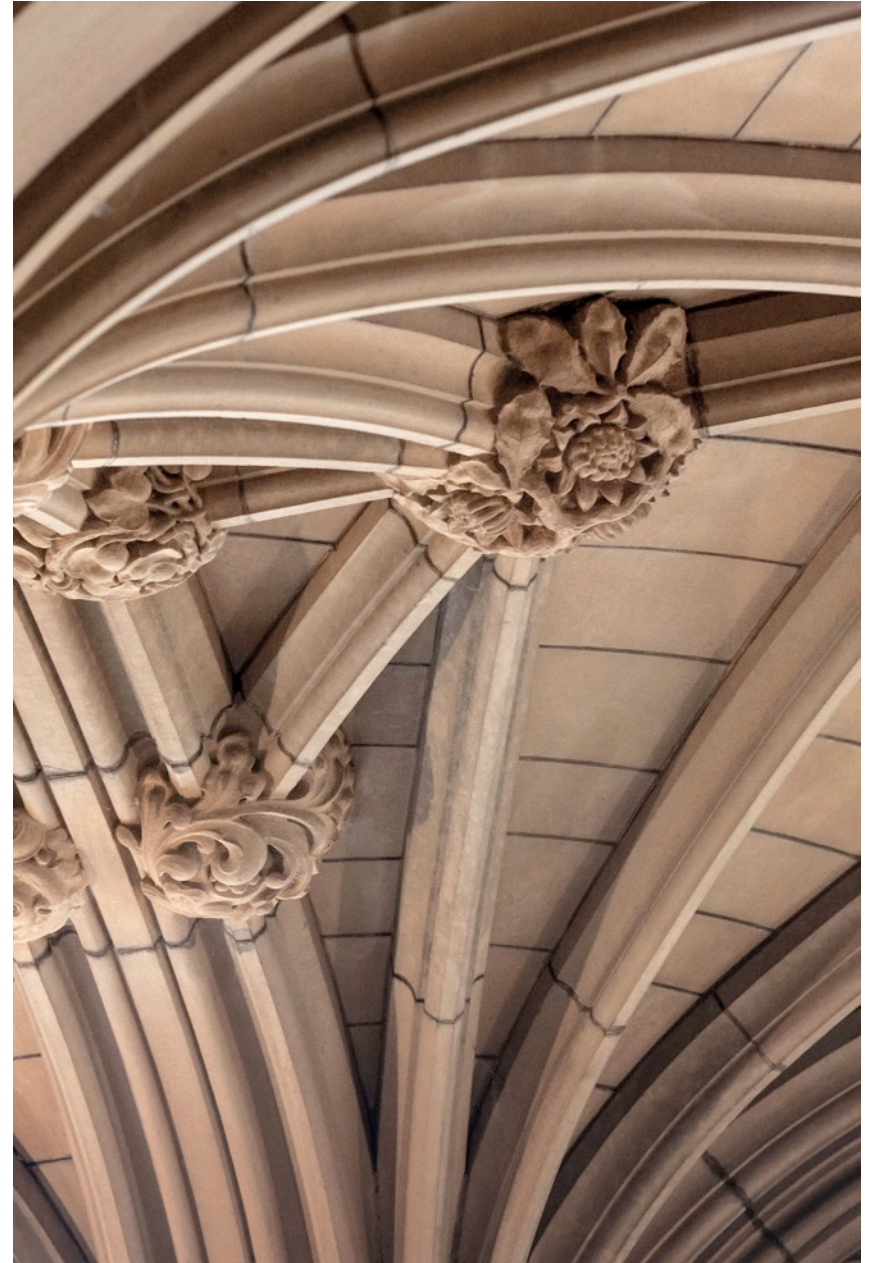


Route choice behaviour under travel time uncertainty accounting for learning via description- and experience-based feedback

