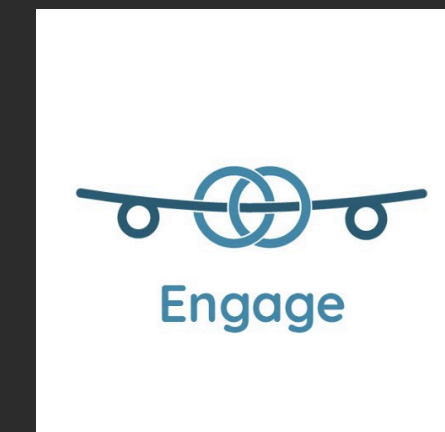


Can behavioural science model 'irrational' (real) agents?



Agenda

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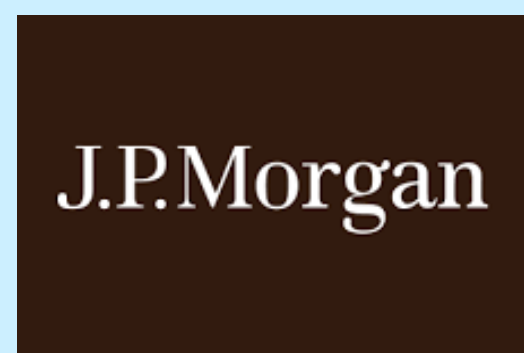


Introduction

Your Speaker Today.



Member of the LSE Behavioural Science Hub



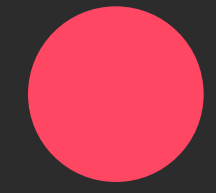
Former structured commodities trading executive



Director and co-founder of Salient Behavioural Consultants



PPL holder



The Irrational Agent

The Irrational (Real) Agent.

- What is a rational agent?

Classical Economic view

- Fully utility maximising
- Weighs up costs and benefits of choices across lifetime, unlimited cognitive ability
- Act accordingly

- What is an irrational (real) agent?

How humans really behave

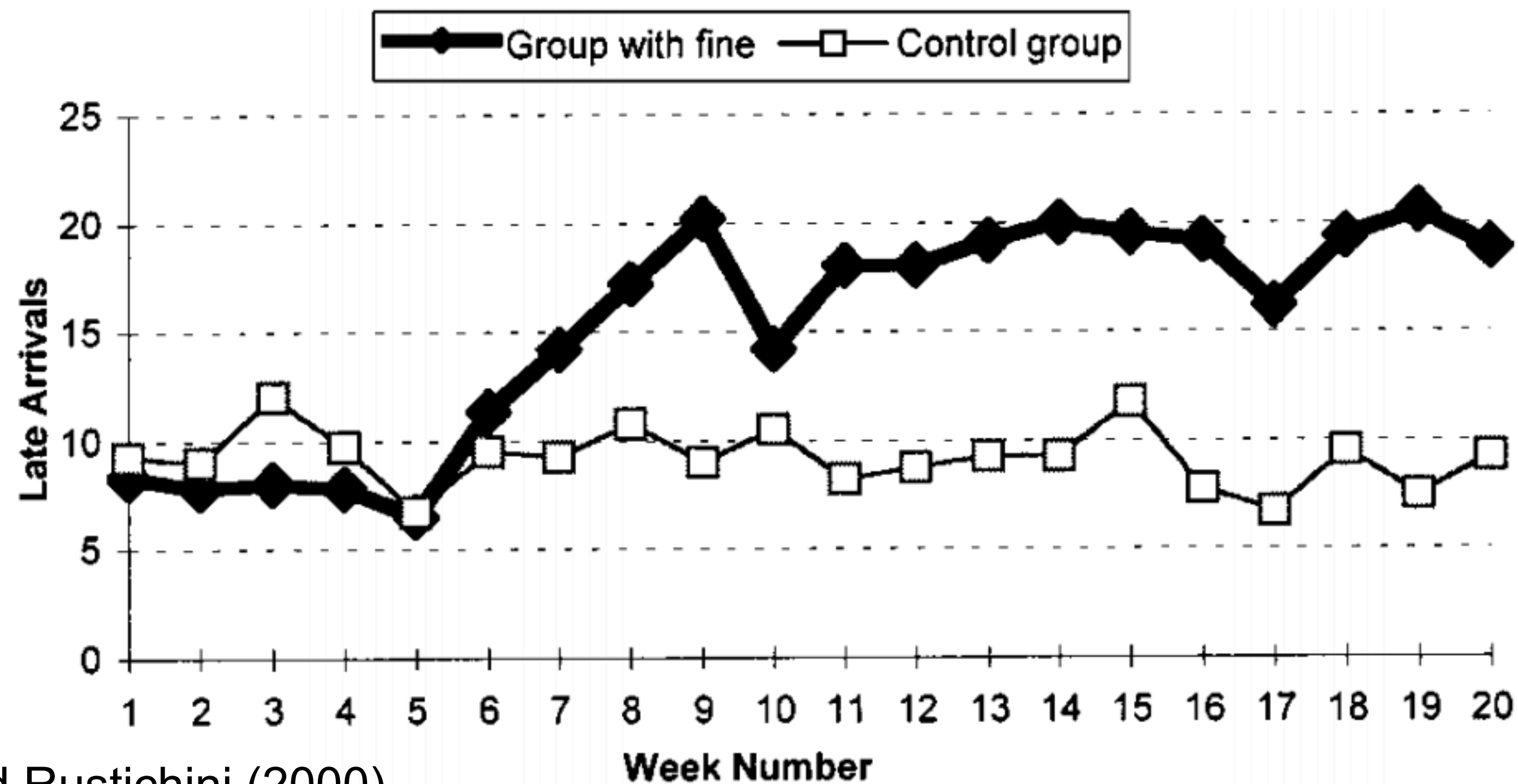
- Sub-optimal utility / decision making
- Limited cognitive capacity
- Act contrarily

