# Decision making with moral dimensions

*Modelling and applicaion in transport*

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# Outline


1. Overview of the PhD-project
2. Research gaps and objectives
3. Empirical study on cooperative driving
4. Research process

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# Research on morality

**Morality**

Tells whether an action or state of world is right or wrong.

Normative research: how should we act?
Positivism: how do we actually act?

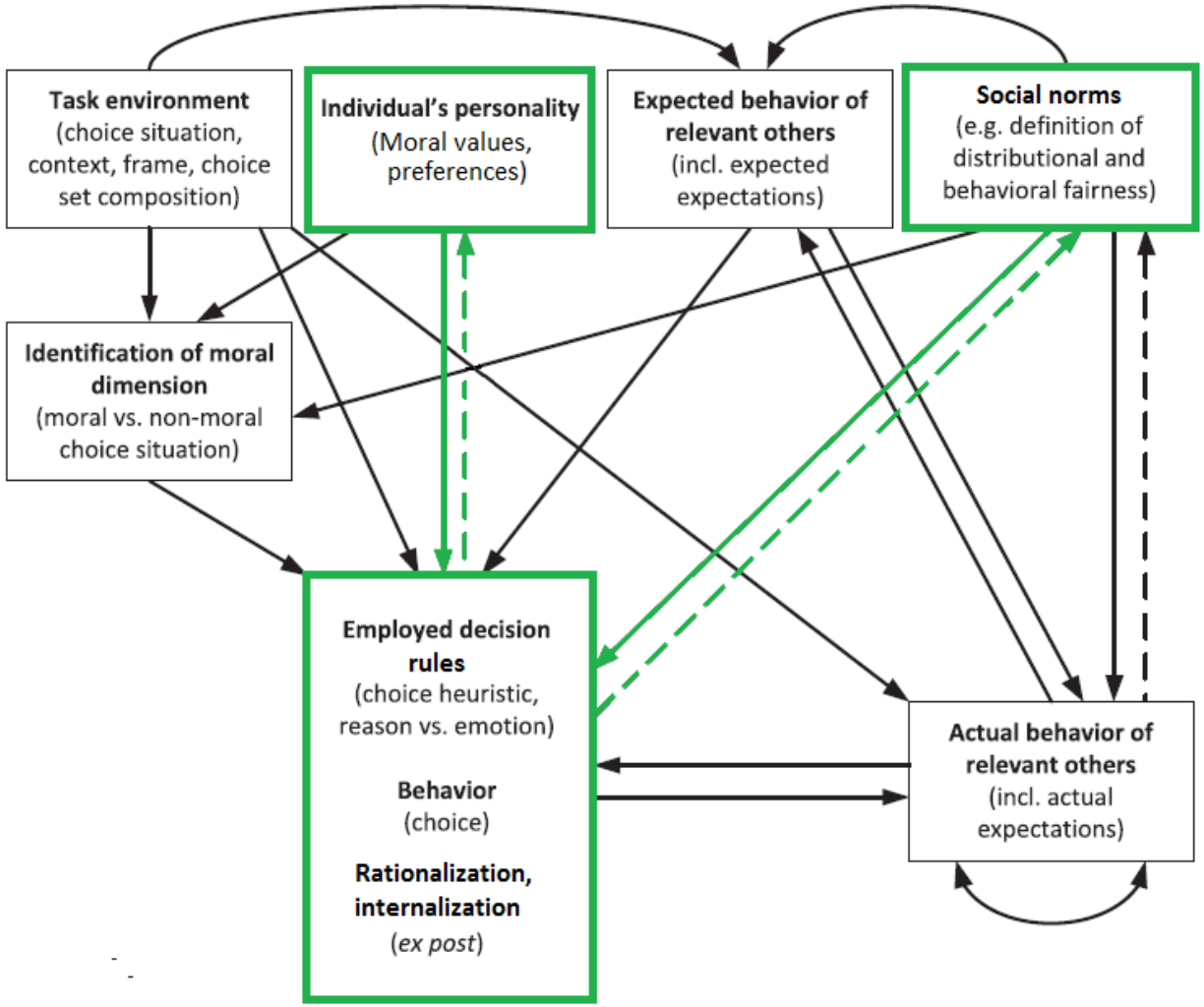
**Morality**

Collection of rules to enhance cooperation in social life.