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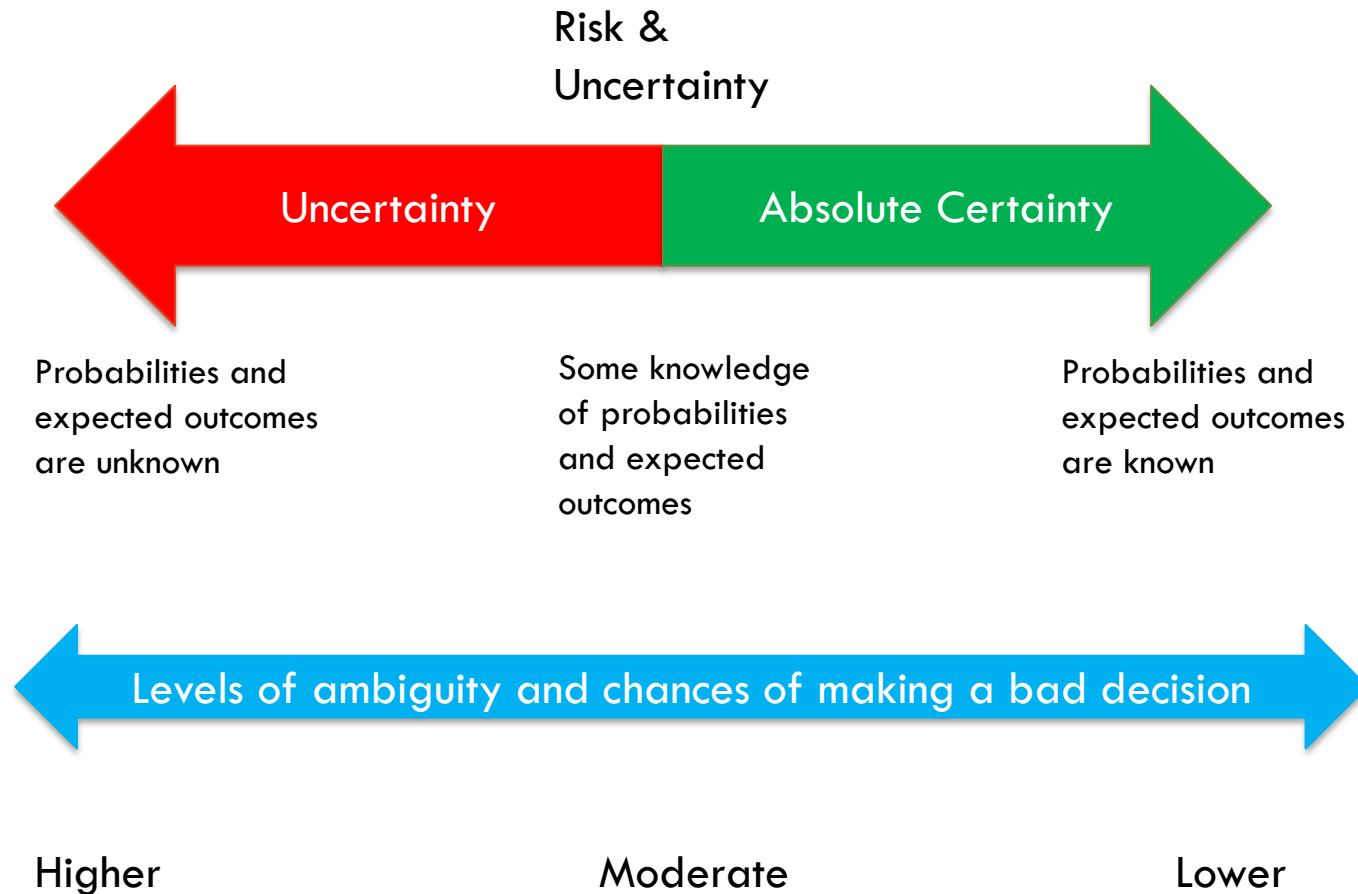


