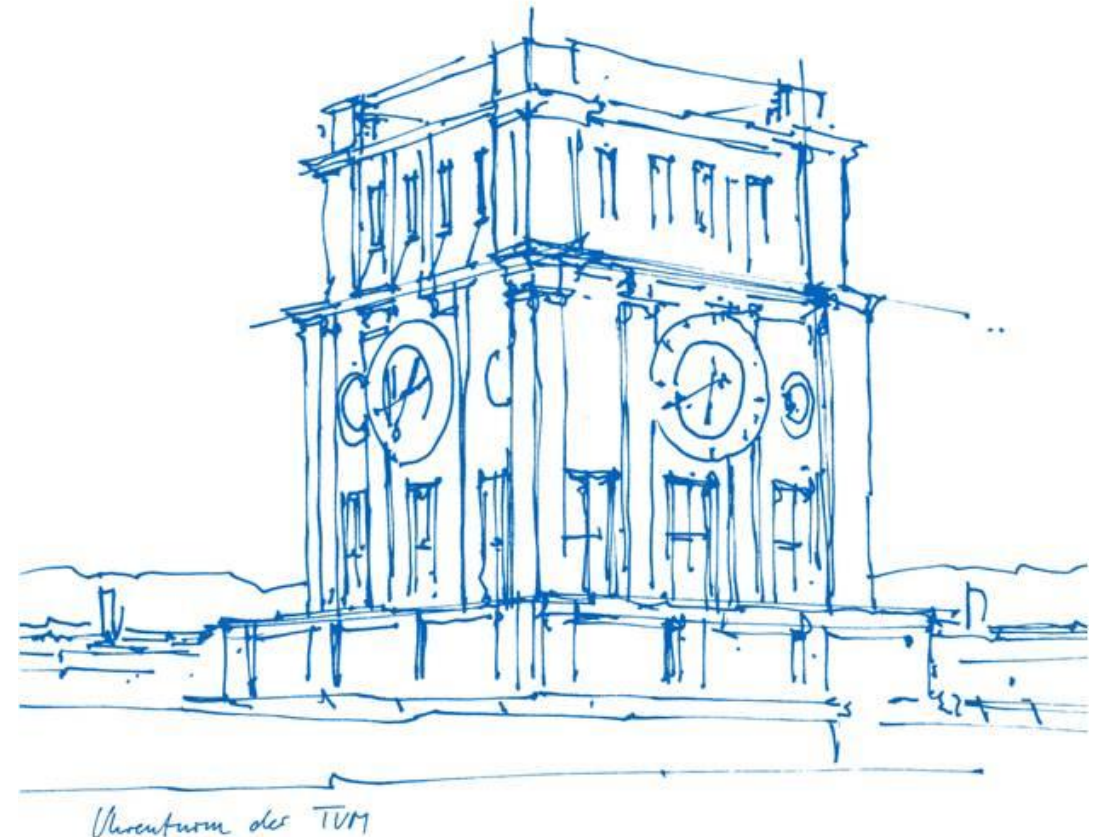


# Behavioral Economics

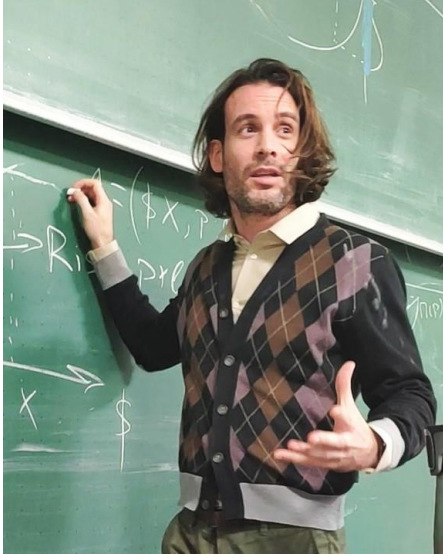
Prof. Dr. Sebastian J. Goerg  
Dr. Orestis Kopsacheilis

Technical University of Munich  
TUMCS for Biotechnology and Sustainability  
TUM School of Management  
Department of Economics and Policy

Winter 2024/25



# About me



Dr. Orestis Kopsacheilis  
*(just call me Orestis)*



BSc in **Management**; University of Piraeus, Greece



MSc in Economics: **Behavioral** and Game Theory;  
University of Amsterdam, Netherlands



PhD in Economics: **Behavioral** and **Experimental**;  
University of Nottingham, UK

## I. What is Behavioural Economics

II. Principles of Experimental Economics

III. The Standard Economic Model: Consumer Theory

IV. Reference dependence & departures from the standard model

V. Decisions Under Risk and Uncertainty (I)

VI. Decisions Under Risk and Uncertainty (II)

VII. Intertemporal Choice

VIII. Interaction with others: Game Theory

IX. Interaction with others: Beh. Game Theory & Social Pref/ces

X. Behavioral Economics and Policy

# In this course



- I. Some classroom experiments
- II. A brief historical overview of Behavioral Economics
- III. Course logistics

# The standard economic model

The standard economic model assumes people are

1. Rational – they do not make systematic mistakes.
2. Selfish – they care only about themselves.

# Classroom Experiments



# Experiment 1

# Experiment: Bill

*Bill is 34 years old. He is intelligent, but unimaginative and generally lifeless. In school, he was strong in mathematics but weak in social studies and humanities.*

**Rank the following statements from most probable to least probable by drag and dropping them in the appropriate order.**

- 1 Bill is an accountant who plays jazz for a hobby
- 2 Bill is an architect
- 3 Bill is an accountant
- 4 Bill surfs for a hobby
- 5 Bill is a reporter
- 6 Bill is a physician who plays poker for a hobby
- 7 Bill plays jazz for a hobby
- 8 Bill climbs mountains for a hobby



# Experiment 2

# Experiment: 3 Simple Questions

Please answer these questions as quickly as possible!!!



# Question 1



A bat and a ball cost \$1.10 in total. The bat costs \$1.00 more than the ball.

How much does the ball cost? \_\_\_\_\_ cents



## Question 2



It takes 5 machines 5 minutes to make 5 widgets, how long would it take 100 machines to make 100 widgets?

\_\_\_minutes



# Question 3



In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake?

\_\_\_days



# Experiment 3

# Blinking Lights

Two lamps, a green and red one. In each round, only one of the two lamps lights up.  
The Red light has a probability of 60% to light while the Green only 40%. The probabilities are independent.  
Try to guess which light is going to blink in every round!