**Social norms**

When the members of societies act on shared moral values and develop mutual expectations accordingly towards each other, that code of conduct is called a social norm.

# Morality, social norms and decision making - a conceptual overview



# Modelling

## Individual level: Discrete Choice Models

- Utility maximization
- Trade off between attributes of alternatives

## Social level: Agent Based Models

- Simulating actions and interactions
- Heterogeneity among agents (people, institutions, etc.)

- New models need to be adapted/developed to account for morality
- Application fields: Health, Marketing and Transport

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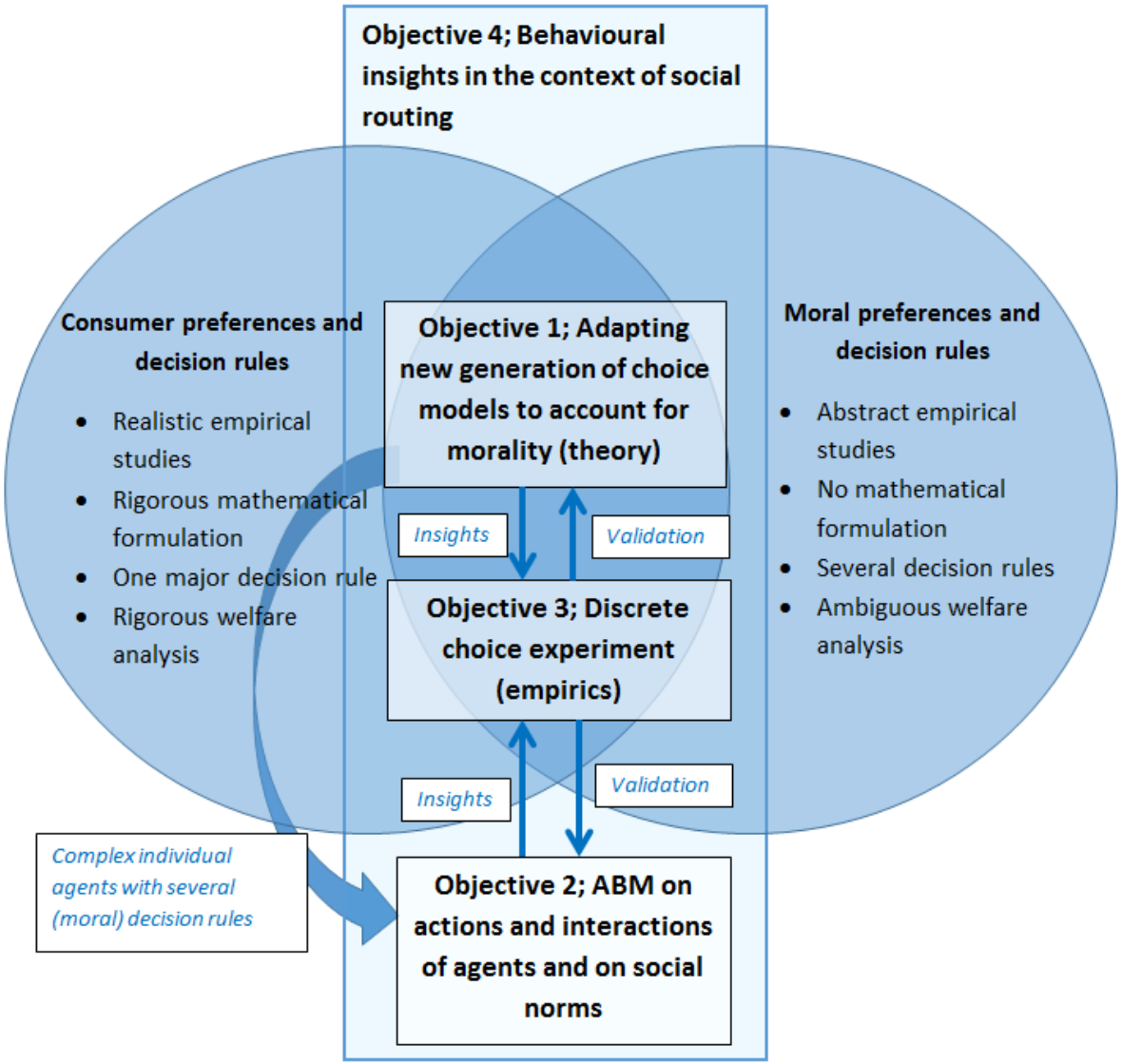
# Research gaps