Introduction



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Decision making conditions

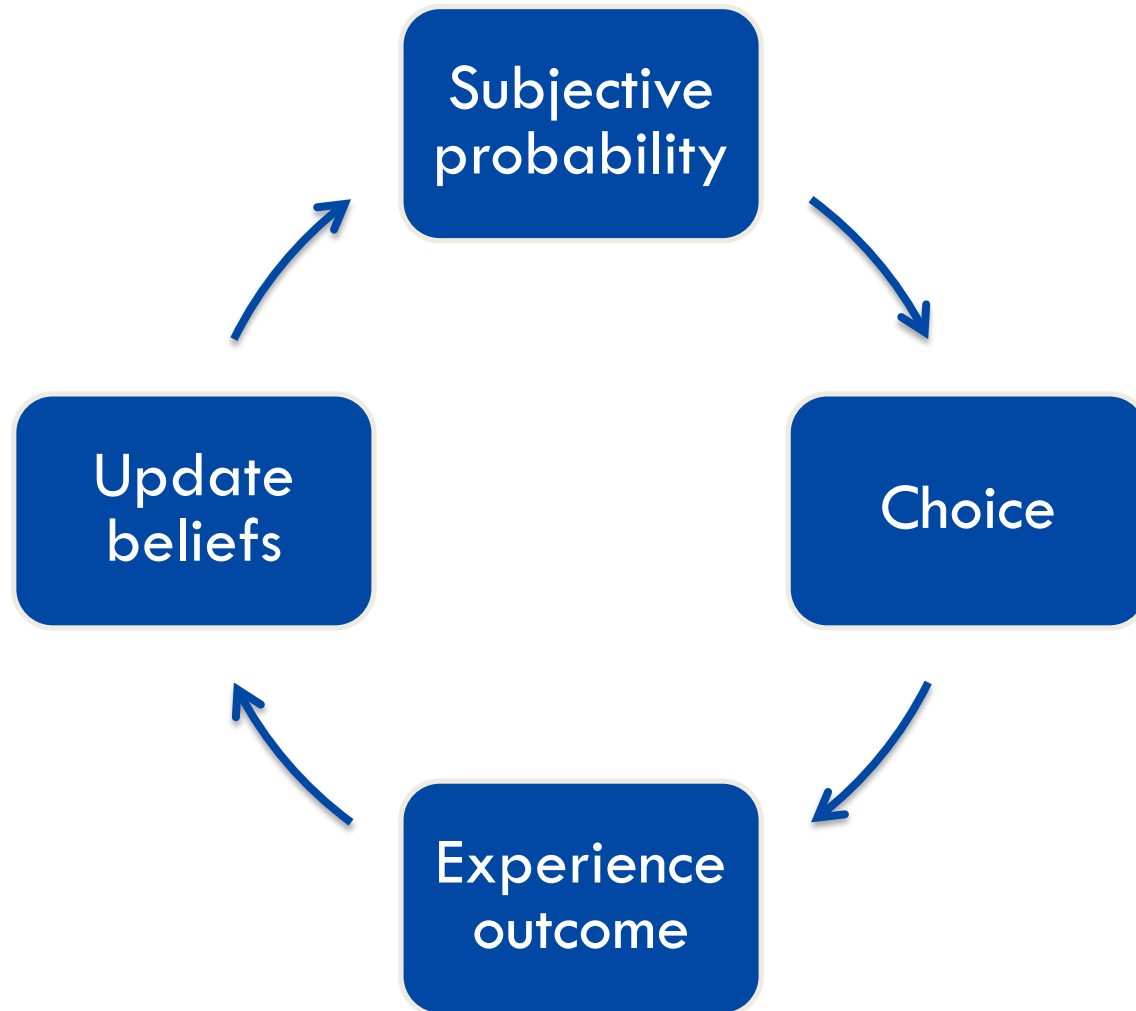


Risk and uncertainty in route choice



Source: <http://www.thehindu.com/news/cities/bangalore/rain-sets-a-record-but-also-exposes-old-failings/article17429474.ece>

Learning



An example of travel time under risk and uncertainty, in a stated choice task

The travel time varies.
You will experience one of the
following travel times (in
minutes) with equal
probability:

2

2

2

7

7

(a) Risk

The travel time varies between
2 minutes and 7 minutes.