Israeli Day Care Study.

- Gneezy and Rustichini (2000) conducted a study in Israeli day care
- The aim was to reduce the number of parents arriving late to pick up their children from day care
- The intervention was very simple: Introduce a late arrival fee
- What result do you expect?

A Fine is a Price.

- Shortly after introducing the late arrival fine the number of parents arriving late to pick up their children *increased*



Source: Gneezy and Rustichini (2000)

The Invisible Gorilla.



Source: Simons (1999)

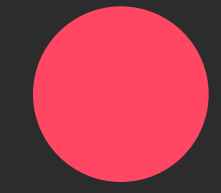
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The Invisible Gorilla and Scarcity.

- Inattentional blindness
 - Which means that the attention is focussed on one thing and one thing alone; everything around is ignored
- Scarcity itself can create this very strong focus or cognitive capture
- We have limited (scarce) mental capacity
 - In the early days of my PPL I had a sudden radio failure just before turning base – how accurate was my airspeed afterwards and would I have noticed a stall warning?

Scarcity.

- In an economic framework scarcity leads to careful cost-benefit calculation
- In reality, however, scarcity leads us to tunneling, which is focussing on the most salient item or task and neglecting everything around
- Example: An air traffic controller managing numerous planes some of which are delayed and the controller focussing only on the most salient first plane, neglecting not only lunch but also several other later planes that are even more delayed