1. Sophisticated, mathematically formalized and validated decision making models that can account for moral dimensions.
2. ABMs with empirically validated base that can capture morality (incorporating realistic individual decision making models).
3. Realistic empirical studies that incorporate moral dimensions while also keep the advantages of experimental control.
4. Insight into the effects of social routing.

# Objectives


Objective 4; Behavioural insights in the context of social routing
Consumer preferences and decision rules
Realistic empirical studies
Rigorous mathematical formulation
One major decision rule
Rigorous welfare analysis
Moral preferences and decision rules
Abstract empirical studies
No mathematical formulation
Several decision rules
Ambiguous welfare analysis
Objective 1; Adapting new generation of choice models to account for morality (theory)
Insights
Validation
Objective 3; Discrete choice experiment (empirics)
Insights
Validation
Complex individual agents with several (moral) decision rules
Objective 2; ABM on actions and interactions of agents and on social norms

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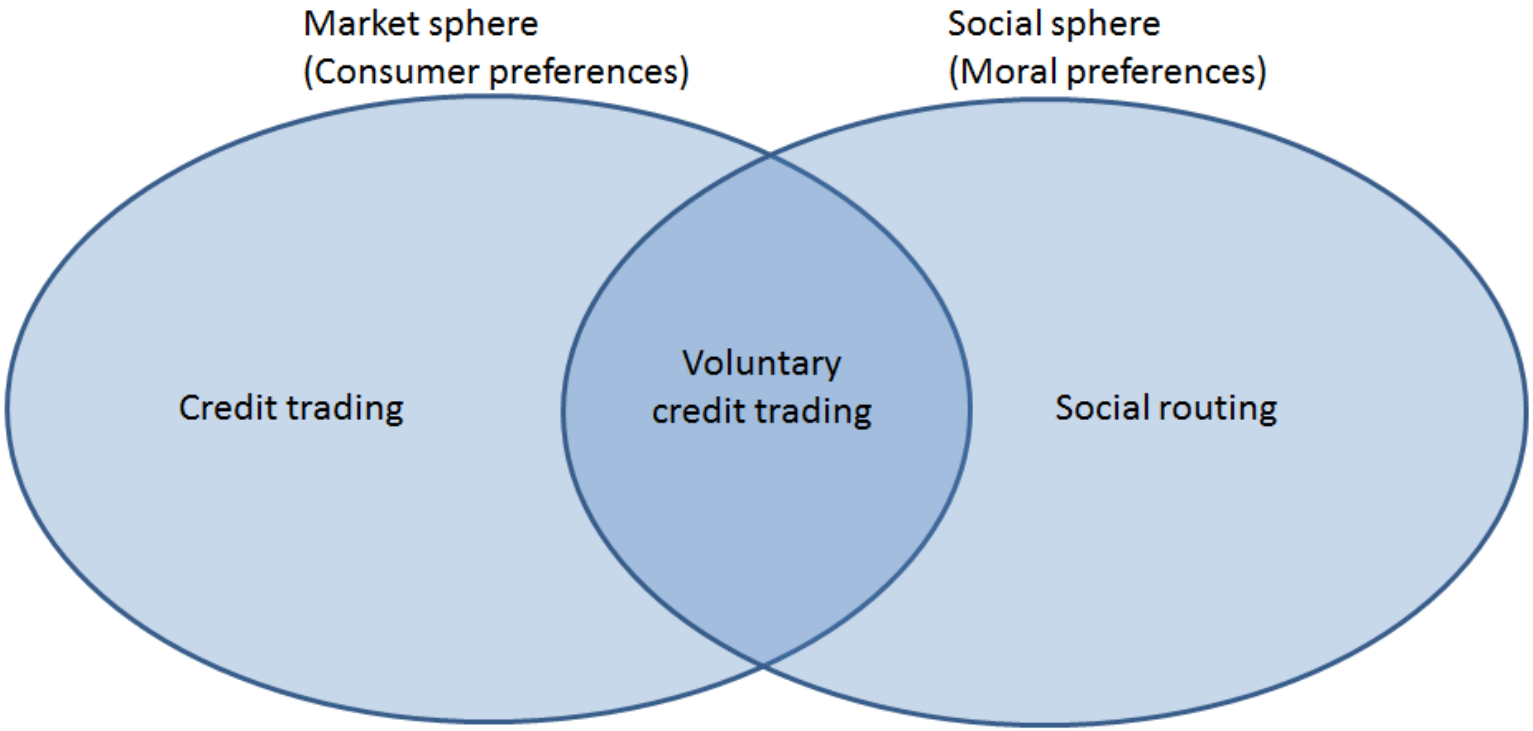
# Empirical study on cooperative driving

