UNDERSTANDING TRAVEL AND OTHER CHOICES

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- Why travel behaviour?
- The importance of understanding choices
- Main limitations of traditional modelling tools
- Alternative approaches and new directions

Where we do this

Why travel behaviour? Some facts

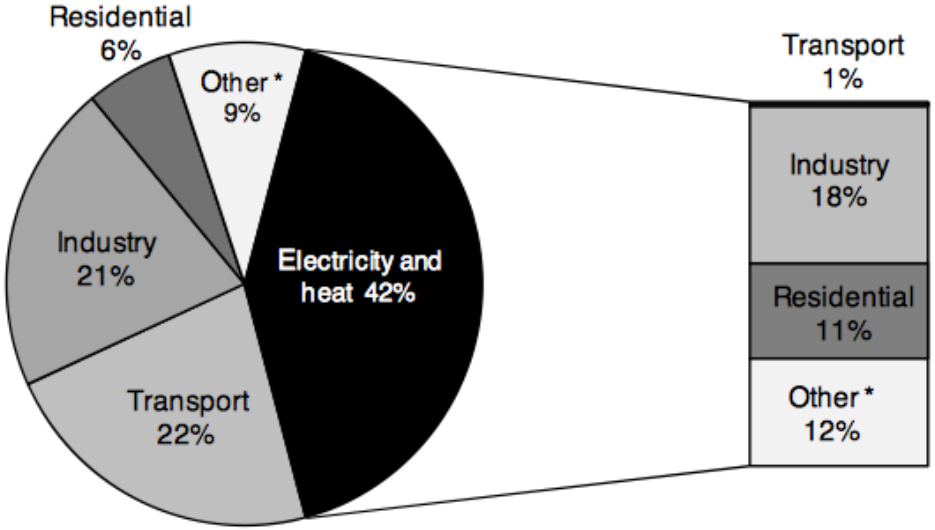
- The transport sector employs more than 10 million people in Europe
- In London, 20% of commuters spend **more than two hours a day** travelling to and from work

- Children living near roads with heavy-duty vehicle traffic have twice the risk of respiratory problems as those living near less congested streets.

Why travel behaviour? More facts

- In Europe, transport depends on **oil and oil products for more than 96%** of its energy needs.
- Europe imports around 84% of its crude oil from abroad

World CO2 emissions by sector in 2011



Source: International Energy Agency, 2013

What does “sustainable mobility” mean?

- Less pollution
- Less congestion
- Less oil-dependent
- Quality public transportation
- Sharing Vs. Owning
- Socially inclusive