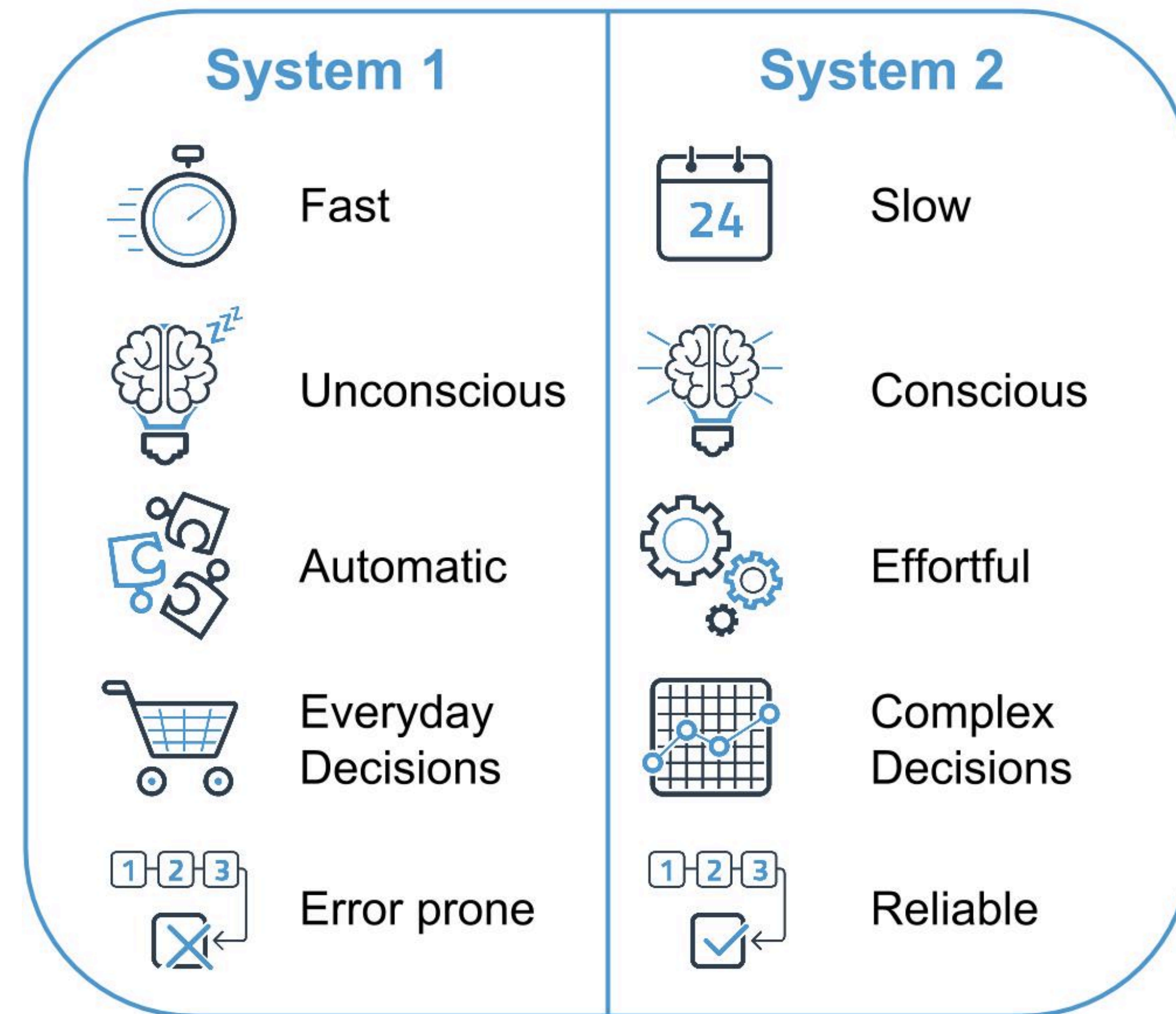
Behavioural Science

Behavioural Science.

- Science of what people do and how it can be changed
- Behavioural Science can help to understand, predict and ultimately influence behaviour and decision-making
- Traditional economic approach
 - Prescriptive models which are often violated as people do not behave like homo economicus and make suboptimal choices / decisions
- Behavioural Science approach
 - Descriptive models based on actual observed behaviour

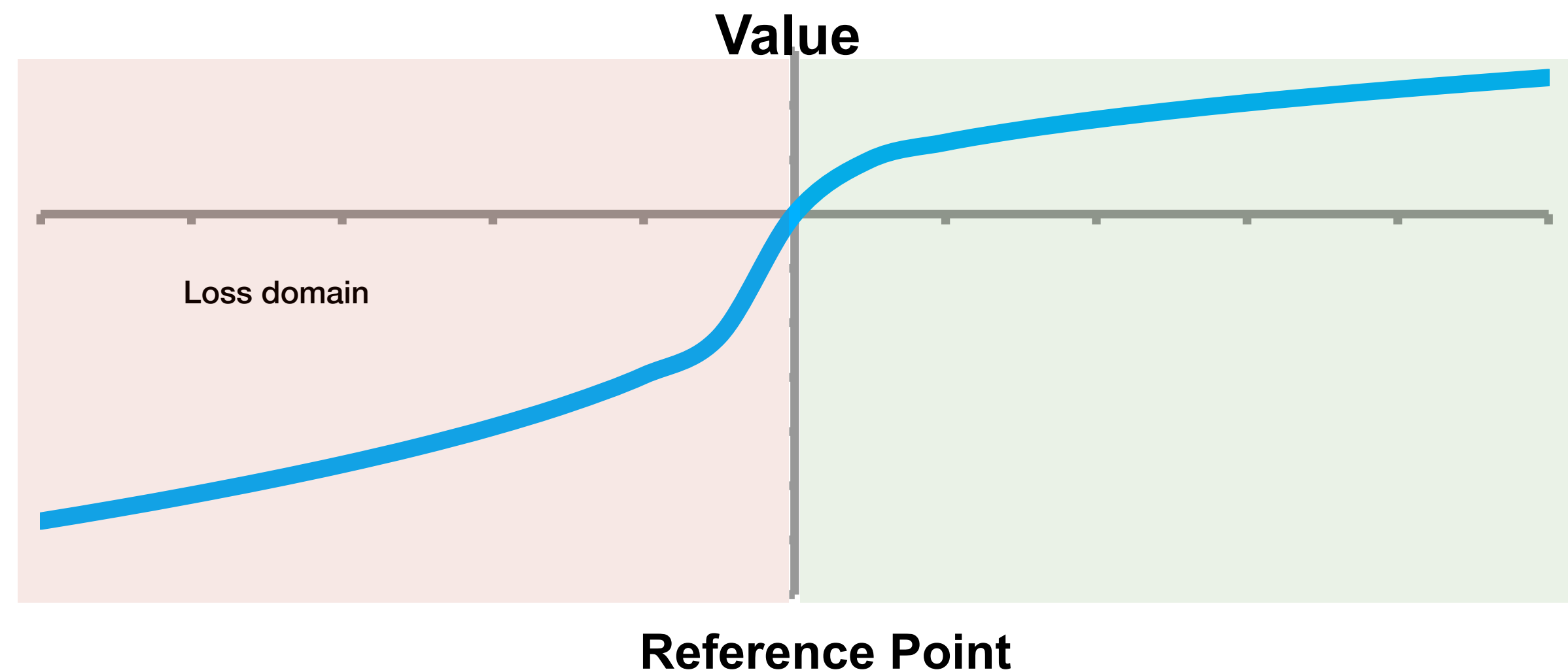
Dual Process Theory.