# Round 1





# RED



# Round 2



# RED



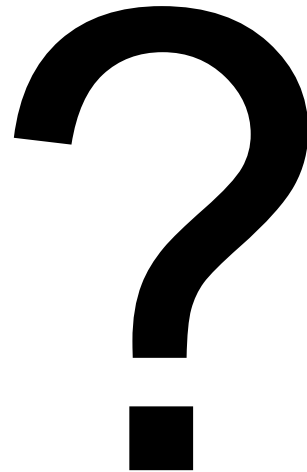
# Round 3



# GREEN



# Round 4



# GREEN



# Round 5

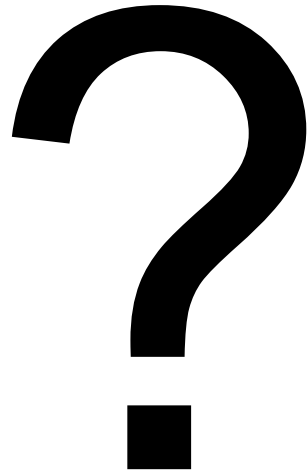




# RED

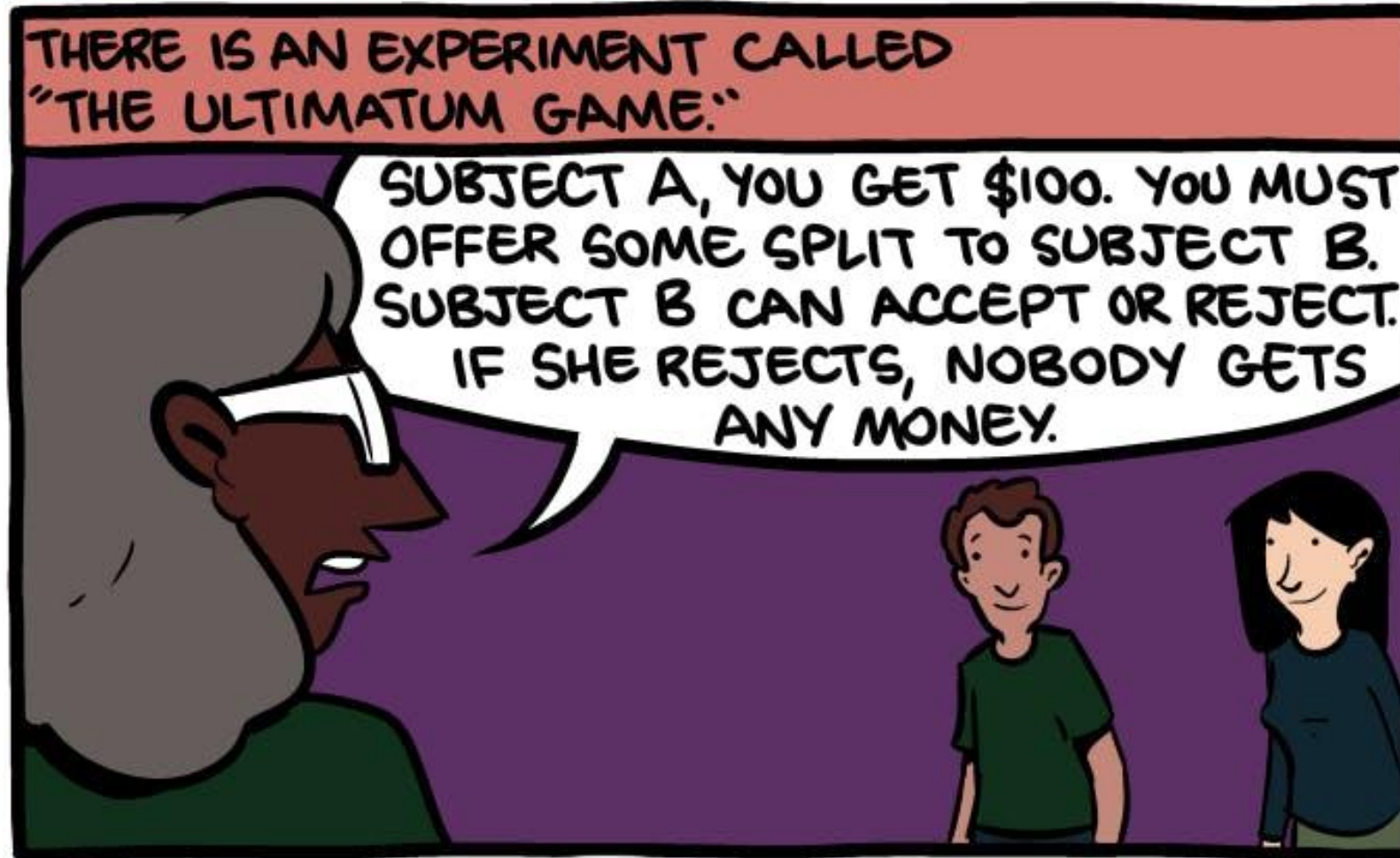


# Round 5

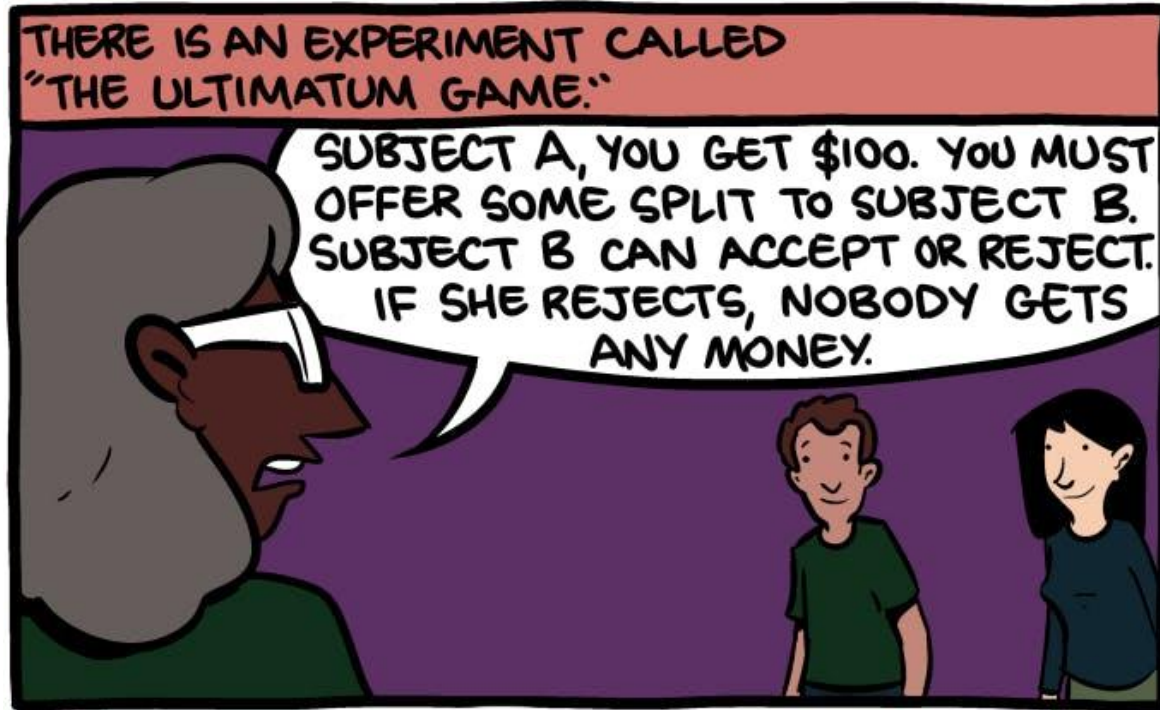


# Experiment 4

# The Ultimatum Game



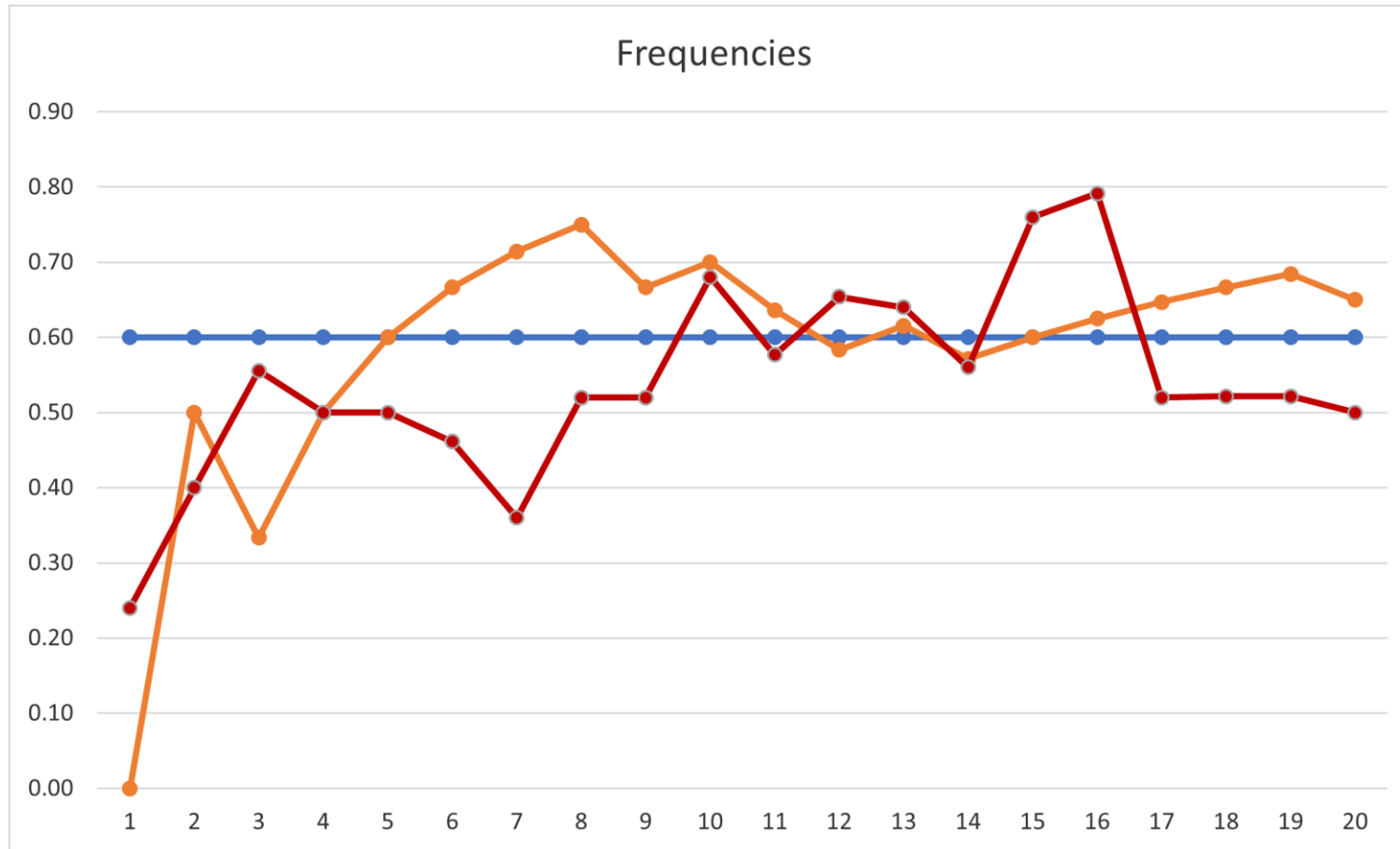
# Ultimatum Game



- Imagine you are Subject B
- Subject A offers you \$5 and keeps 95\$ to themselves
- Would you accept or reject the offer?

# Discussion of experimental results

# Results: Blinking Lights



- **Blue:** underlying probability of blinking red
  - Fixed at 60%, so red is more likely than green
- **Orange:** aggregate, observed frequency of Red
  - Converging at 60% by the Law of Large Numbers
- **Red:** observed proportion of students thinking that the Red light would blink next
  - Converges at 60% but is this the right strategy?

# Results: Blinking Lights

## Probability matching

A decision strategy in which predictions for events are proportional to the base rate of the event. Often it is considered a mistake if the objective is to maximize the number of correct guesses



# Experiment: Bill

*Bill is 34 years old. He is intelligent, but **unimaginative**, compulsive, and generally **lifeless**. In school, he was strong in **mathematics** but weak in social studies and humanities.*

*(Tversky and Kahneman, 1983)*

Rank the following statements from most probable to least probable

*Bill is a physician who plays poker for a hobby*

*Bill is an **accountant***

*Bill is an architect*

*Bill is an **accountant** who plays jazz for a hobby*

*Bill surfs for a hobby*

*Bill is a reporter*

*Bill plays jazz for a hobby*

*Bill climbs mountains for a hobby*

# Experiment: Bill (results)

*Bill is 34 years old. He is intelligent, but unimaginative, compulsive, and generally lifeless. In school, he was strong in mathematics but weak in social studies and humanities.*

*(Tversky and Kahneman, 1983)*

Rank the following statements from most probable to least probable

*Bill is a physician who plays poker for a hobby*

*Bill is an accountant (A)*

*Bill is an architect*

*Bill is an accountant who plays jazz for a hobby (AJ)*

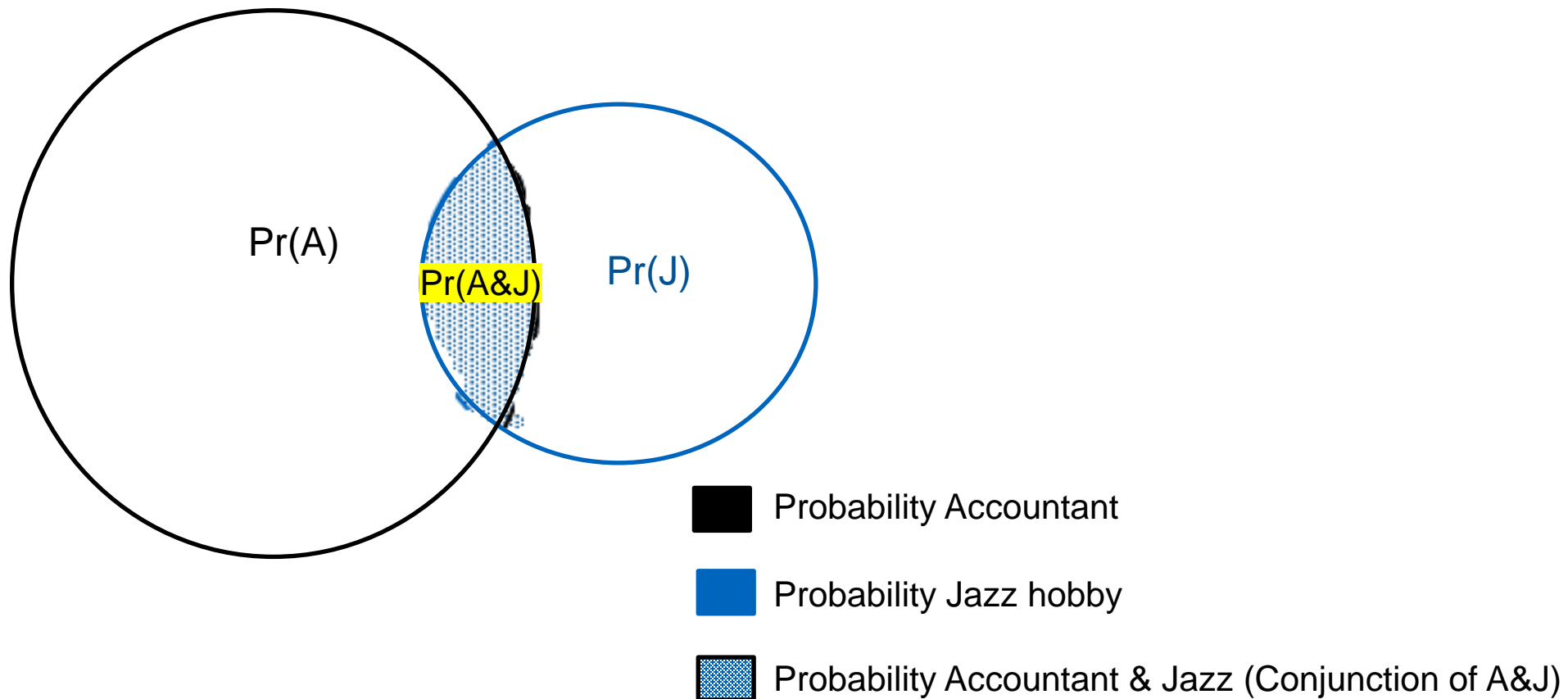
*Bill surfs for a hobby*

*Bill is a reporter*

*Bill plays jazz for a hobby (J)*

*Bill climbs mountains for a hobby*

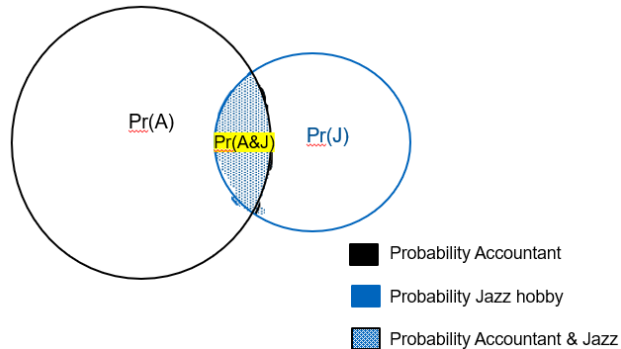
# Conjunction Fallacy



# Conjunction Fallacy

## Conjunction Fallacy

A fallacy that occurs when two specific conditions are jointly evaluated as more probable than a single one. It is a mistake if the probability of two events occurring **together** (in "conjunction") is less than or equal to the probability of one occurring alone



$$P(A \cap J) \leq P(A)$$

And

$$P(A \cap J) \leq P(J)$$

But, very often:

$$P(J) < P(A \cap J) < P(A)$$

# Experiment: Bill (results)

$$\Pr(A) > \Pr(A \cap J) > \Pr(J)$$



Amos Tversky  
Daniel Kahneman

Indeed:  
87% of participants exhibited this ranking!

# Experiment: Bill (results)

## Psychological Review

VOLUME 90 NUMBER 4 OCTOBER 1983

### Extensional Versus Intuitive Reasoning: The Conjunction Fallacy in Probability Judgment

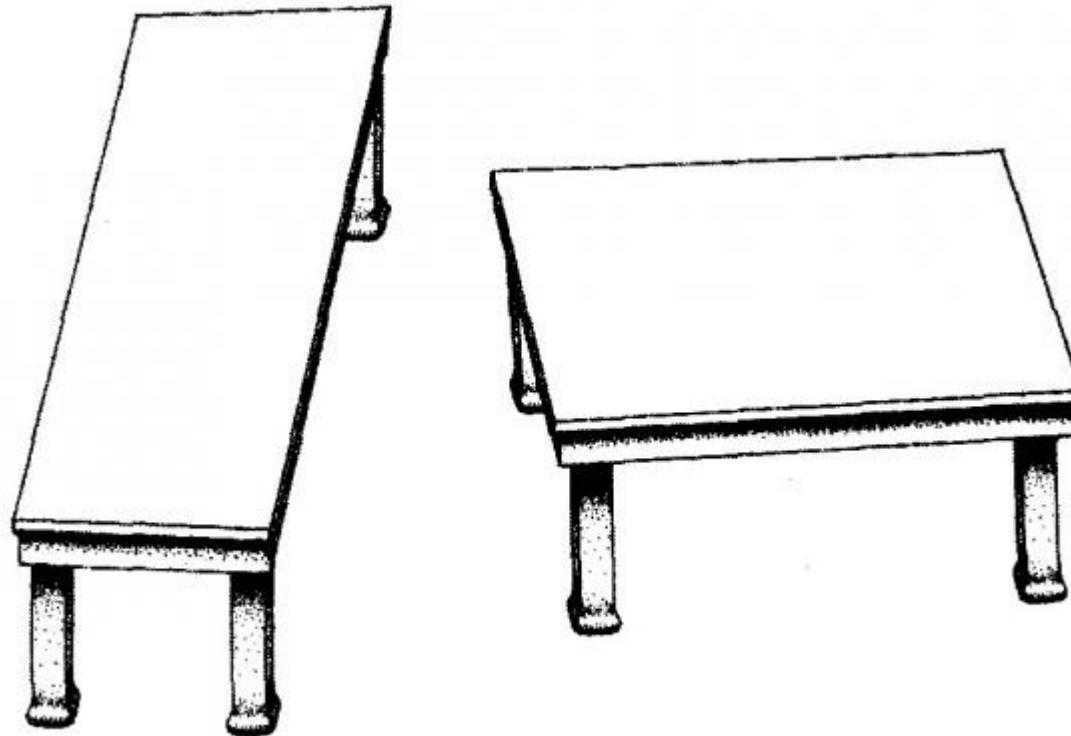
Amos Tversky  
Stanford University

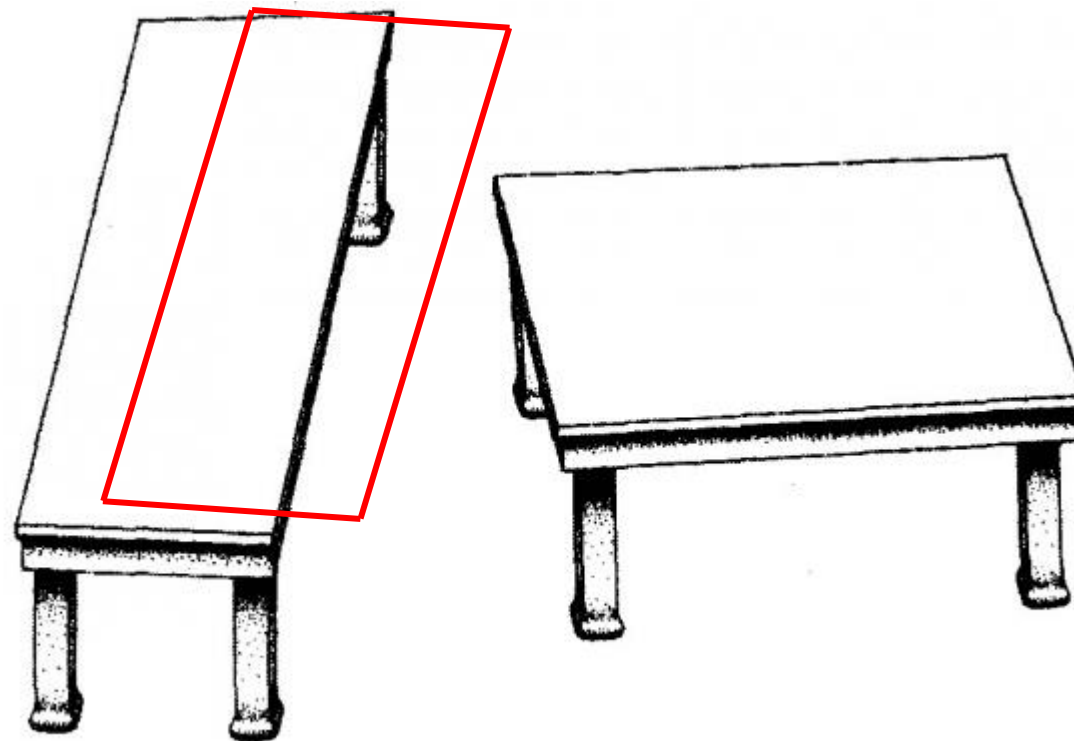
Daniel Kahneman  
University of British Columbia, Vancouver,  
British Columbia, Canada