(b) Uncertainty

Our study

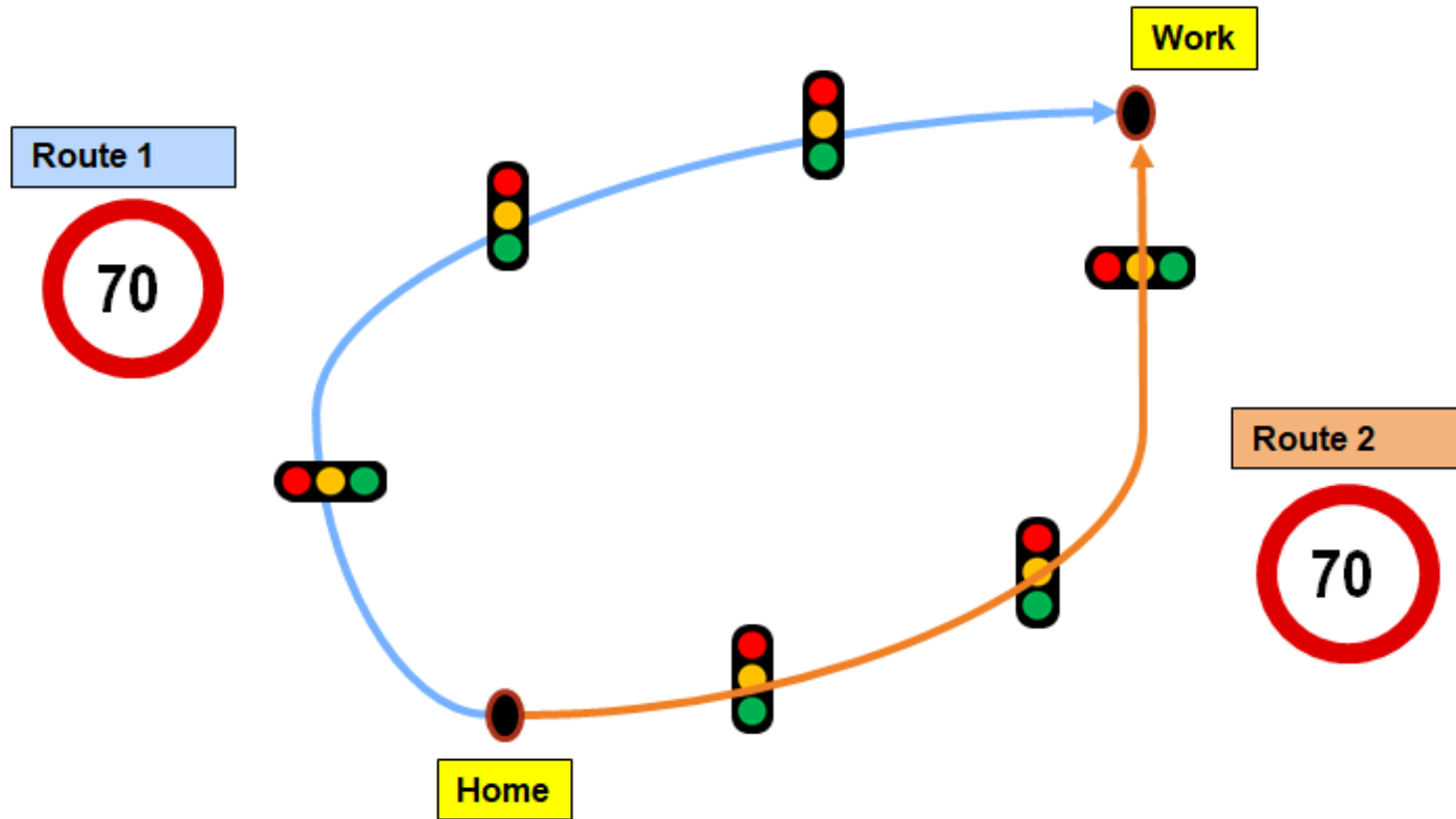
- We investigate travel time learning under **uncertainty** in two data collection techniques:
 - Stated choice experiment (**SCE**) with feedback (**description-based decisions**); and
 - Driving simulator experiment (**DSE**) (**experienced-based decisions**).