- The human mind is complex
- Dual-process theory looks at two interrelated 'systems' often called System 1 and System 2
- These systems are responsible for our decision-making process



Prospect Theory.

- Developed by Kahneman and Tversky in 1979
- Main distinguishing features:
 - Losses loom much larger than gains – about twice as much
 - Risk-aversion in the gain domain and risk-seeking in the loss domain
 - Reference point dependent - often the status quo



How many of you
think they are above
average drivers?



Overconfidence.

- Overconfidence is a widespread psychological phenomenon and often divided into two categories:
 - Overconfidence in one's ability
 - Overconfidence in one's knowledge

Present Bias and Discounting.

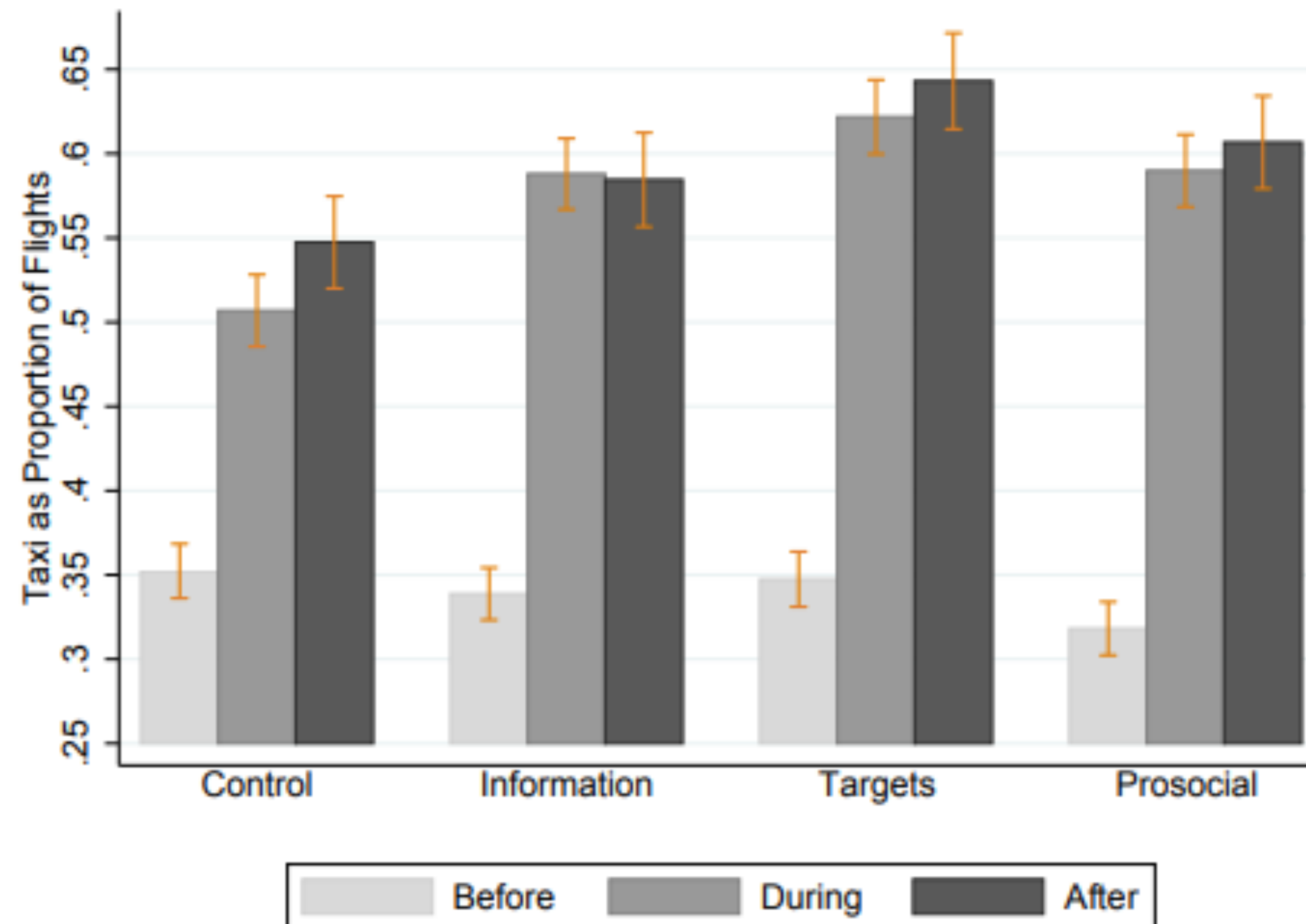
- People put a very high weight on the present compared to the future (present bias), this might be particularly pronounced in the domain of air traffic management operating at very fine margins
- It might not seem like a big sacrifice to give up a slot in six months time compared to giving up one slot for today

