glasgow
- Travel uncertainty: Social network analysis (ego-centric)
- Previous disruption experience
- Social (attitudes) information
- Stated preference experiment on travel between the two cities & post-choice responses



Previous findings: SNA & uncertain travel

Riley, T.J. & Zanni, A.M. (2013) An examination of the relationship between social interactions and travel uncertainty. *Journal of Transport Geography Special Issue on The Social Dimension of Activity, Travel, and Location Choice Behavior. In press, corrected proof.*

- Cluster analysis of socio-demographic & social network variables
- Travellers appear to refer to social network when taking travel decisions in an uncertain context
- Most contact the first member of the social network if experiencing an uncertain travel situation
- Social networks do not always function to support decision-making, but often to provide emotional support

Please now consider the people (above 14 years of age) who are part of your social circle. In order to identify them, please consider those people who you have regular contact with, and/or who are the most important to you, and/or who you would want help to discuss personal matters, and/or who you can trust, and/or those you really enjoy socialising with. Please list below the first names of these people (These names will be used later in the questionnaire to help you identify people you have listed here as in your social circle, so you can use whatever name you wish, but please be sure you will know to whom they refer to). If two or more people have the same name, please also add a number e.g. Peter 1, Peter 2, Peter 3 etc. Please also indicate whether they live with you or not.

	Name	Does this person live with you	
		Yes	No
Person 1	Angela	<input checked="" type="radio"/>	<input type="radio"/>
Person 2	Michael	<input type="radio"/>	<input checked="" type="radio"/>
Person 3	Olivia	<input type="radio"/>	<input checked="" type="radio"/>
Person 4	Jack	<input type="radio"/>	<input checked="" type="radio"/>
Person 5	Thomas	<input type="radio"/>	<input checked="" type="radio"/>
Person 6		<input type="radio"/>	<input type="radio"/>
Person 7		<input type="radio"/>	<input type="radio"/>
Person 8		<input type="radio"/>	<input type="radio"/>
Person 9		<input type="radio"/>	<input type="radio"/>
Person 10		<input type="radio"/>	<input type="radio"/>
Person 11		<input type="radio"/>	<input type="radio"/>
Person 12		<input type="radio"/>	<input type="radio"/>
Person 13		<input type="radio"/>	<input type="radio"/>
Person 14		<input type="radio"/>	<input type="radio"/>
Person 15		<input type="radio"/>	<input type="radio"/>
Person 16		<input type="radio"/>	<input type="radio"/>
Person 17		<input type="radio"/>	<input type="radio"/>
Person 18		<input type="radio"/>	<input type="radio"/>
Person 19		<input type="radio"/>	<input type="radio"/>
Person 20		<input type="radio"/>	<input type="radio"/>

Social Network Analysis

2,027 egos

13,022 alters

Main characteristics of alters, including location, frequency & medium of contact, & main person they contact in uncertain situation

Previous survey findings: disruption experience

Riley, T.J. & Zanni, A.M. (2013) Traveller attitudes and responses towards disruption from weather and natural events. Paper presented at the Universities' Transport Studies Group 45th Annual Conference, Oxford, 2nd - 4th January 2013. *To be submitted to journal*

- Report & describe up to 3 previous trips (over 50 miles) affected by extreme weather / natural events - 1,125 trips
- Heavy snow affecting air travel is most common situation - typically resulting in a long delay (> 45 minutes) or cancelled service
- Car users can be more flexible when facing travel uncertainty - less likely to cancel trip - shows difficulty operators face (22% likely to travel even with official warning)