2. Methodology



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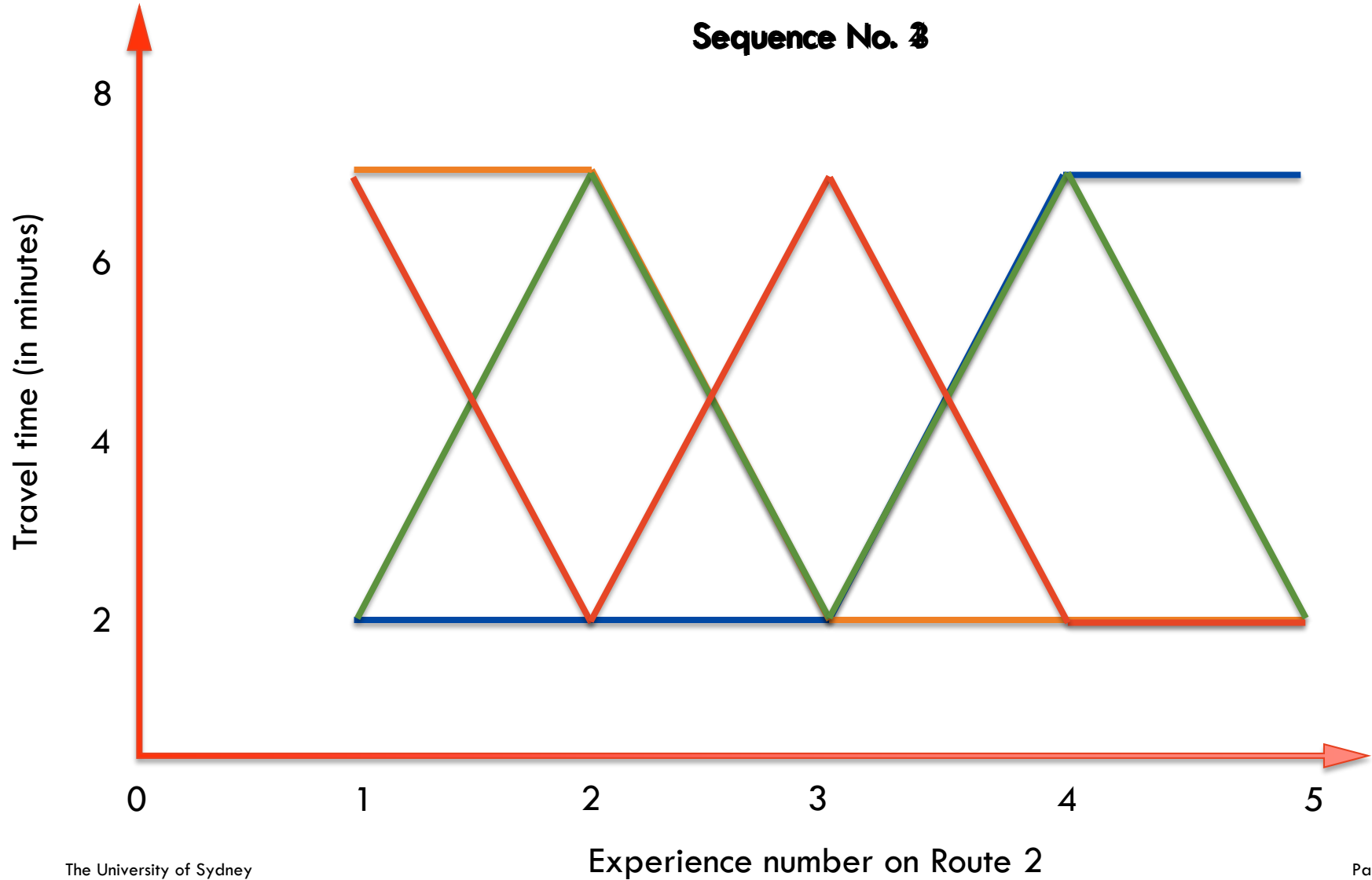
Description



Travel time distribution

Route 1	Route 2
<p>The travel time is fixed at 5 minutes everyday.</p>	<p>The travel time varies between 2 minutes and 7 minutes.</p>

Travel time sequences



SCE with feedback

Day 1:

Imagine travelling **on day 1** from home to work by car. Which route do you prefer?

You have selected Route 2

The travel time for Route 2 on this day was 2 minutes.

Next

Route 1

Route 2

Next

Day 1:

Imagine travelling **on day 1** from home to work by car. Which route do you prefer?

Route 1	Route 2
The travel time is fixed at 5 minutes everyday.	The travel time varies between 2 minutes and 7 minutes .