Virgin Atlantic Case Study (1/2).

- Using nudges for pilots in an effort to reduce fuel consumption, with pilots randomly assigned to different groups
 - Control: Informed that their fuel consumption will be monitored
 - Information: Received information on their previous performance
 - Target: Received in addition personalised targets and feedback
 - Prosocial: Charitable donation was made for each monthly target met
- Results over eight months
 - Control reduced fuel consumption dramatically, moderate additional saving in information group, target and prosocial significantly reduce fuel consumption at a similar level. However, pilots in the prosocial group report higher overall job satisfaction
 - Saving of 6,828MT fuel (3.3 mio GBP) and 21,507 tons CO₂

Virgin Atlantic Case Study (2/2).

Efficient Taxi, by time period



Source: Gosnell, List and Metcalfe (2016)

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Other Successful Behavioural Science Interventions.

- Water crisis in Cape Town to reduce daily per capita use to 50 liters (the daily use in the U.S. is about 300 liters)
 - Use of planning prompts
 - Use of social norms
- Pension contributions
 - Changing the default to being automatically enrolled tripled the saving rate in the initial study



Behavioural Science and Air Traffic Management

Prospect Theory and Air Traffic Management.

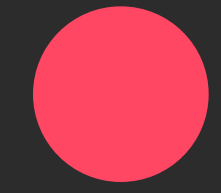
- Importance for air traffic management: Losing a slot might be experienced as very painful and as a consequence disproportionate means might be taken to avoid that loss
- Risk seeking in the loss domain
- Changing the reference point about number of slots could change the experience of loss or gain

Overconfidence and Air Traffic Management.

- Overconfidence can have significant consequences in aviation
 - A non-instrument rated pilot being overconfident in his or her abilities ending up in IMC
 - An air traffic controller being overconfident in his or her ability to make a tight routing work
- Some ideas about mitigating overconfidence
 - Pre-mortem
 - Use actual statistics and transform them into easily understood metrics: 10% is a lot more abstract and intangible than 1 out of 10

How Air Traffic Management Can Leverage Insights from Behavioural Science.

- Behaviour and decision making can deviate significantly from the predictions of rational choice models
- Behavioural Science tries to capture and predict actual behaviour
- There is no room for error and bias in aviation and Behavioural Science should be seen as a complementary approach to continuously ensure the efficiency and safety of our skies
- Moreover, Behavioural Science can help to optimise the economics of air traffic management and hence minimise the delay costs



Key Takeaways

Key Takeaways.

- People do not (always) behave rationally
- An adult makes about 35,000 decisions per day
 - These are subject to biases and heuristics
- The impact of behaviour change interventions can be unexpected and surprising
- Behavioural Science advocates the use of single interventions within a controlled context and rigorous measurement of any impact before rolling out interventions at larger scale
- Behavioural Science should be seen as a complimentary rather than competing discipline

Questions?



salient.

Thank you.

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