Perhaps the simplest and the most basic qualitative law of probability is the conjunction rule: The probability of a conjunction,  $P(A\&B)$ , cannot exceed the probabilities of its constituents,  $P(A)$  and  $P(B)$ , because the extension (or the possibility set) of the conjunction is included in the extension of its constituents. Judgments under uncertainty, however, are often mediated by intuitive heuristics that are not bound by the conjunction rule. A conjunction can be more representative than one of its constituents, and instances of a specific category can be easier to imagine or to retrieve than instances of a more inclusive category. The representativeness and availability heuristics therefore can make a conjunction appear more probable than one of its constituents. This phenomenon is demonstrated in a variety of contexts including estimation of word frequency, personality judgment, medical prognosis, decision under risk, suspicion of criminal acts, and political forecasting. Systematic violations of the conjunction rule are observed in judgments of lay people and of experts in both between-subjects and within-subjects comparisons. Alternative interpretations of the conjunction fallacy are discussed and attempts to combat it are explored.

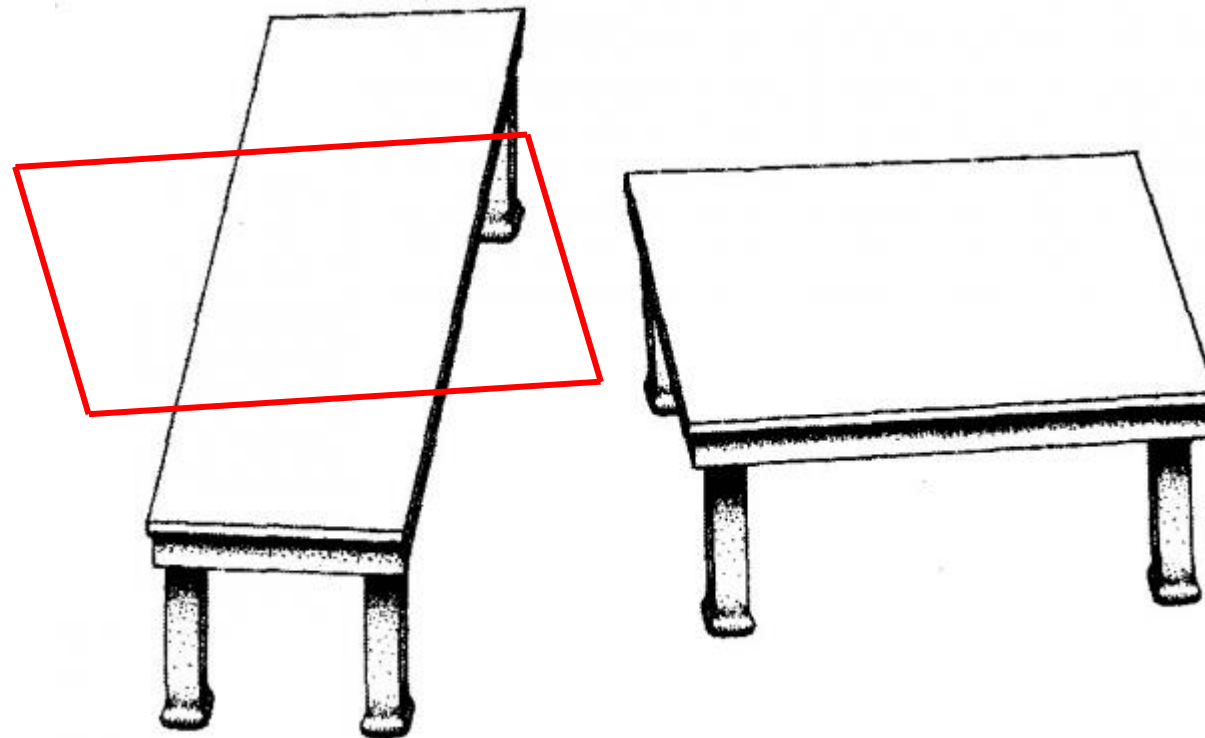


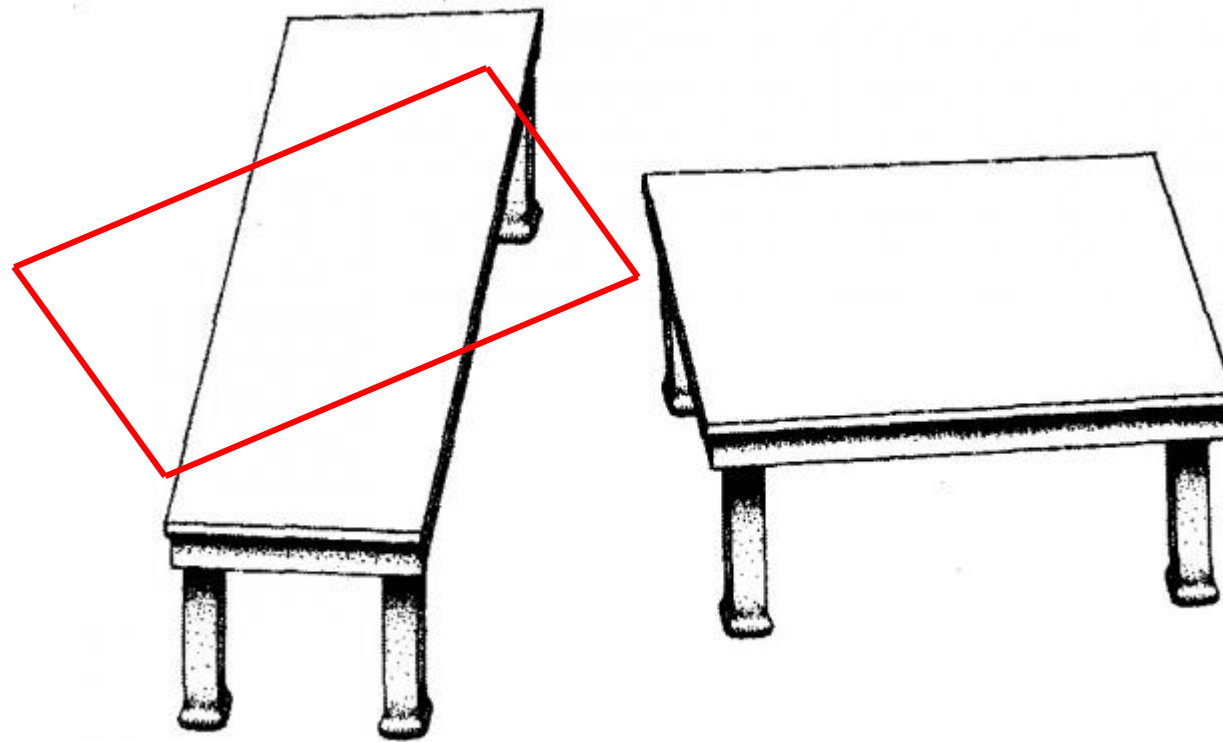
Amos Tversky  
Daniel Kahneman

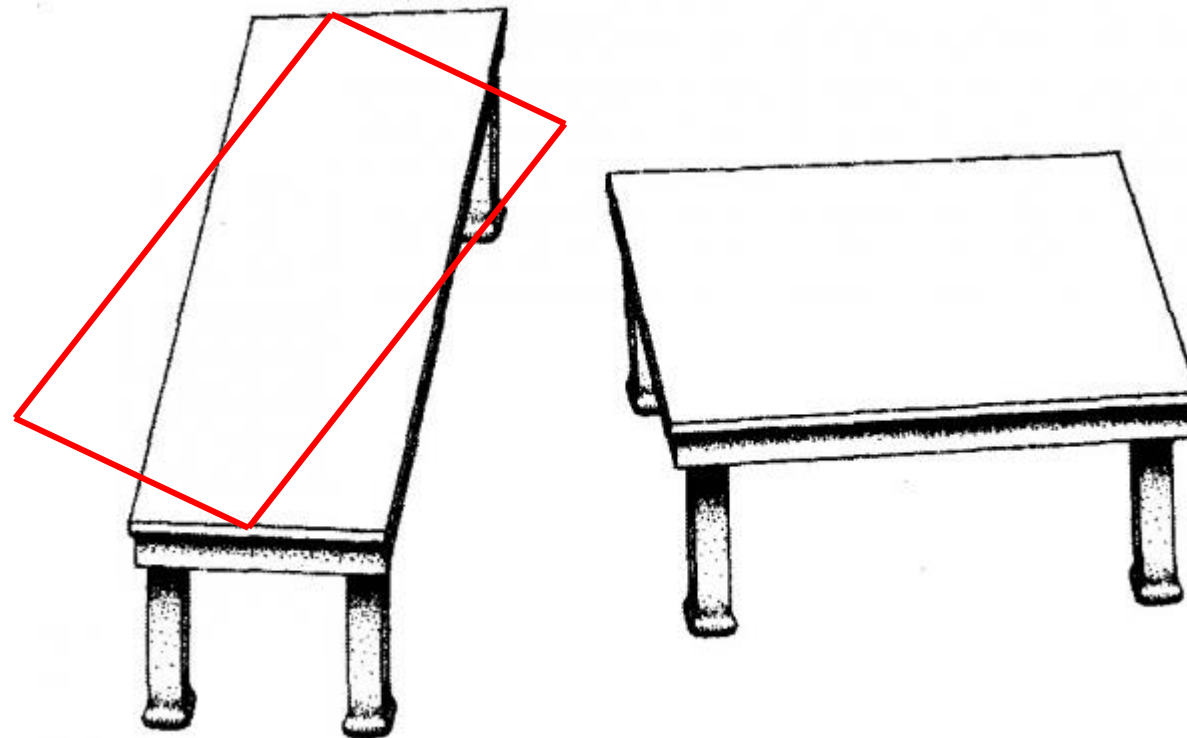




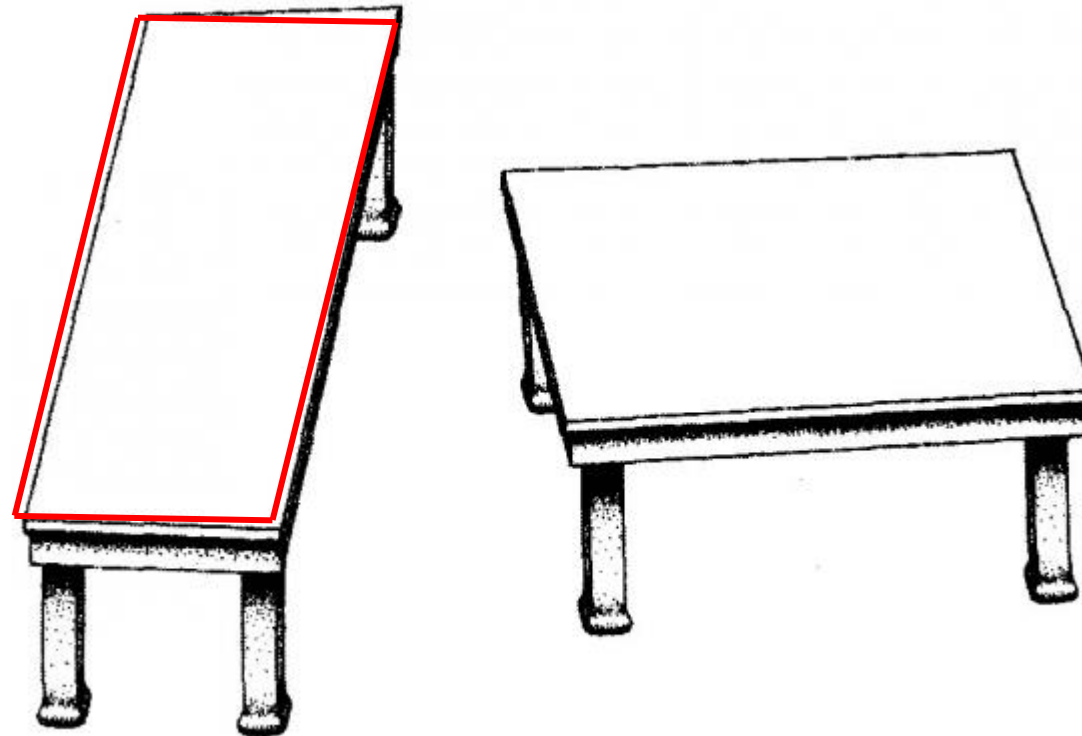








# The mind takes shortcuts



# Experiment: 3 Simple Questions

A bat and a ball cost \$1.10 in total. The bat costs \$1.00 more than the ball.

How much does the ball cost?

5 cents

If it takes 5 machines 5 minutes to make 5 widgets,  
how long would it take 100 machines to make 100 widgets?