Iacopo Melio, 24 yo, from Livorno

The big dilemma

Technology Vs. Behaviour

Not only a transport matter

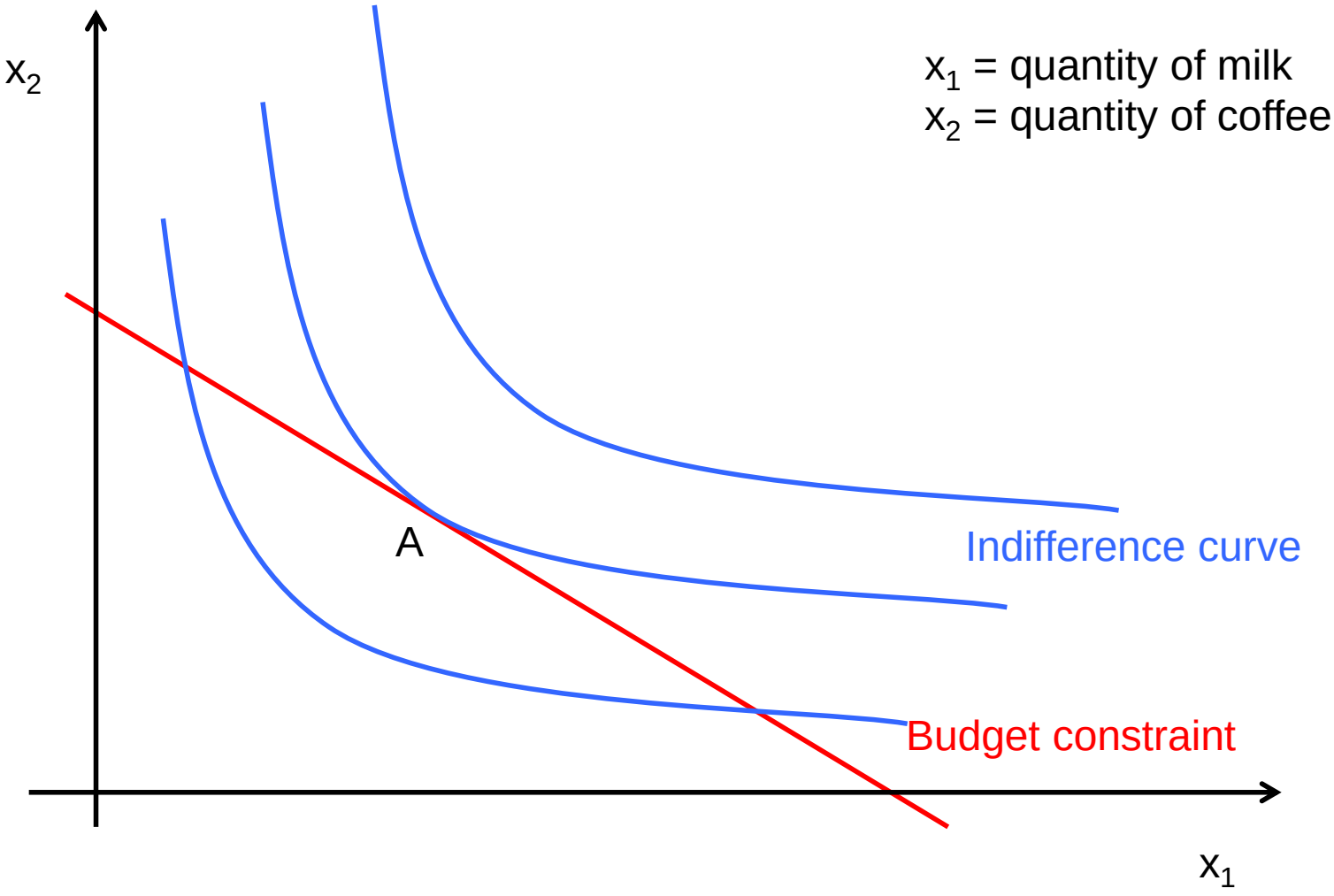
Why is it important to understand and predict choices?

- Solving real-life problems requires understanding what people want and will want

Understanding and predicting choices

- Several approaches from various fields:
  - Optimization in consumer theory
  - **Utility maximization**
  - Theory of planned behaviour (psychology)
  - **Discrete choice modelling**
  - Regret minimization
  - …

What does “maximizing utility” means?



Traditional utility maximization

- Assumption of **rational** preference relation: completeness, transitivity + IIA and perfect information
- Utility maximization theory: fully deterministic

$$U = f(x_1, x_2 \ldots x_n)$$

- In random utility models (DCM), the error term represents what is left out

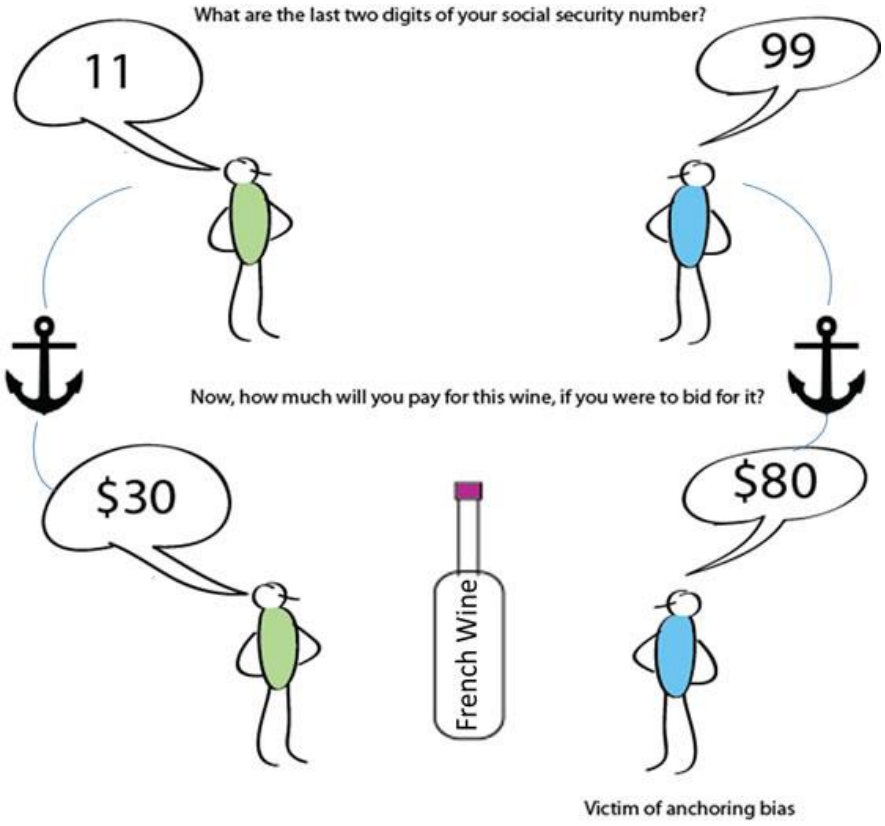
$$U = f(x_1, x_2 \ldots x_n, e)$$

Does it really work like that?