- Peak hour congestion is a major problem in urban areas
- Incentivizing drivers to use initially suboptimal alternative route/departure time
- Monetary incentives $\rightarrow$ market sphere
- Moral incentives $\rightarrow$ social sphere
- Ineffective/counterproductive incentives
- Perception depends on: choice of words, habituation, experience, social peers

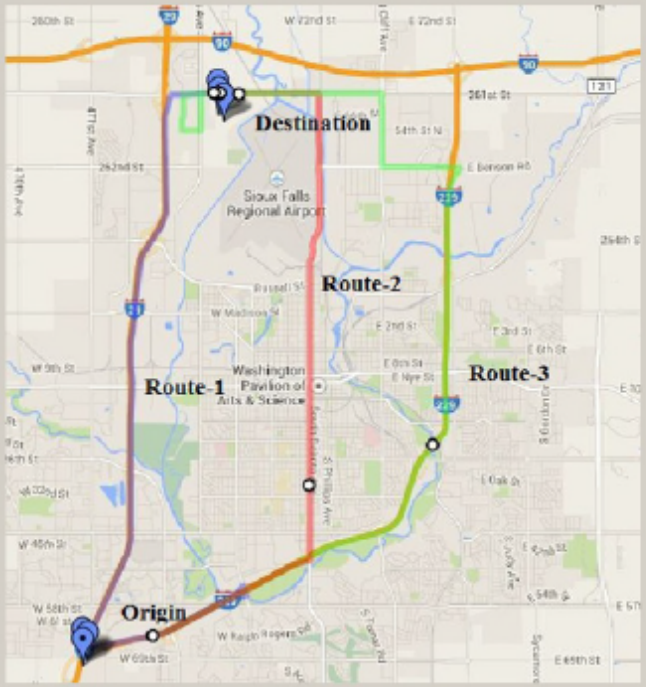
# Three hypothetical congestion policies



# Discrete Choice Experiment

Work commute (Weekdays) [2 Trip(s)]

No. of trips left = 6




Total Money (Account) = 500

Total Credits (Account) = 429

Total Cost (in Francs) = 1622.0

Price( unit Carbon Credit) = 21

Choose a travel option: 2 Trips

| Option | Time (min) | Carbon | Time Var. | Cost |
|---|---|---|---|---|
| 6:45 am Route-1 | 34 | 39 | 4 | 280 |
| 6:45 am Route-3 | 37 | 31 | 3 | 316 |
| 7:00 am Route-1 | 43 | 25 | 4 | 322.4 |
| 7:00 am Route-2 | 48 | 21 | 2 | 489.6 |
| 7:10 am Route-3 | 55 | 17 | 2 | 596 |

- 6:45 am Route-1
- 6:45 am Route-3
- 7:00 am Route-1
- 7:00 am Route-2
- 7:10 am Route-3