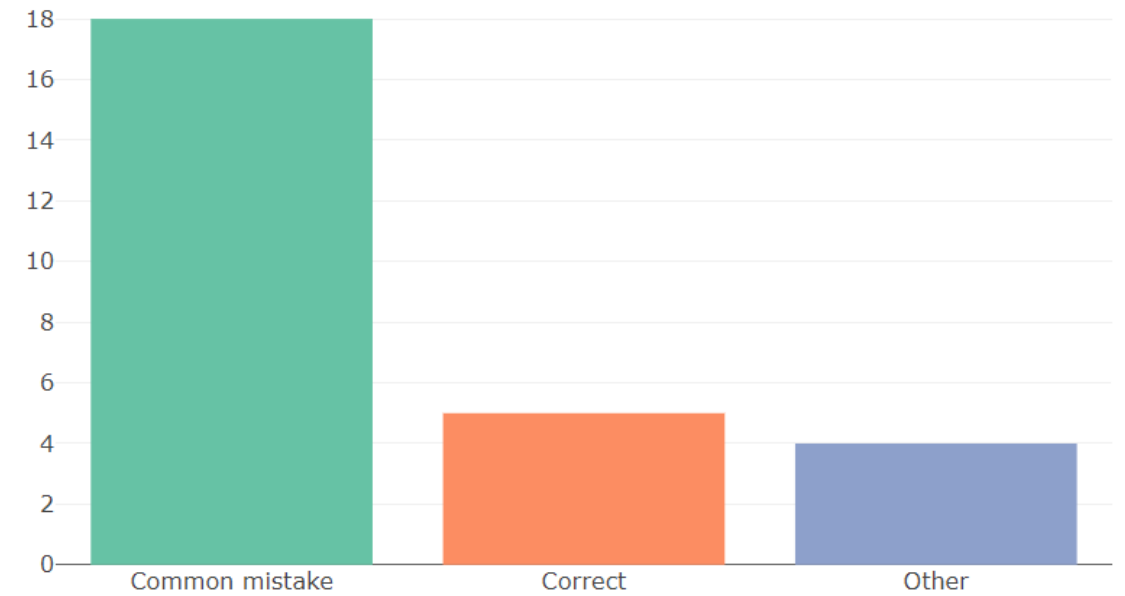
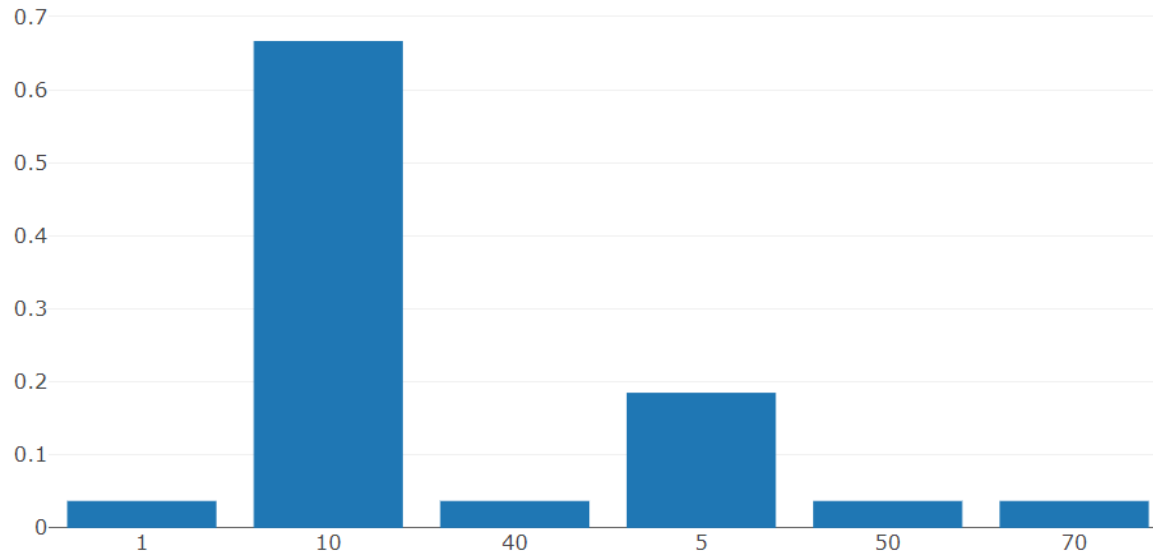
5 minutes

In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake?

47 days

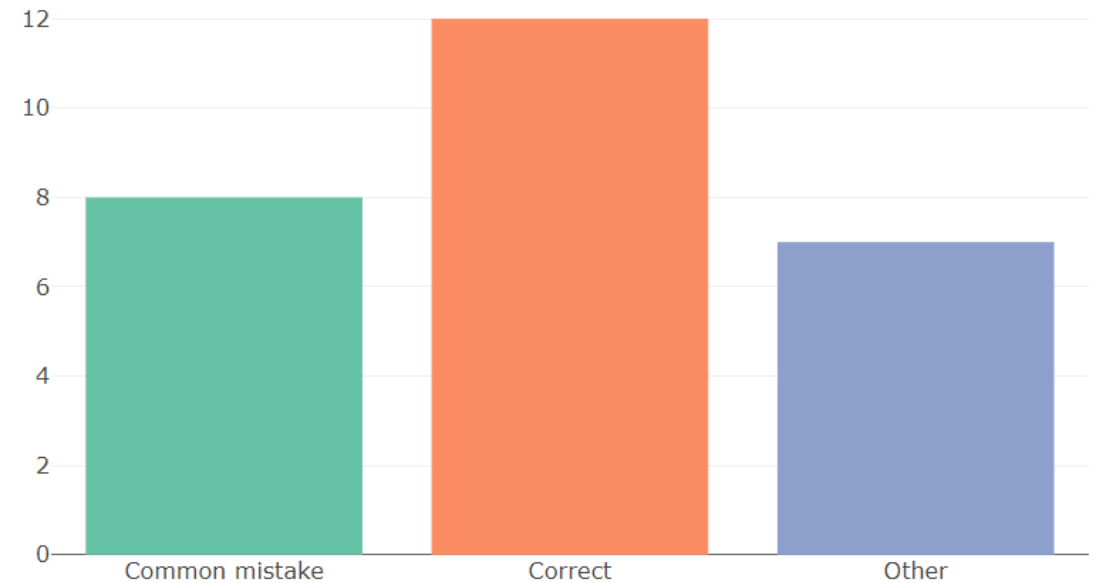
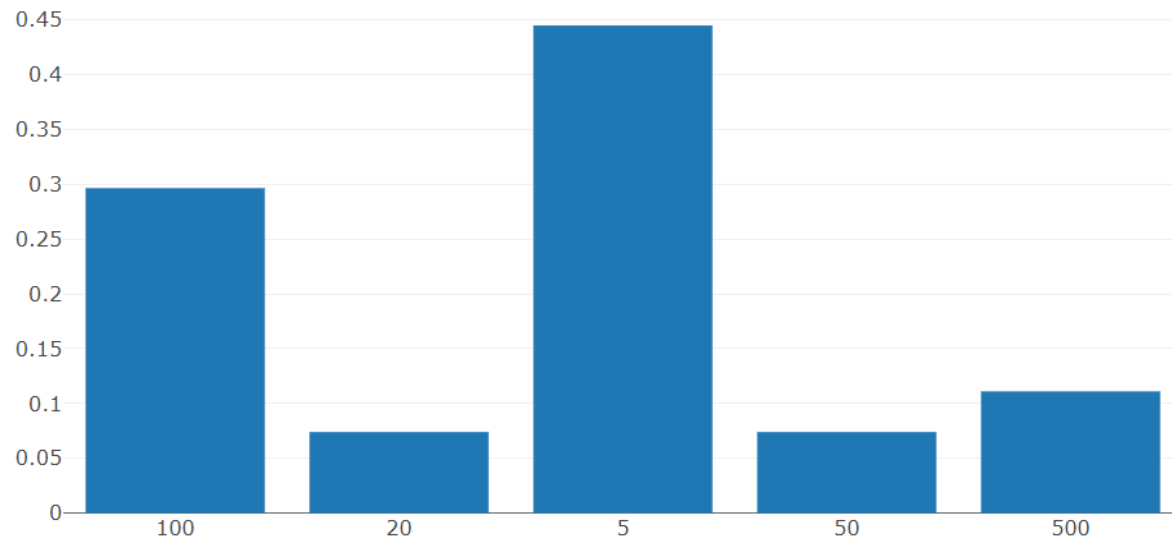
# Show results of CRT: Baseball price

2.1 Baseball price



# Show results of CRT: 100 machines

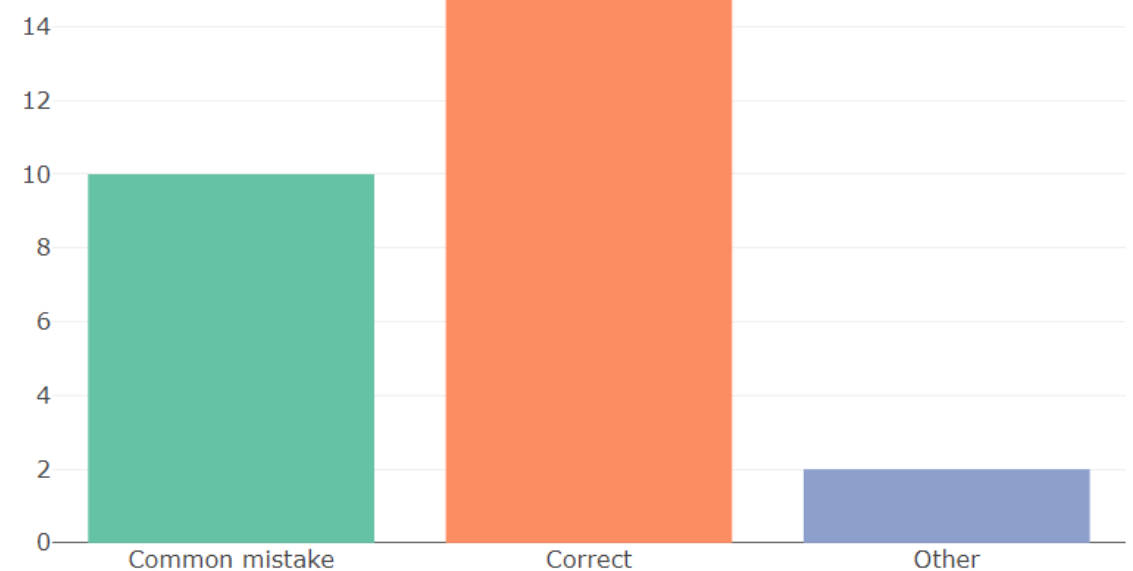
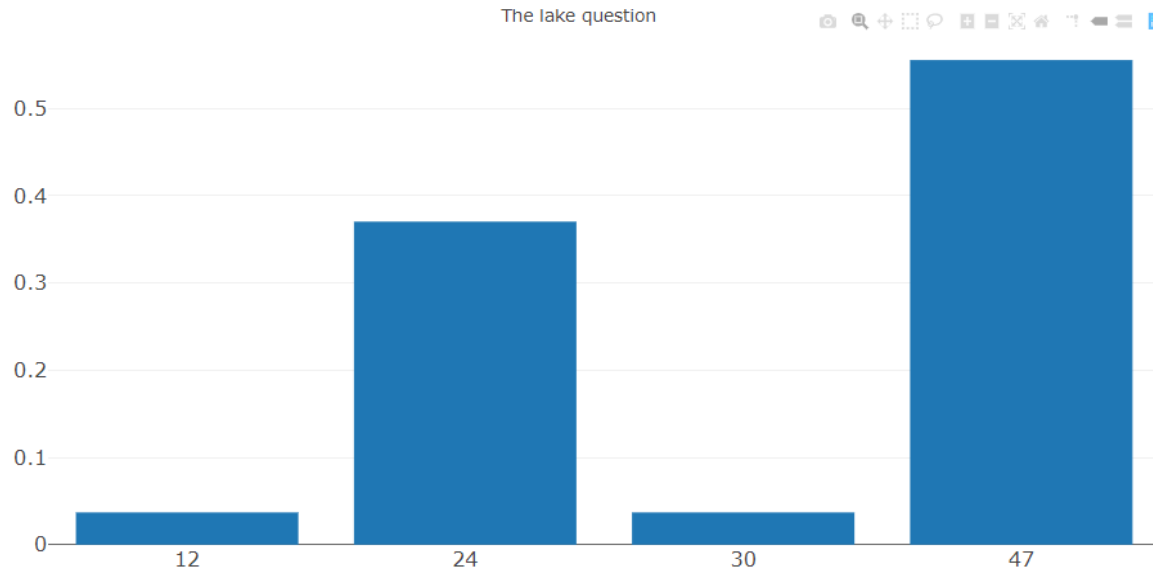
2.2 100 machines



# Show results of CRT: lake

## 2.3 The lake

The lake question





# Cognitive Reflection Test overview

*Journal of Economic Perspectives—Volume 19, Number 4—Fall 2005—Pages 25–42*

## Cognitive Reflection and Decision Making

Shane Frederick

People with higher cognitive ability (or “IQ”) differ from those with lower cognitive ability in a variety of important and unimportant ways. On average, they live longer, earn more, have larger working memories, faster reaction times and are *more* susceptible to visual illusions (Jensen, 1998). Despite the diversity of phenomena related to IQ, few have attempted to understand—or even describe—its influences on judgment and decision making. Studies on time preference, risk preference, probability weighting, ambiguity aversion, endowment effects, anchoring and other widely researched topics rarely make any reference to the possible effects of cognitive abilities (or cognitive *traits*).

Decision researchers may neglect cognitive ability because they are more interested in the *average* effect of some experimental manipulation. On this view, individual differences (in intelligence or anything else) are regarded as a nuisance—as just another source of “unexplained” variance. Second, most studies are conducted on college undergraduates, who are widely perceived as fairly homogenous. Third, characterizing performance differences on cognitive tasks requires terms (“IQ” and “aptitudes” and such) that many object to because of their association with discriminatory policies. In short, researchers may be reluctant to study something they do not find interesting, that is not perceived to vary much within the subject pool conveniently obtained, and that will just get them into trouble anyway.