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Route 1

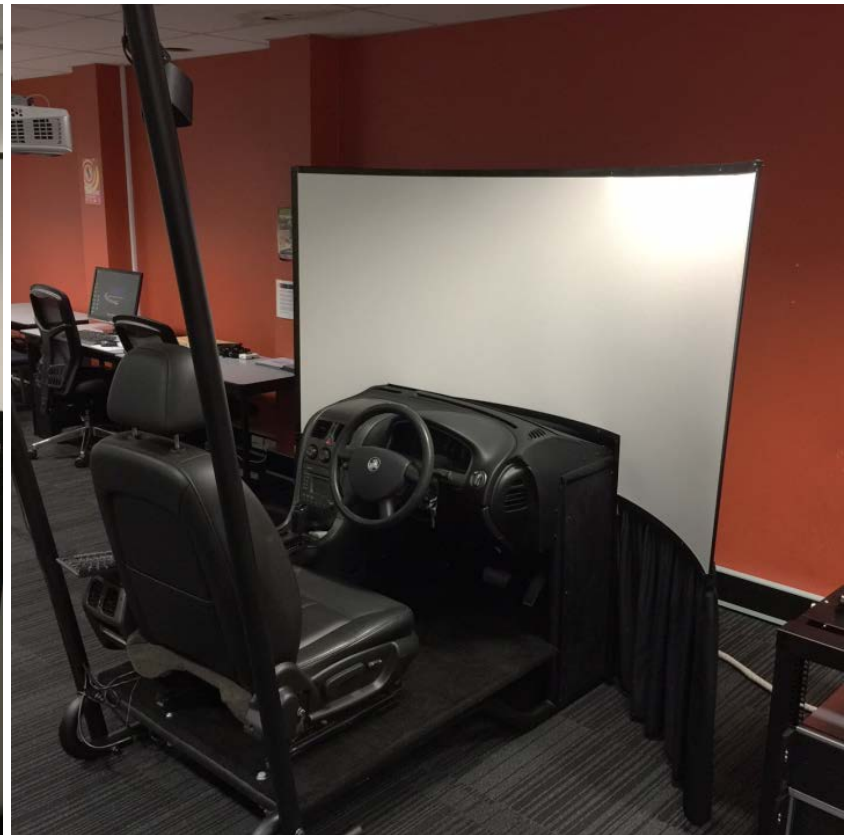
Route 2

Next

Next

Travel Choice Simulation Laboratory (TRACSLab@USyd)