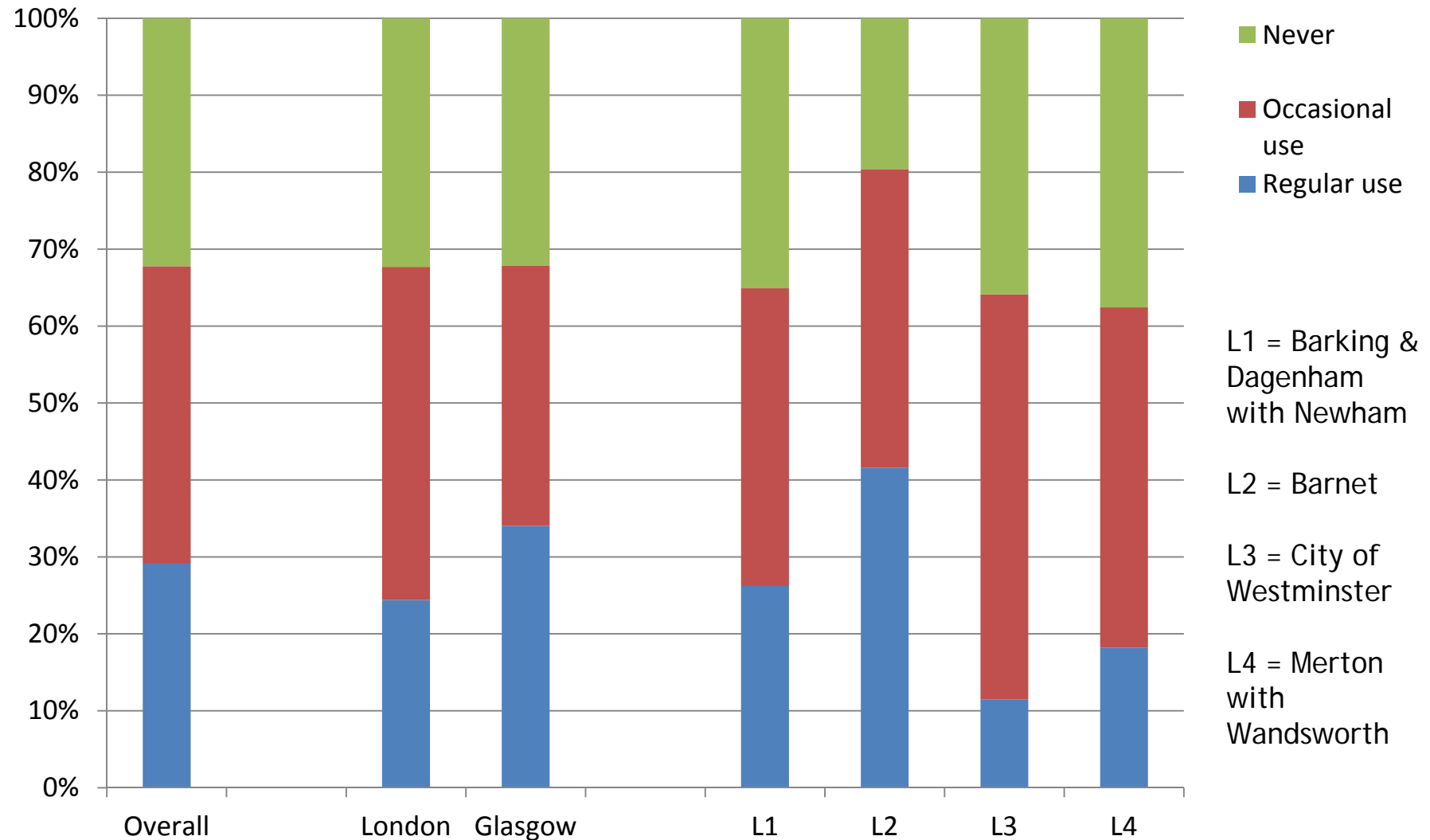
Grouping 21 attitude to weather statements

Factor	N	Typical statements
1 Not mind about uncertain or difficult weather conditions	4	I do not mind driving during heavy rain / snowy conditions / icy conditions.
2 Prefer not travelling, level that show caution and how respond to uncertainty	5	When I find the weather very hot / cold I prefer not to travel at all.
3 Planning and looking up information	3	I tend to look at a lot of information about travel & weather conditions before starting my journey / whilst on my journey using portable devices (like satnav, mobile phone, laptop, radio).
4 Prefer travelling by car over public transport due to weather	3	When I find the weather very hot / cold I prefer travelling by car than using public transport.
5 Level that will keep travelling regardless of others or official warnings	2	During bad weather I normally attempt to travel even when an official warning of 'not to travel unless absolutely necessary' is in place.
6 Contacting others and wanting extras (pay for extra information / flexible tickets)	4	When facing travel uncertainty, I tend to contact my friends or family for suggestions on what to do.