But as Lubinski and Humphreys (1997) note, a neglected aspect does not cease to operate because it is neglected, and there is no good reason for ignoring the *possibility* that general intelligence or various more specific cognitive abilities are important causal determinants of decision making. To provoke interest in this

■ *Shane Frederick is Assistant Professor of Management Science, Sloan School of Management, Massachusetts Institute of Technology, Cambridge Massachusetts. His e-mail address is (shane@mit.edu).*

Design to measure the cognitive reflection of a person, the ability to reflect on an initial response when searching for a solution to a problem.

The test is design such that every question does have an easy but incorrect answer.

Behavior of probability matching and CRT are correlated

# Cognitive Reflection Test (Frederick, 2005)

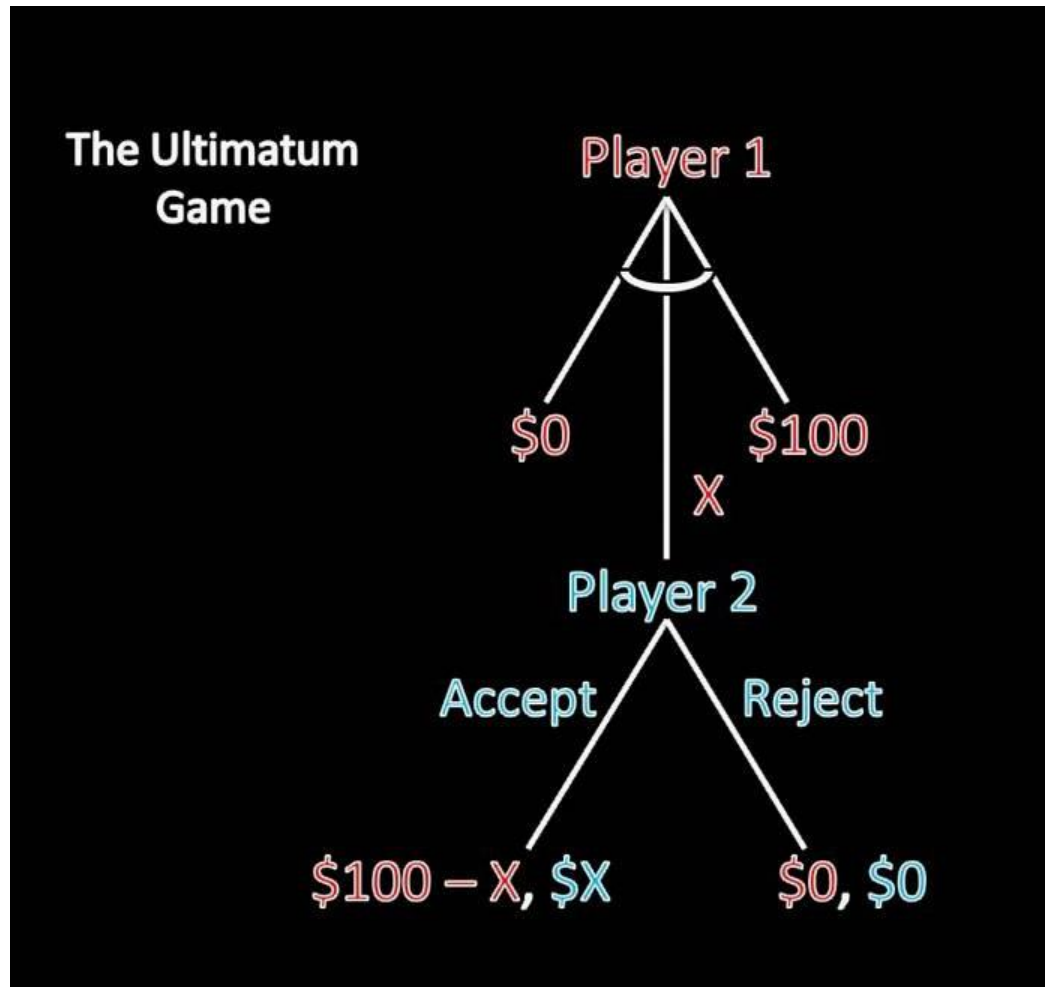
## Dual Process Theory

Theory from psychology that explains how thoughts and decisions can be the results of two different cognitive processes.

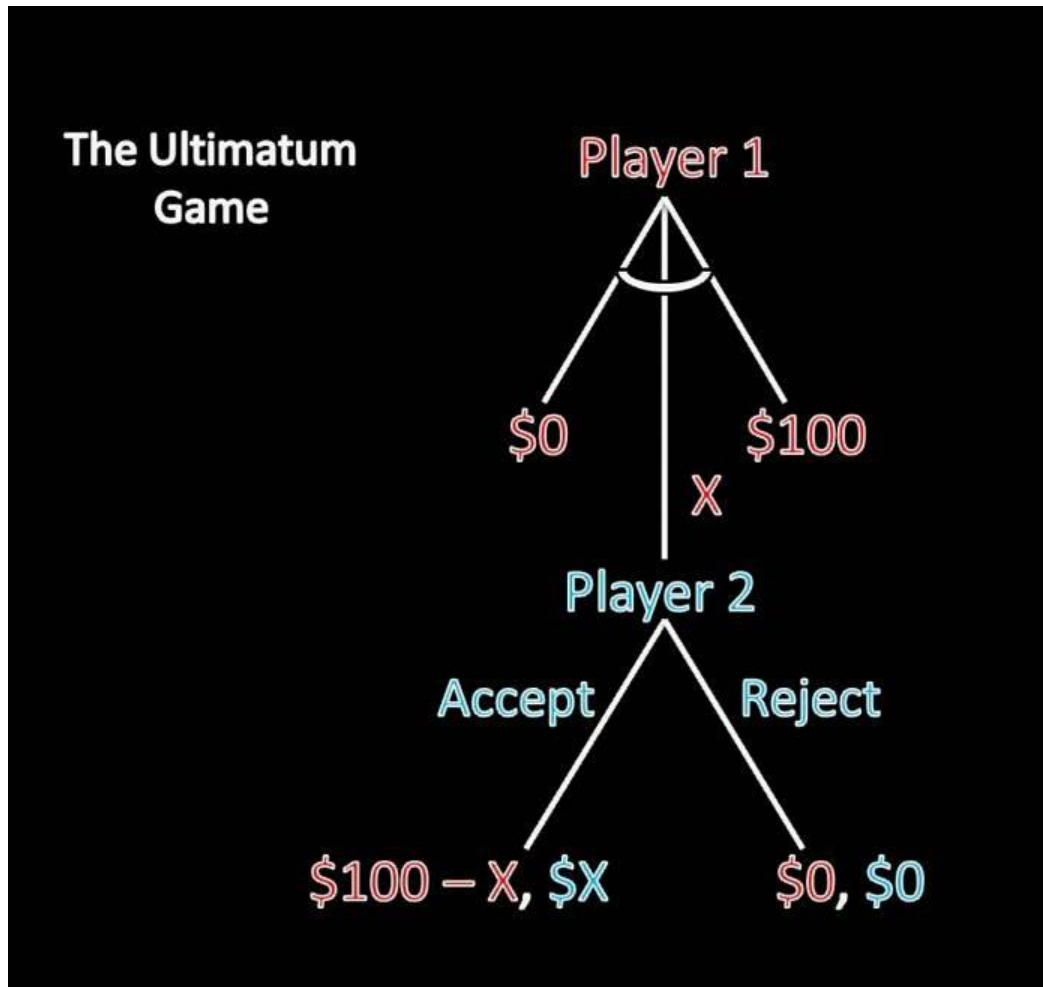
System 1 comprises automatic processes without reflection. Easy.

System 2 comprises analytical processes with reflection. Needs to be activated.  
Costly and hard.

# Experiment 4: The ultimatum game



# Experiment 4: The ultimatum game

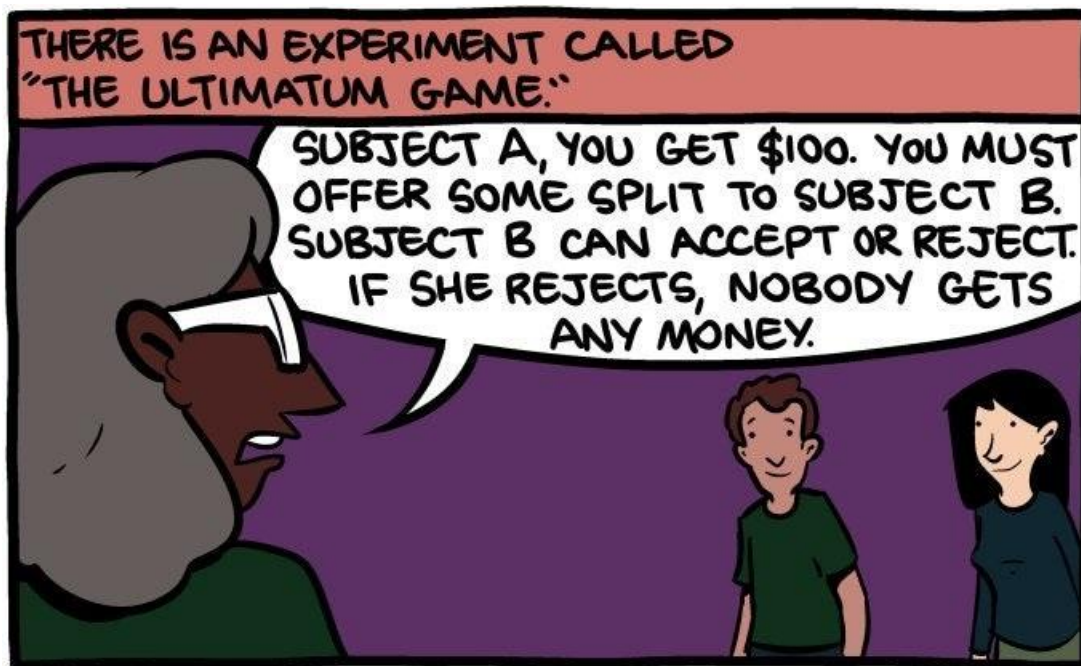


Formal equilibrium prediction (backwards induction):

- Player 2 accepts any positive allocation as it's better than the alternative
- Player 1 anticipates Player 2's response and offers the minimum amount

*Is this what happens in reality?*

# Experiment 4: The ultimatum game

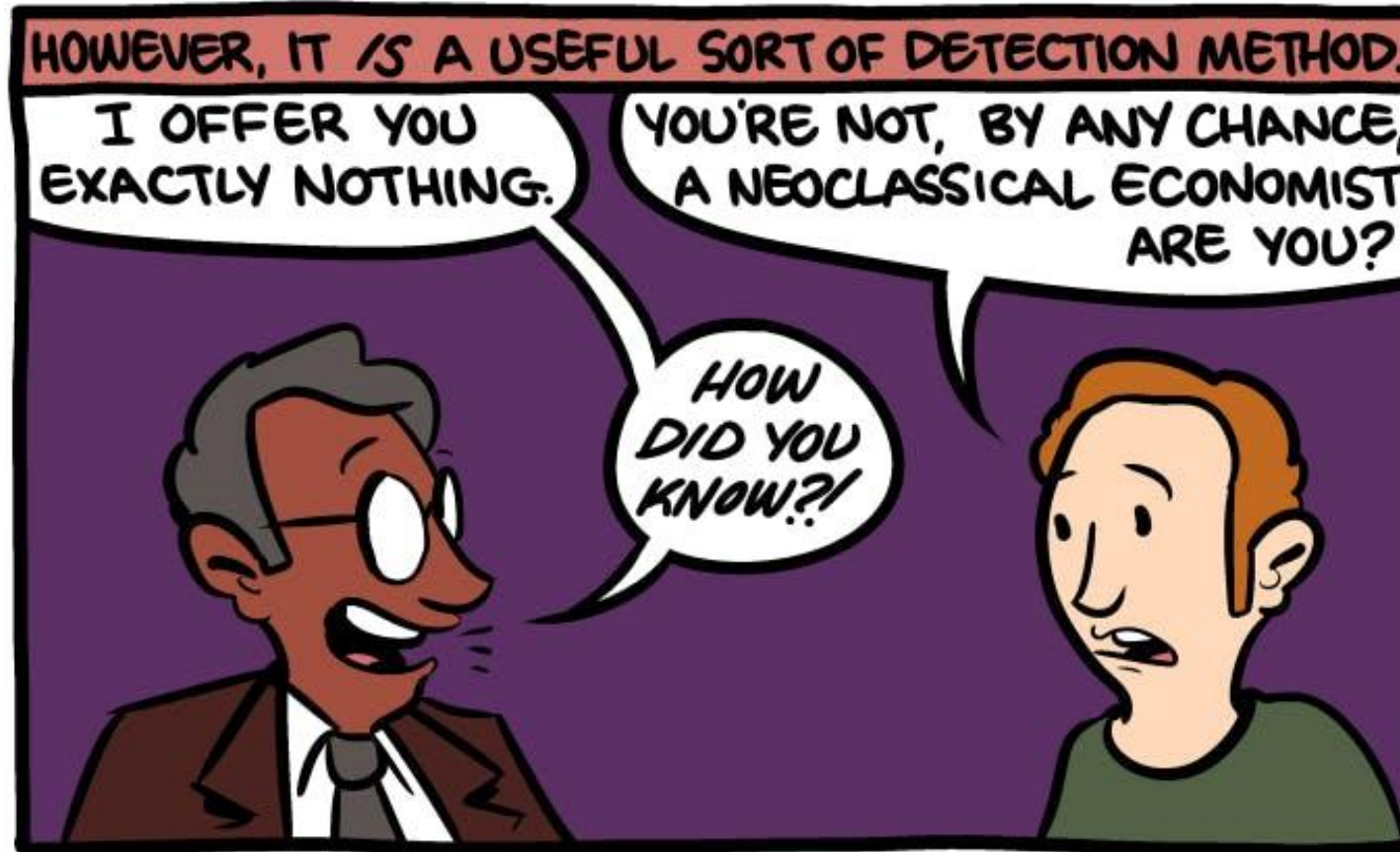


# Experiment 4: The ultimatum game





# Experiment 4: The ultimatum game



*smbc-comics.com*

# Taking stock

The standard economic model assumes people are

1. Rational – they do not make systematic mistakes.
2. Selfish – they care only about themselves.



# Taking stock

The standard economic model assumes people are

- ~~1. Rational – they do not make systematic mistakes.~~
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# Taking stock

The standard economic model assumes people are

- ~~1. Rational — they do not make systematic mistakes.~~
- ~~2. Selfish — they care only about themselves.~~
  - Especially considering the “Dictatorship game” a variant of the Ultimatum game (see Game Theory lectures for more details)

# What is Behavioral Economics?

# What is behavioral economics?

It is about understanding economic behavior

– Why do we make the choices we do?