- 5 driving simulators at The University of Sydney



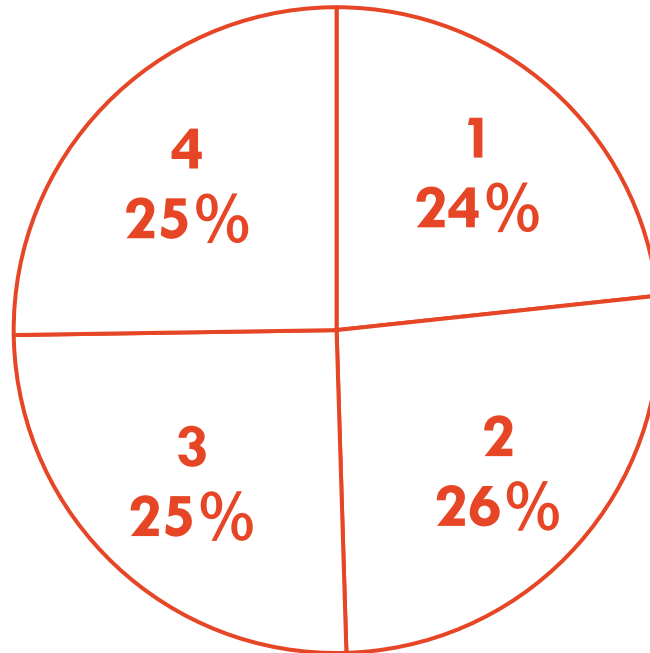
Data collection



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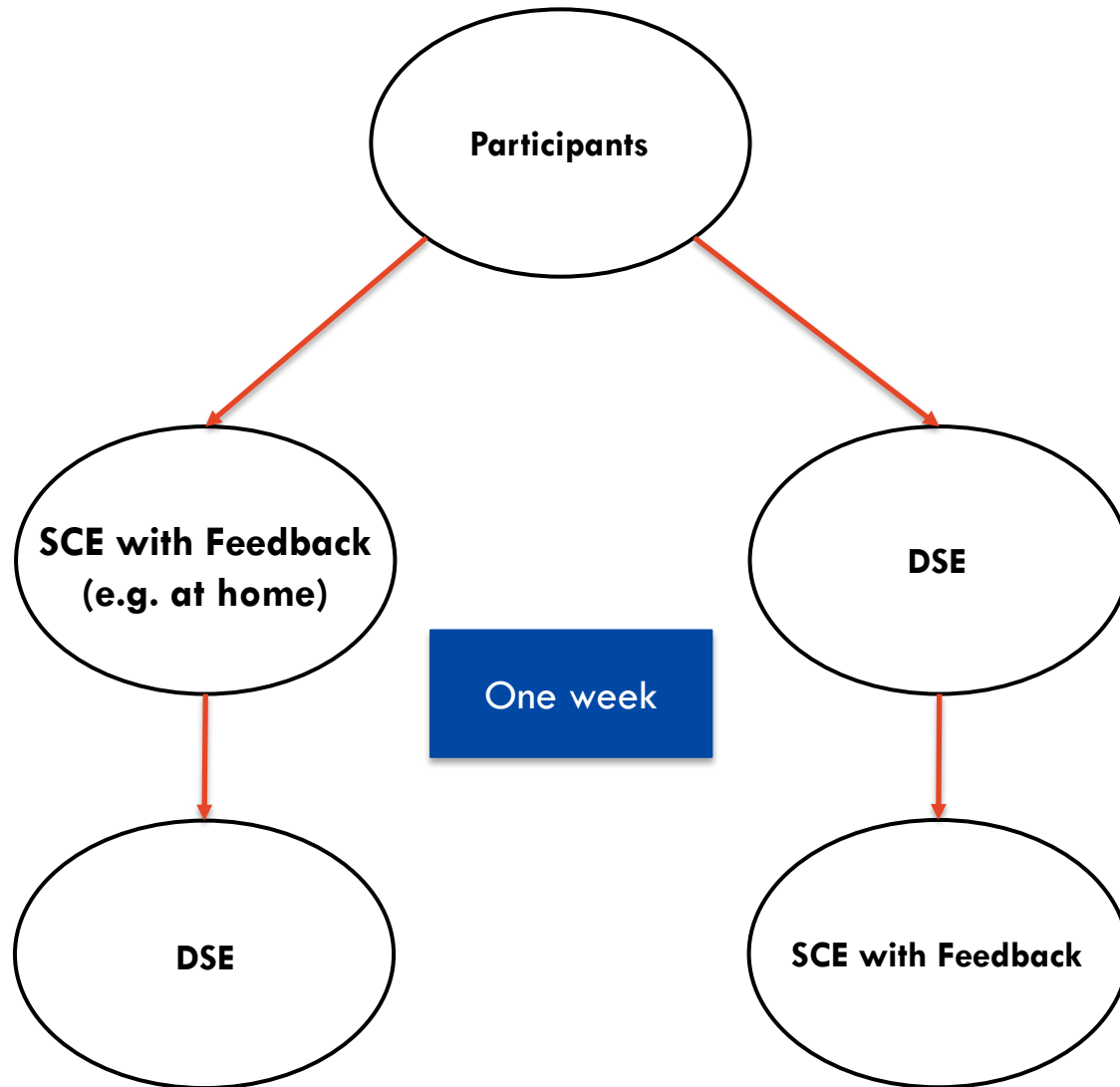
Participants

- 103 participants, in total.



- 20 observation per participant.

Procedure



3. Behavioural model



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Expected utility and belief based model

$$U_{(\text{Route } 1)} = \quad (-) \text{ Expected travel time }_{(\text{Route } 1)}$$

$$U_{(\text{Route } 2)} = \quad (-) \text{ Expected travel time }_{(\text{Route } 2)}$$

$$\text{Belief }_{(t)} = (1 - \text{Beta}) \times \text{Belief }_{(t-1)} + \text{Beta} \times \text{new signal }_{(t-1)}$$

$$p_{(t)} = [1 - \text{Beta} \times Y_{(t-1)}] \times p_{(t-1)} + \text{Beta} \times [Y_{(t-1)} \times Z_{(t-1)}]$$

$Y_{(t)} = 1$ if Route 2 is selected in choice task t , and 0 otherwise

$Z_{(t)} = 1$ if travel time of 2 minutes is experienced/informed on Route 2 in choice task t , and 0 otherwise

4. Results



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Estimated parameters (Joint estimation I)