General travel: social influence

- Examine general mode choice from 9 transport modes & 8-point scale (5 or more days / week to never)
- 5 main modes: car driver, bus, train, cycling walking
- Factor analysis of attitudinal statements on social influence
- Social & spatial dimensions explored in an ordered logit modelling framework (number of social network members in their neighbourhood)

Travel behaviour characteristics: driving car



Grouping 20 social influence attitudinal statements

Factor	N	Typical statements
1 Opinion leader	13	I consider myself to be an experienced traveller. In my household or group of friends, I am the one who contributes the most to joint travel decisions.
2 Tend to make decisions on own	5	My travel decisions are mostly taken on my own without the contribution of people that I know.
3 Inexperienced yet consistent traveller	4	I tend to travel to the same destinations / using the same method most times. People I know tend not to ask for my opinion on travel decisions.
4 Not consider cost when travelling - not enjoy it either	2	I do not enjoy travelling. Cost is not the most important aspect I look at when making travel decisions.
5 Need to meet & interact with people	2	My working/social life depends on the fact that I can travel to meet & interact with other people

SP experiment - screenshot 1

Research - Microsoft Internet Explorer provided by Ipsos MORI

http://surveys.ipsosinteractive.com/surveys/?pid=p1113990478&id=test3

File Edit View Favorites Tools Help

Research

Ipsos Access Panels

Please now imagine you have to travel between Glasgow to London in a Spring month (such as April) in the future. Even if you have never been to London or would not intend to do so, please imagine what you would do if you have to travel between the two cities.

Please also consider that you could travel to London as an intermediate stop for a further trip (for example in the South of England or continental Europe).

You will be asked to make choices for eight different hypothetical travel situations. Each journey is described, including the reasons why you are undertaking the trip, who you would be travelling with, the importance of the trip, and the weather conditions on the day of travelling. Under these circumstances, you will then be asked to choose from five different travel options (by air, train, car, coach, or would not travel), described by a number of characteristics associated with the trip.

If you are asked about travel companions (e.g. a partner or children), that does not describe your current situation, please imagine what you would do under these circumstances.

Please read carefully the information provided as each travel situation is different. Also note that there is no right or wrong answer, as we are simply interested in people's preferences.


FOR THE FIRST TRAVEL SITUATION, the reason for you to undertake this trip to (or through) London is: **Holiday - Longer stay**

The importance score of the trip (from 0 "not very important, I could have easily postponed the trip to another moment" to 10 "the trip was extremely important and there was no way I could postpone it to another moment) is... **Three**

Please note that a trip with a high importance score may also mean that it is not possible to get reimbursed if you do not travel

Also imagine you are travelling: **On your own**

And please imagine that the average weather over the trip on the day of travelling is:



Severe Weather Alert: Dense fog

Please consider that the weather would be generally fine for your hypothetical return trip, so you should be basing your decisions on the weather of the first leg only.

SP experiment - screenshot 2

Research - Microsoft Internet Explorer provided by Ipsos MORI
 http://surveys.ipsosinteractive.com/surveys/?pid=p1113990478&id=test3

Mode	Air	Train	Car	Coach	Would not travel
Departure Time	Morning (between 6am and 12pm)	Night (after 9pm)		Afternoon (between 12pm and 5pm)	
Time taken to reach airport, railway or coach station + waiting time (for checking in, security etc.)	2 hours and 30 minutes	1 hour and 15 minutes		1 hour	
Time taken for the journey in normal conditions (including necessary breaks)	1 hour and 30 minutes	3 hours and 30 minutes	6 hours and 30 minutes	9 hours and 30 minutes	
Cost - single ticket (includes taxes and charges), and other costs to reach your final destination for Air/Train/Coach; fuel, parking and motorway tolls for cars	£170	£40	£210	£60	
And you have:	0% chance of arriving 10 minutes early	10% chance of arriving 20 minutes early	0% chance of arriving 40 minutes early	0% chance of arriving 20 minutes early	
	10% chance of arriving on time	0% chance of arriving on time	0% chance of arriving on time	10% chance of arriving on time	
	50% chance of arriving 45 minutes late	60% chance of arriving 30 minutes late	50% chance of arriving 1 hour and 30 minutes late	60% chance of arriving 1 hour late	
	40% chance of arriving 5 hours late	30% chance of arriving 4 hours and 30 minutes late	50% chance of arriving 3 hours late	30% chance of arriving 2 hours and 30 minutes late	
Time to reach your destination once arrived (this includes additional waiting time for disembarking)	2 hours and 30 minutes	1 hour		20 minutes	

Stated choice model outputs

In 35% of choice cards (around 16,000), respondents selected train as their preferred mode between London & Glasgow. Air was the second most favourite mode, selected by respondents in 31% of choice cards. In 15% of choice cards respondents chose not to travel (in 43% of these cases they considered the weather to be too disruptive to travel). 9% travel by car & 8% travel by coach.