# What is behavioral economics?

It is about understanding economic behavior

- Why do we make the choices we do?

It is about testing the standard economic model

- What does it do well and what not so well?

# What is behavioral economics?

It is about understanding economic behavior

– Why do we make the choices we do?

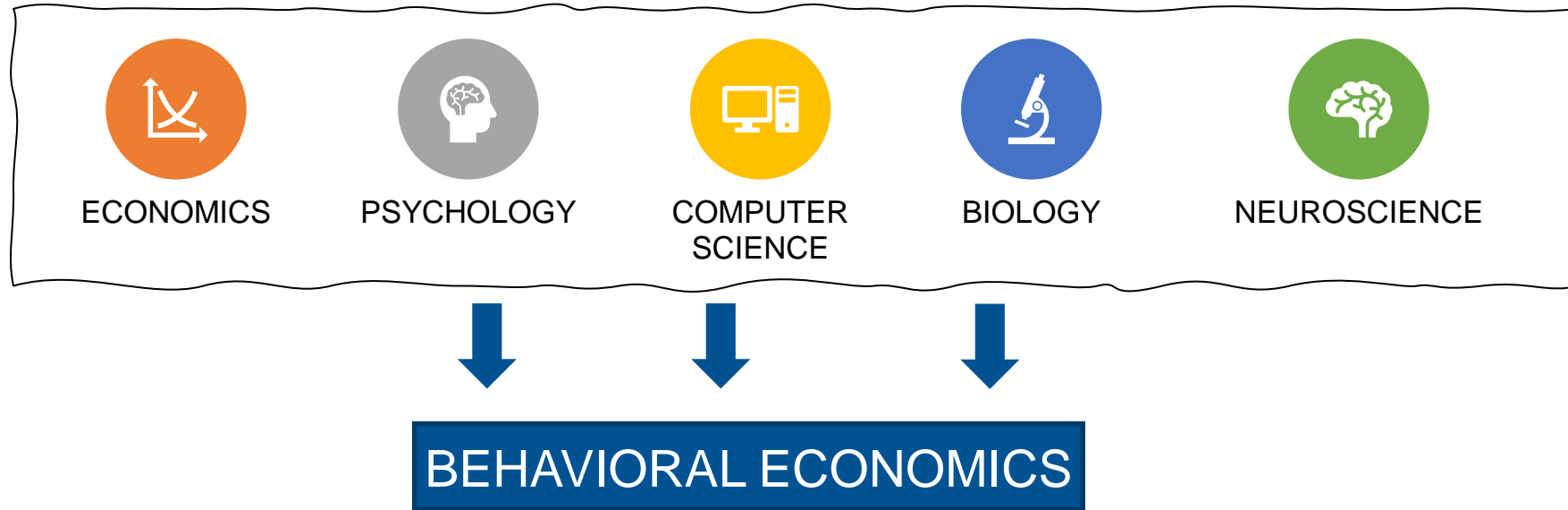
It is about testing the standard economic model

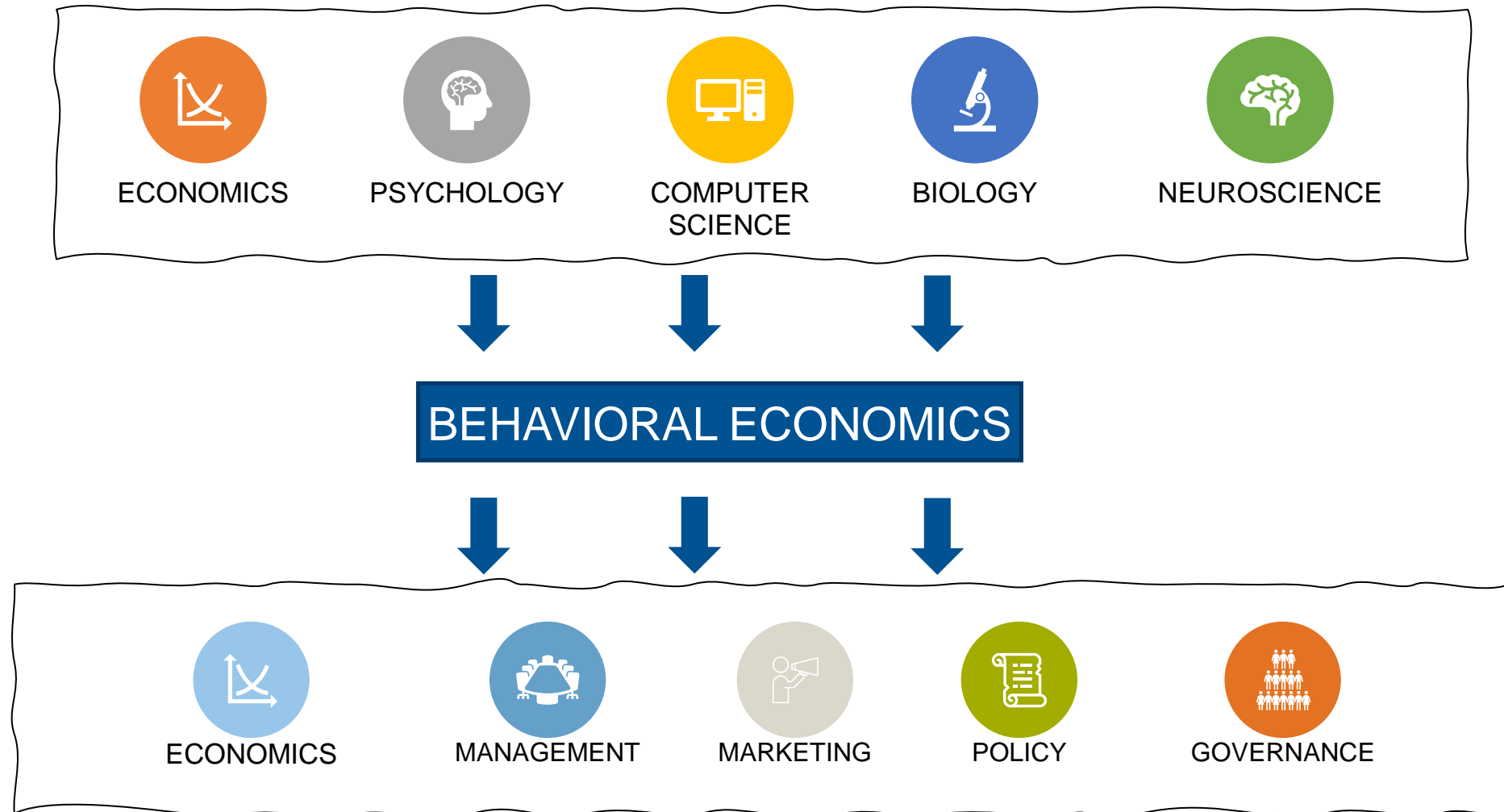
– What does it do well and what not so well?

It is about applying insights from

economics,  
psychology and  
other social sciences

to study, explain, and predict human behavior







# Behavioral Economics

Homer Simpson



Homo Economicus



# Behavioral Economics

Homer Simpson



Not very smart!

Behavior determined by emotions, affect, reflexes, drive.

No self-control

Homo Economicus



Very, very smart!

Behavior determined by logic and optimization.

Maximal self-control

# Behavioral Economics

Homer Simpson



Not very smart!

Behavior determined by emotions, affect, reflexes, drive.

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Very, very smart!

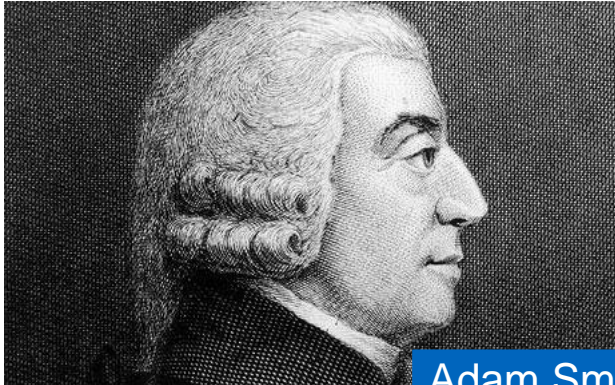
Behavior determined by logic and optimization.

Maximal self-control

Real People  
Homo Sapiens

Behavioral Economics studies this middle ground

# The origins of economics

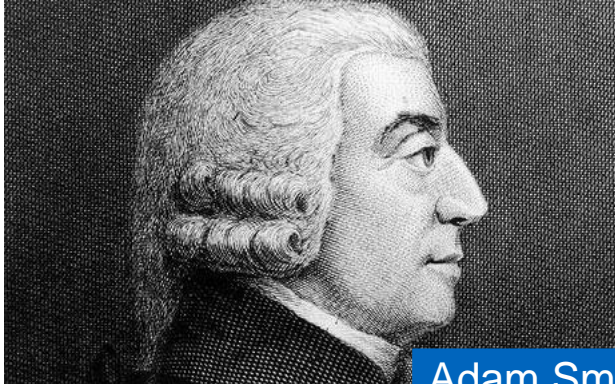


Adam Smith (1723 – 1790)

The Theory of Moral Sentiments 1759

The Wealth of Nations (1776)

# The origins of economics



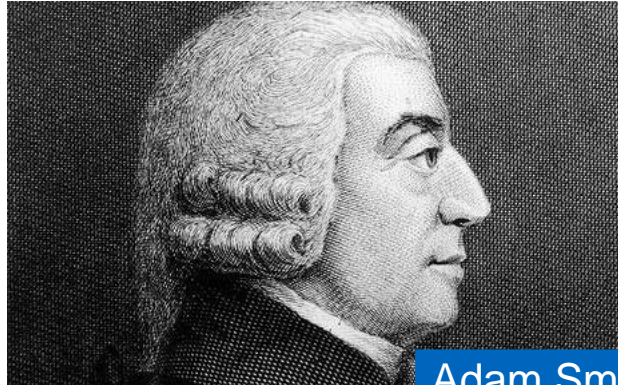
Adam Smith (1723 – 1790)

The Theory of Moral Sentiments 1759

The Wealth of Nations (1776)

*He generally, indeed, neither intends to promote the public interest, nor knows how much he is promoting it. [...] he intends only his own gain, and he is in this, as in many other cases, led by an **invisible hand** to promote an end which was no part of his intention. Nor is it always the worse for the society that it was no part of it. By pursuing his own interest he frequently promotes that of the society more effectually than when he really intends to promote it. I have never known much good done by those who affected to trade for the public good.*

# The origins of economics



Adam Smith (1723 – 1790)

The Theory of Moral Sentiments 1759

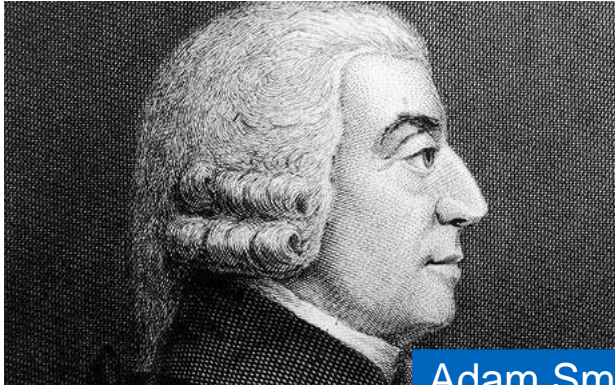
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It is not from the benevolence of the butcher, the brewer, or the baker, that we expect our dinner, but from their regard to their own interest. We address ourselves, not to their humanity but to their self-love, and never talk to them of our own necessities but of their advantages.



# The origins of economics



Adam Smith (1723 – 1790)

The Theory of Moral Sentiments 1759

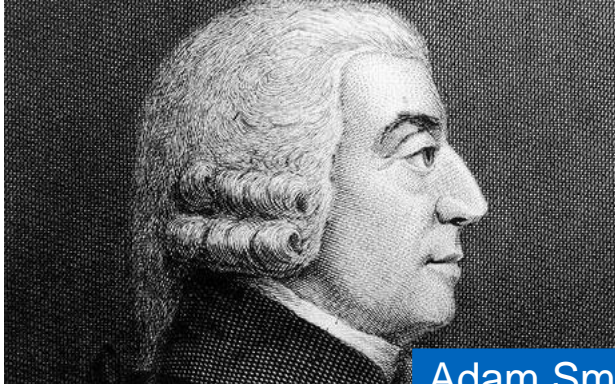
The Wealth of Nations (1776)

Smith tries to explain how humans develop their ability to form moral judgements.

In short: People observe others behavior and judgment. At the same time they are self-aware and want to be perceived well by others. This leads to a *mutual sympathy of sentiments*. Thus, people are not solely motivated by self-interest but also feel a natural sympathy with others.

habits → principles of behavior → conscience

# The origins of economics



Adam Smith (1723 – 1790)

The Theory of Moral Sentiments 1759

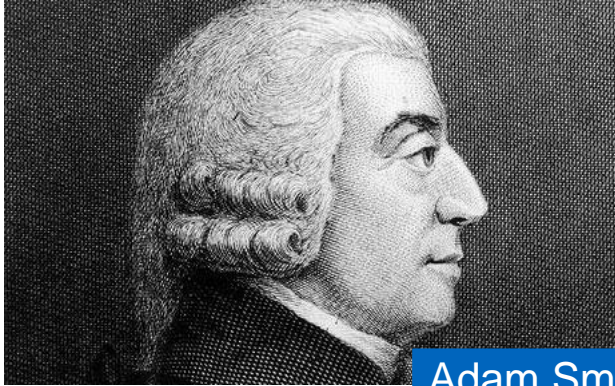
The Wealth of Nations (1776)

While *The Wealth of the Nations* is probably better known, Smith probably regarded *The Theory of Moral Sentiments* as more important. He kept revising it until his death.