Scale = Lamda

Prior beliefs = $p_{(t=1)}$

Information/experience = Beta

Joint estimation I

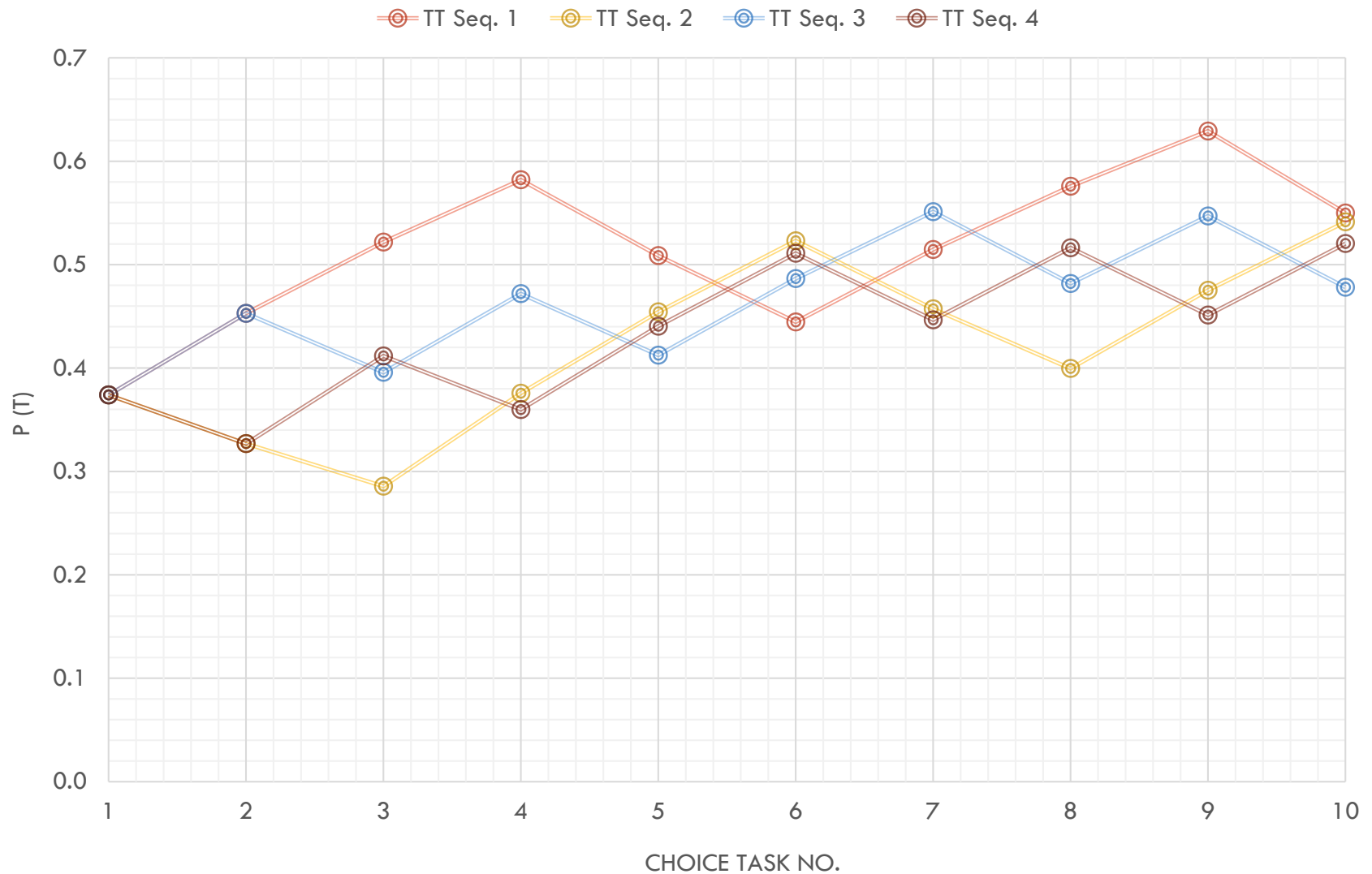
	Estimate	Rob.std.err.	Rob.t-ratio(0)	95 % CI	
Scale	2.280	0.696	3.275	0.916	3.644
Prior beliefs	0.379	0.025	14.881	0.329	0.429
	$0.379 \times 2 \text{ min.} + (1 - 0.379) \times 7 \text{ min} = 5.11 \text{ min.}$				
Information/ experience	0.108	0.049	2.184	0.011	0.205

LL (0)= -1427.88

LL (final)= -1175.65

Adj Rho. sq. = 0.175

Learning, $p(t)$



Joint estimation II

Estimate	Rob.std.err.	Rob.t-ratio(0)	95 % CI	
2.010	0.394	5.099	1.237	2.782
1.858	0.515	3.606	0.848	2.867
0.325	0.038	8.528	0.250	0.399
0.433	0.030	14.529	0.375	0.491
<u>ience</u>				
0.144	0.044	3.313	0.059	0.229
0.133	0.052	2.573	0.032	0.235

LL (0)= -1427.88

LL (final)= -1152.61

Adj. Rho. sq. = 0.189

Thank you!



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