Post choice task questions: integrating SNA

1. Considered what people in respondent's social circle would do.
2. People similar to respondent would choose in terms of method of transport (air, train, car, coach) - same as them or not
3. What each of first five members of the respondent's social circle would choose in terms of method of transport
4. Market share of neighbourhood

Post choice task 1

When choosing Air have you considered what other people within your social circle (those identified previously), or people similar to you (for example in terms of age, income and neighbourhood) would do in the same situation?

PLEASE TICK ONE BOX ONLY

<input checked="" type="radio"/> Yes I have considered what people in my social circle would do in the same situation and chosen as I think they would have	27.0%
<input type="radio"/> Yes I have considered what people in my social circle would do in the same situation and I have chosen differently	3.9%
<input type="radio"/> Yes I have considered what people similar to me would do and chosen as I think they would have	9.4%
<input type="radio"/> Yes I have considered what people similar to me would do and chosen differently	2.4%
<input type="radio"/> No, I have decided on my own without thinking what other people would do	48.3%
<input type="radio"/> I do not know	8.5%
<input type="radio"/> Other (PLEASE SPECIFY) <input type="text"/>	0.3%
	N=4,286

To help you, here are the travel situations you were shown earlier again.

Post choice task 2

You have chosen Air . What do you think the majority of other people similar to you (for example in terms of age, income and neighbourhood) would choose if facing the same situation?

PLEASE TICK ONE BOX ONLY

- The same as me
- They would choose train
- They would choose car
- They would choose coach
- They would choose not to travel
- I do not know

54.6% (Same as me)

16% (All options)

29.4% (I don't know)

N=4,501

To help you, here are the travel situations you were shown earlier again.

Post choice task 3

Please imagine that members of your social circle have to face the same choice as you. What do you think they would choose?

	AIR	TRAIN	CAR	COACH	NO TRAVEL	I DO NOT KNOW
Angela	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Michael	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Olivia	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jack	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Thomas	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>

To help you, here are the travel situations you were shown earlier again.

9.0% (Very) Unconfident
28.0% Neither
63.0% (Very) Confident

1.0% Change mind: Yes
86.3% Change mind: No
12.7% Don't know

N= 3,856

Post choice task 4

Please now consider that in your neighbourhood in Glasgow the following choices were recorded when facing the same question.
Would your choice remain the same? **TICK ONE BOX ONLY**

Air	Train	Car	Coach	No travel
60 %	20 %	5 %	3 %	12 %

- Yes, I would still choose Air
- No, I would choose Train
- No, I would choose Car
- No, I would choose Coach
- No, I would choose not to travel
- I do not know
- I do not believe these percentages are realistic of what people in my neighbourhood would do in a similar situation.

80.6% Yes...

7.7% No... (4 options)

8.0% Don't know

3.8% I do not believe...

N=4,501

To help you, here are the travel situations you were shown earlier again.

Discussion point 1

- Questions after choice cards ask respondents to report the preferences of other people - important alteration to traditional model of choice
- The fact that in social network should be enough, although not always correct reporting of spouse (Beck et al., 2009; Beharry-Borg et al., 2009)
- Better approach interview all members - financial constraints of this study
- We can cross check by looking at what similar people in terms of age, income & neighbourhood have done, & see whether respondents were right when asked directly about their choices

Discussion point 2

- Need development of econometric approach to explore social & spatial dimensions
- Perhaps employ Latent Class to model endogenous spatial & social sorting (Baerenklau, 2011)
- Model post choice task independently or part of a multiple discrete choices approach
- Issue of the treatment of endogeneity in a discrete choice setting

Summary

- 27% of choice tasks did respondents consider preference of social circle before choosing
- In 15% of cases respondents did say they considered what people similar to them would have done
- Some evidence of explicit social influence, to be then confirmed with in-depth analysis of choice data
- In 55% of choice cards respondent think people similar to them would have chosen the same. Interesting to check whether they are right
- More info about SP survey, conceptual framework & preliminary results in Envecon conference paper (Zanni & Ryley 2013) available at:
<http://www.eftec.co.uk/docman/envecon-2013>

Next steps

- Develop forecasting of long distance modal choice: future transport, society, weather & climate scenarios
- Spatial analysis at neighbourhood level for Glasgow & London
- Develop social interactions elements from other surveys:
 - Ground access trips with social interactions influence for drop-off / pick-up trips
 - Social interactions for rural DRT (Demand Responsive Transport) services

Thank you

Any questions?

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