But aren't the two books in sharp contrast to each other? Is one right and the other wrong?



# The origins of economics



Adam Smith (1723 – 1790)

The Theory of Moral Sentiments 1759

The Wealth of Nations (1776)

While *The Wealth of the Nations* is probably better known book, Smith probably regarded *The Theory of Moral Sentiments* as more important. He kept revising it until his death.

But aren't the two books in sharp contrast to each other? Is one right and the other wrong?

Some scholars argue that both books are indeed compatible. Both books cover mechanism that keep self-interest in check:

- sympathy
- markets and competition

# The origins of economics

For a long while economics and psychology went hand in hand.

In *The Theory of Moral Sentiments* Adam Smith recognizes the importance of emotions, social preferences, social norms etc.

# The origins of economics



# The origins of economics



# The origins of economics



# The origins of economics



# The origins of economics



## Diminishing Marginal Utility

Principle that as more of a good is consumed, the consumption of additional amounts will yield smaller additions to utility.



# The origins of economics

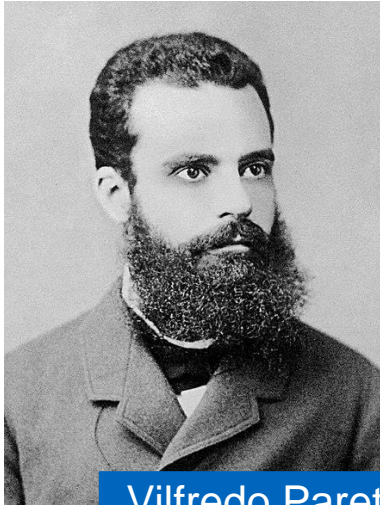
For a long while economics and psychology went hand in hand.

In *The Theory of Moral Sentiments* Adam Smith recognizes the importance of emotions, social preferences, social norms etc.

Fundamental economic principles like the law of diminishing marginal utility were based on the psychological theory of the time.

Thus, behavioral economics is not new!

# Homo-economicus is born



Vilfredo Pareto (1848 – 1923)

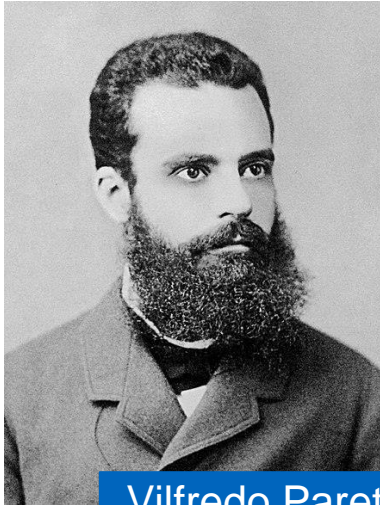
Pareto optimality

Propagated the shift from moral philosophy to an approach based on data and math

At the end of the 20th century Vilfredo Pareto argued economics break from psychology. The focus should be on choice rather than desire:

*“I am not interested in the reason why man is indifferent between [one thing and another]:  
I notice the pure fact.”*

# Homo-economicus is born



Vilfredo Pareto (1848 – 1923)

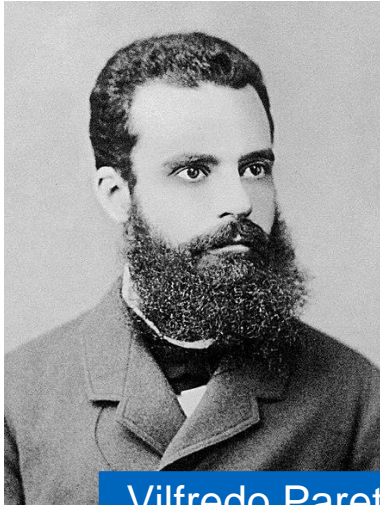
Pareto optimality

Propagated the shift from moral philosophy to an approach based on data and math

This approach allows to abstract away from complicated psychological questions and develop a mathematical theory of rational choice.

If people are rational, they will reveal their desires through choices and it is sufficient to focus on choice. Pareto recognized the limitations of the rational choice approach. For him it was a convenient theoretical starting point

# Homo-economicus is born



Vilfredo Pareto (1848 – 1923)

Pareto optimality

Propagated the shift from moral philosophy to an approach based on data and math

In the 21st Century economics became more and more dominated by models of rational choice. The model of rational choice transforms from a convenient theoretical starting point to a normative model of how rational economic actors should behave.

# Behavioral economics is (re-)born

In the second half of the 21<sup>st</sup> century behavioral economics made a comeback.

Five distinct elements in the comeback can be discerned:

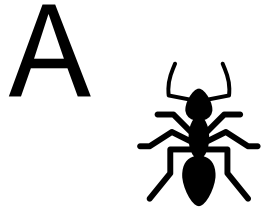
- Bounded rationality
- Cognitive bias
- Market design
- Equilibrium selection
- Policies that work.

# Bounded rationality: Herbert Simon (1916-2001)



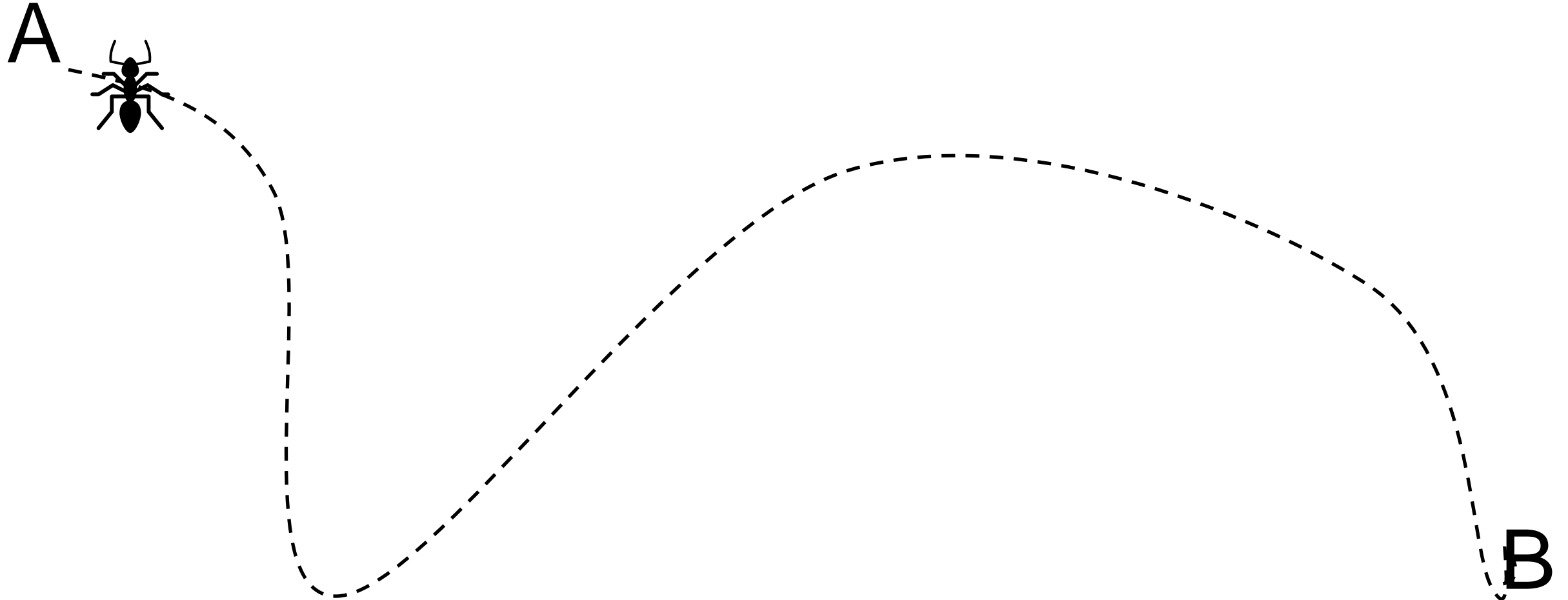
- A true “polymath”: contributed to Economics, but also Political Science, Cognitive Psychology and even Computer Science
- Introduced the concept of “bounded rationality”
- Received a Turing award, 1975
- Received a Nobel Prize in Economics, 1978