- How accurate is the assumption of rationality?
- Is the error term in RUM models enough to include all the aspects of choice behaviour we don't observe?

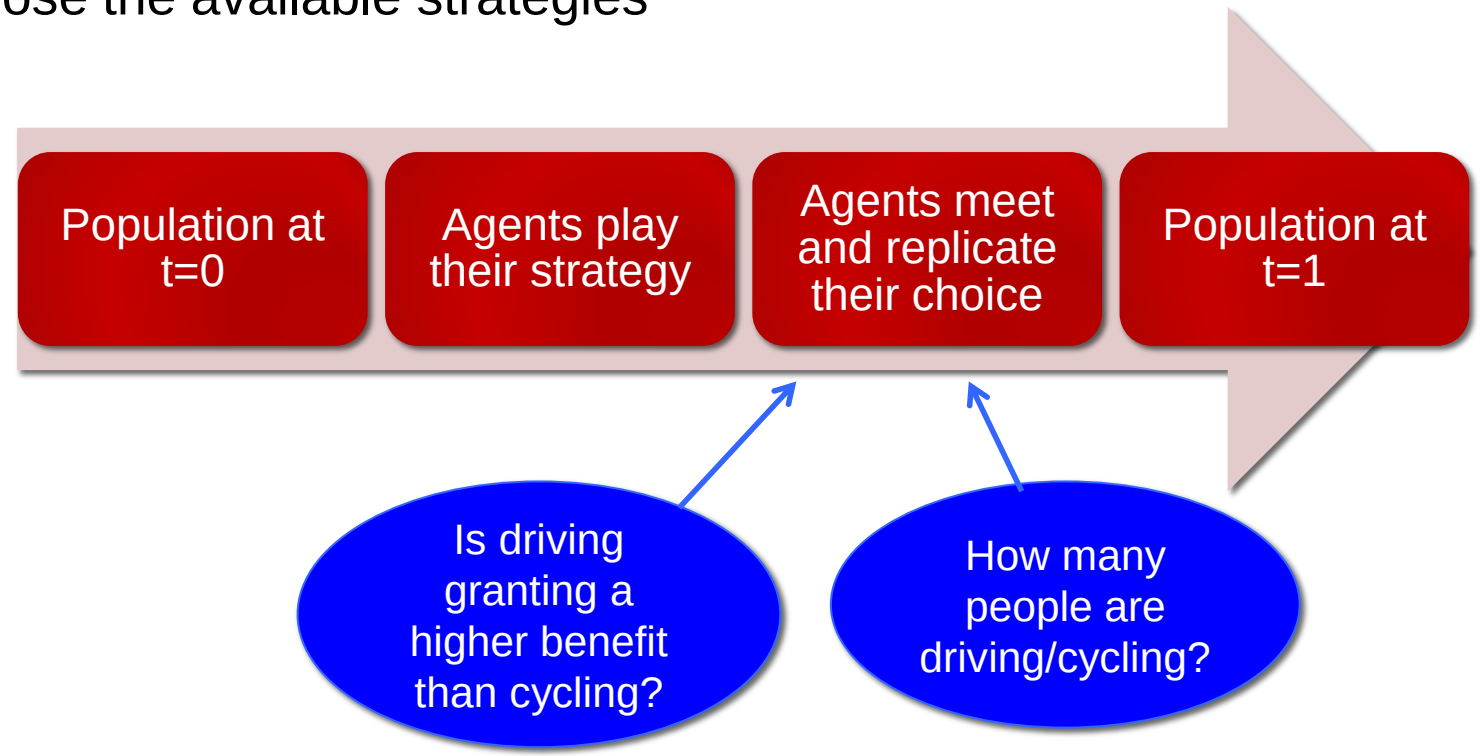
Not in all cases…

- There are non-measurable aspects which are not represented in traditional modelling frameworks