Confirm and Proceed

# Latent Class modelling

Provides insight into:

- Different decision rules in different classes of people
- Different decision rules of similar classes under different incentives

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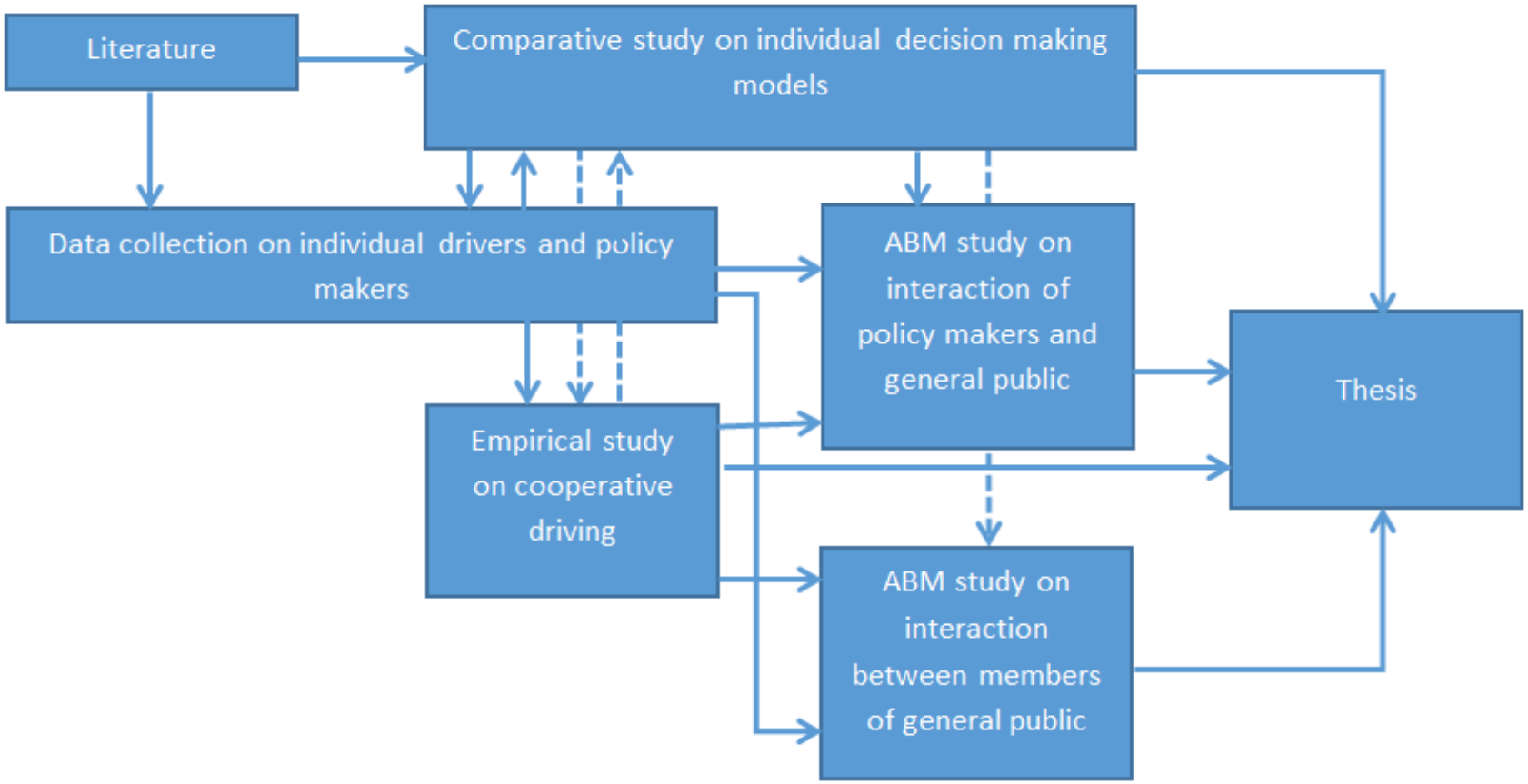

Thank you for your attention!