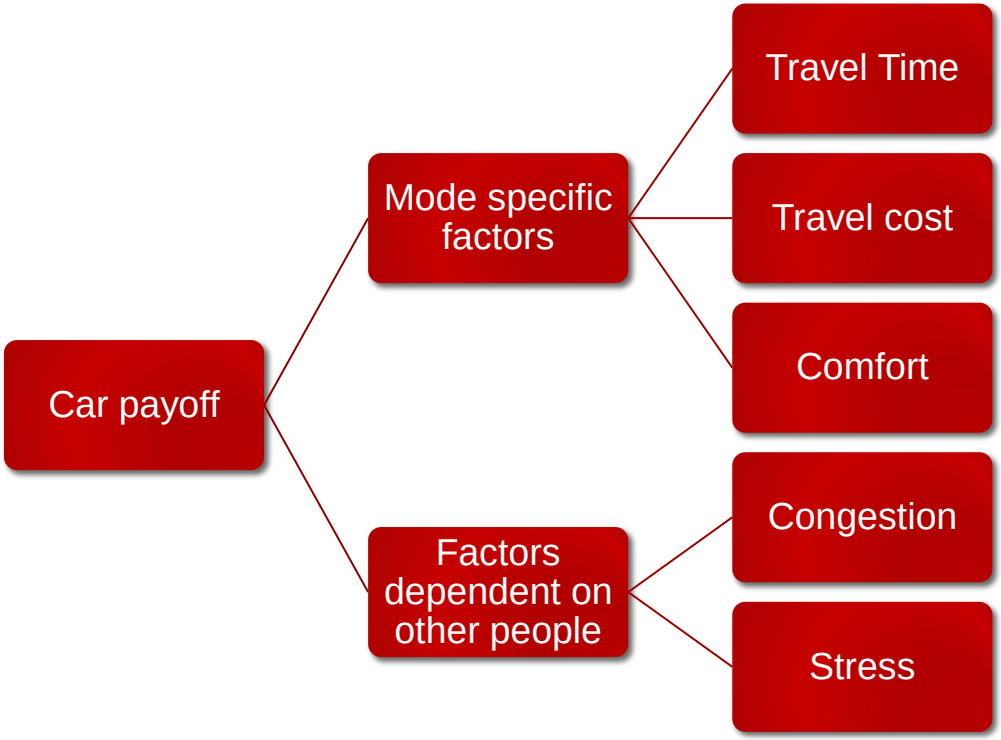
One possible approach to address bounded rationality: evolutionary game theory (EGT)

- Initially started to explain "why are animals so 'gentlemanly or ladylike' in contests for resources?"
- **Replicator Dynamics**: people can change their strategy depending on how it performs with respect to the average and how many people choose the available strategies



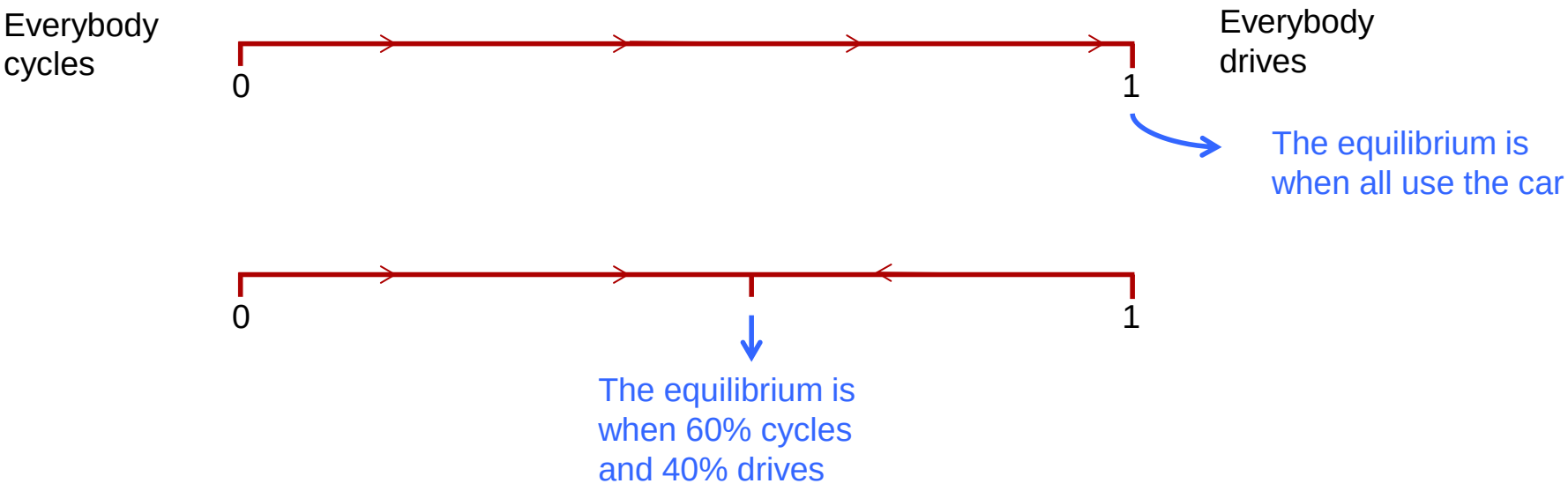
Our framework

- People can choose to commute by car or bicycle
- Each mode has a **payoff**, i.e. the benefit it grants. This depends on **mode-specific factors** and on the **share of people** which uses each mode. These factors are represented by **parameters**



Equilibria and policy implications

- Society ends up in different equilibrium depending on the parameters of the model



- These parameters can be influenced by **policy interventions**, which means that, theoretically, transport policy could influence travel choices.

Using random utility to explain discrete choice

- DCM is a tool to explain and predict choices between two or more alternatives; answers the question “which one?” instead of “how much?”
- It is derived from Utility Theory

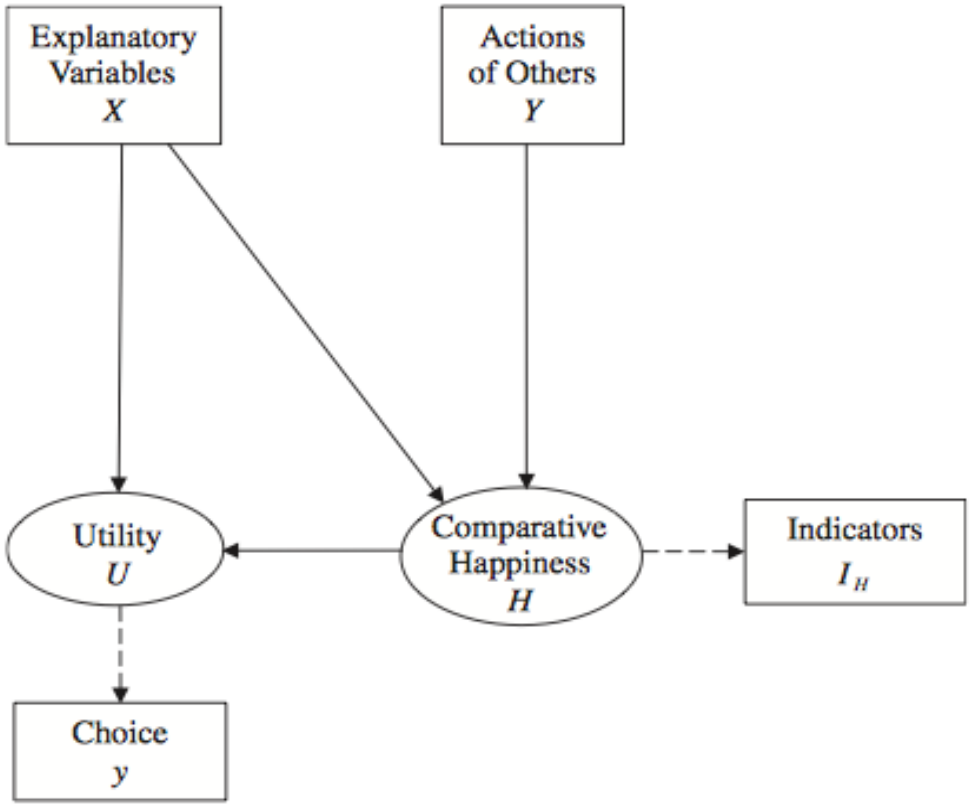
$$P_{i1} = \frac{e^{V_{i1}}}{\sum_{k=1}^{n} e^{V_{ik}}}$$

- Many extensions of the basic model exist to accommodate for different number of choices and patterns of correlation in unobserved factors

Daniel McFadden
2000 Nobel Economics

Latent attitudes in DCM

- This study examines the effect of social comparisons on travel happiness and behavior



Maya Abou-Zeid, Moshe Ben-Akiva (2014), *The effect of social comparisons on commute well-being*

Travel choices are not the only ones to study…

Some interesting research directions

- Consideration of social networks into choice models
- Interactions of long and short term choices
- Detection patterns relating different choice domains
- Increasing consideration of cognitive biases in choice models


ANY
QUESTIONS
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