# Ecological rationality: the environment matters!



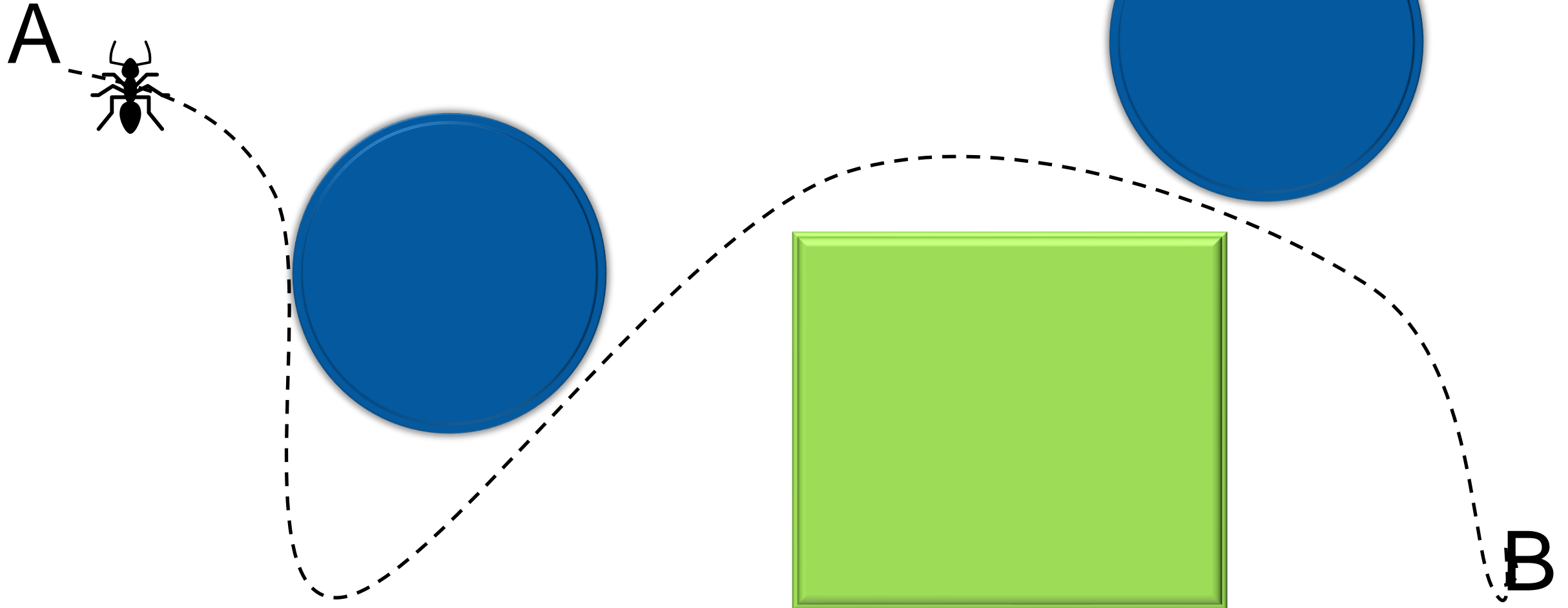
B

# Ecological rationality: the environment matters!





# Ecological rationality: the environment matters!

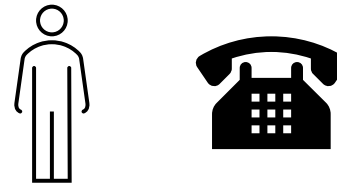


# Two approaches in building a clock...

Watchmaker A



Watchmaker B



# Two approaches in building a clock...

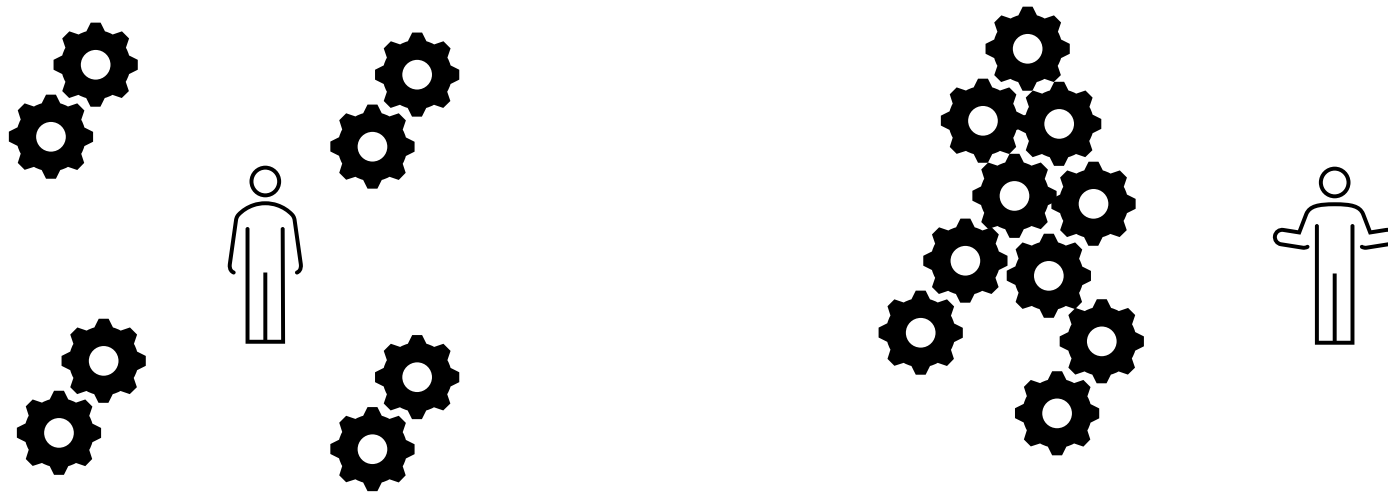
Watchmaker A: succeeds



Watchmaker B: goes bankrupt



# Two approaches in building a clock...



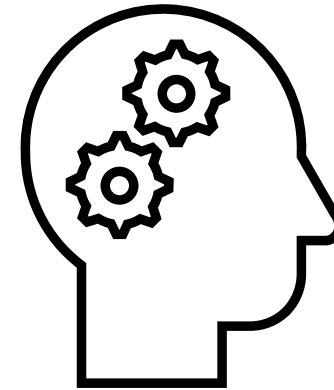
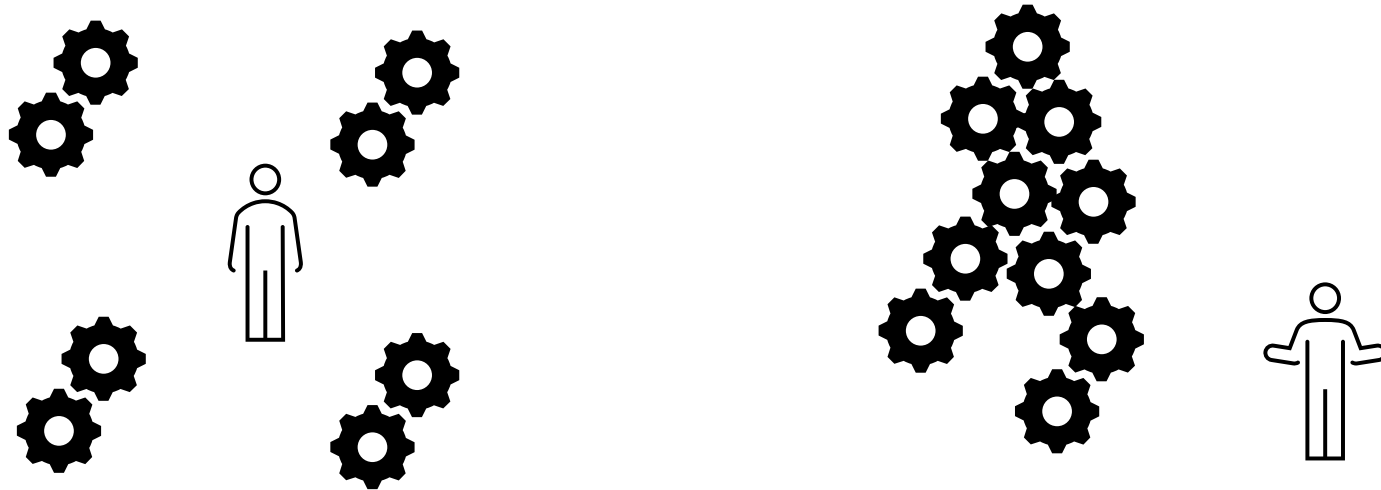
# Bounded rationality



Herbert A. Simon (1916 – 2001)

In 1978 he was awarded the Nobel prize for *his pioneering research into the decision-making process within economic organizations.*

# Two approaches in building a clock...



Boundedly rational agents experience limits in formulating and solving complex problems and in processing (receiving, storing, retrieving, transmitting) information *Herbert A. Simon (1957)*

# Bounded rationality research today

Max Planck Institute for Human Development, Berlin/ Centre for Adaptive rationality



# Bounded rationality



Herbert A. Simon (1916 – 2001)

Introduces bounded rationality

Nobel Prize in Economics, 1978

Simon's critique of the homo economicus was largely ignored. Yet, he inspired some other economists who would later push the boundaries of behavioral economics.

In his 1991 autobiography he writes: *My economist friends have long since given up on me, consigning me to psychology or some distant wasteland.*

One reason his criticism was largely ignored:

Where is the evidence that the models of rational choice fail?



# Heuristics and biases: Amos Tversky and Daniel Kahneman

Kahneman and Tversky provided overwhelming evidence that the *assumptions* of the standard economic model are flawed.

- Cognitive bias – people make systematic mistakes (see the Bill Problem)
- **Prospect Theory**
  - Reference points. Losses loom larger than gains: status quo bias, bronze medalists happier than silver, ending up with EUR50 from EUR100 is worse than just receiving EUR50, etc...
  - Probability weighting: Rare events are overweighted – likely events are underweighted: buy lottery (risk seeking) and insurance (risk averse)



# Cognitive bias



Amos Tversky (1937 – 1996)

Daniel Kahneman (1934 – 2024)

In 2002 Kahneman was awarded the Nobel prize for *having integrated insights from psychological research into economic science, especially concerning human judgment and decision-making under uncertainty.*

# Cognitive bias



Amos Tversky (1937 – 1996)

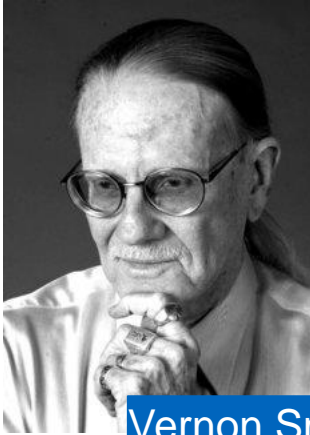
Daniel Kahneman (1934 – 2024)

In 2002 Kahneman was awarded the Nobel prize for *having integrated insights from psychological research into economic science, especially concerning human judgment and decision-making under uncertainty.*

Okay, obviously people are not like the homo economicus.

But does this mean that the standard theory is not a good predictor for aggregate behavior?

# Market works



Vernon Smith (1927-)

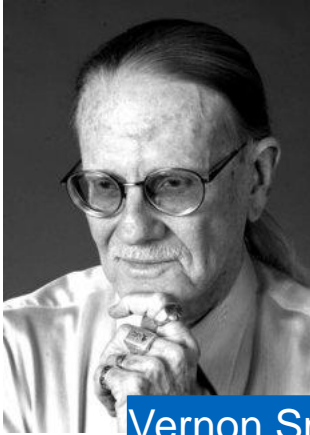
Nobel Prize in Economics, 2002

Pioneer of Experimental Economics

In a pioneering series of experiments, beginning in the 1950s, Vernon Smith studied markets in the experimental lab.

He found that markets work! The *predictions* of the standard economic model hold true.

# Market works



Vernon Smith (1927 - )

Nobel Prize in Economics, 2002

Pioneer of Experimental Economics

In 2002, the alongside Kahneman, Smith was awarded the Nobel prize *or having established laboratory experiments as a tool in empirical economic analysis, especially in the study of alternative market mechanisms.*

# But what if we have multiple equilibria?



Reinhard Selten (1930 - 2016)

Nobel Prize in Economics, 1994

Pioneer of Game Theory

- Spieltheoretische Behandlung eines Oligopolmodells (1965)

Pioneer of Experimental Economics

- Ein Oligopolexperiment (1959)

But what if the standard economic model of rational choice doesn't make a prediction?

Game theory showed that this possibility is all too common – we get multiple equilibria.

Which equilibrium 'to choose'?

Reinhard Selten worked among other things on equilibrium selection.

# But what if we have multiple equilibria?



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- Ein Oligopolexperiment (1959)

Selten considered himself a methodological dualist working on:

Normative Theories, in which subjects are presumed completely rational

Descriptive Theories, explain observed boundedly rational behavior. Construct positive theories which better described and predicted behavior than traditional theory.

# But what if we have multiple equilibria?



Reinhard Selten (1930 - 2016)

Nobel Prize in Economics, 1994

Pioneer of Game Theory

- Spieltheoretische Behandlung eines Oligopolmodells (1965)

Pioneer of Experimental Economics

- Ein Oligopolexperiment (1959)

In 1994, the alongside John F. Nash, Jr., and John C. Harsanyi, Selten was awarded the Nobel prize *for refining the Nash equilibrium concept for analyzing dynamic strategic interaction by getting rid of unlikely equilibria. He also applied the refined concept to analyses of oligopolistic competition.*

He introduced the concept of the subgame perfect equilibrium.



# But what if we have multiple equilibria?



Reinhard Selten (1930 - 2016)

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*[...] more and more I came to the conclusion that [...] the structure of [...] economic behavior cannot be invented in the armchair, it must be explored experimentally'*  
(Selten, 1994)

# Nudge and behavior change



Richard H. Thaler (1945 - )

Nobel Prize in Economics, 2017

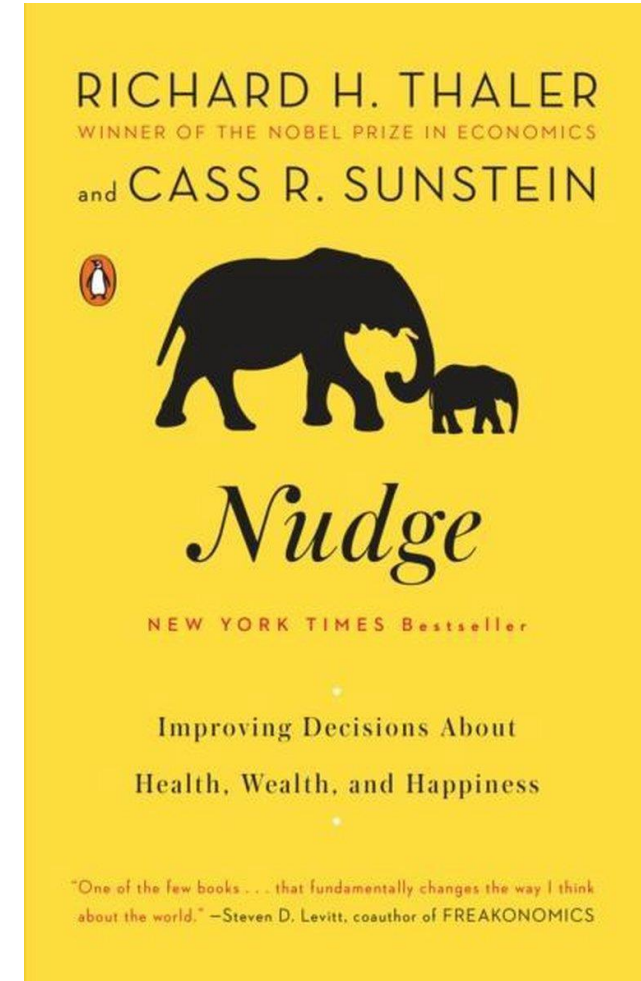
Collaborator of Kahneman and Tversky

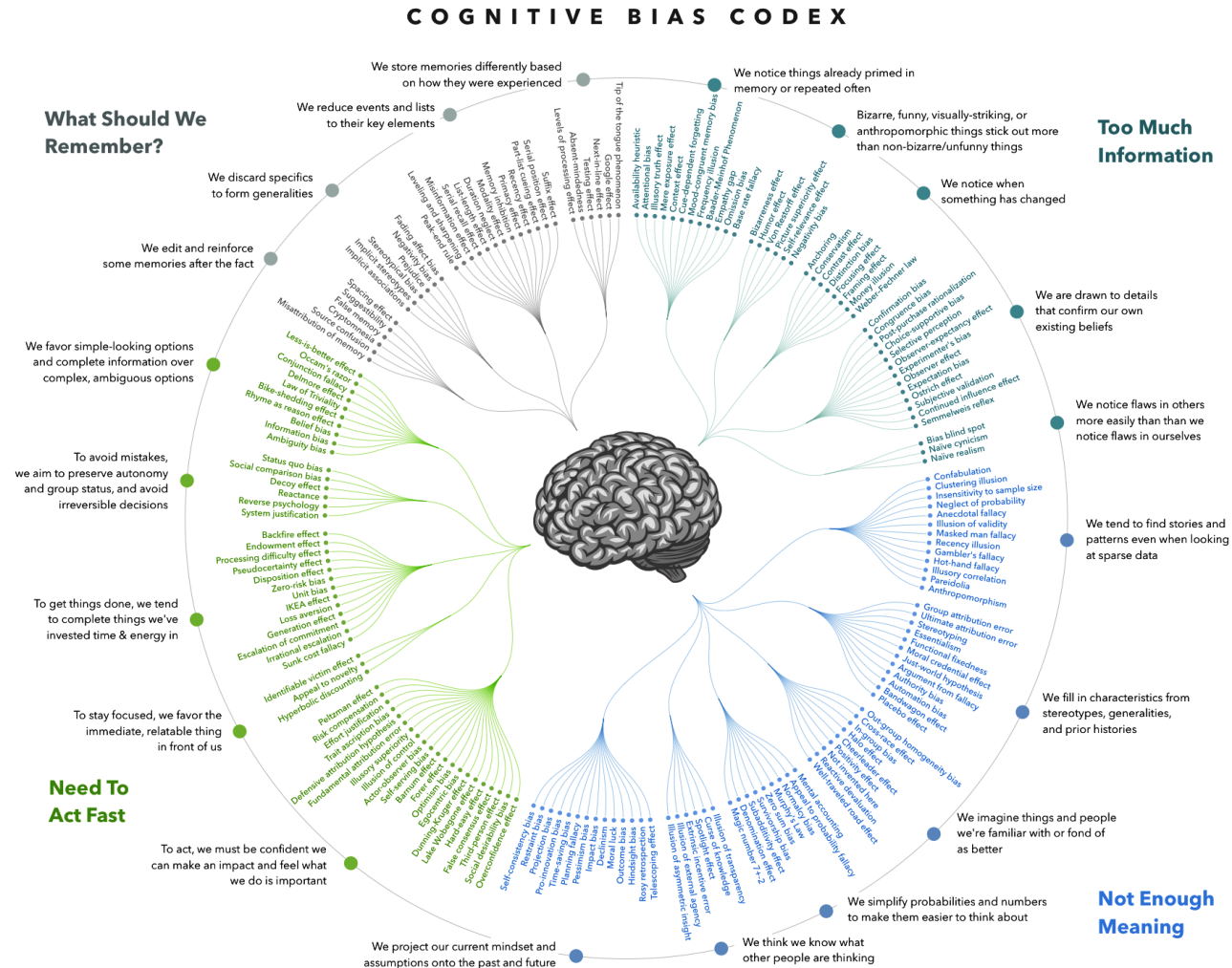
In 2017, Thaler was awarded the Nobel prize *for his contributions to behavioural economics*.

While Kahneman and Tversky are psychologists, Thaler is actually an economist  
Demonstrated many biases in economic decision making  
To the public, he is probably best known for book with Cass Sunstein on Nudges

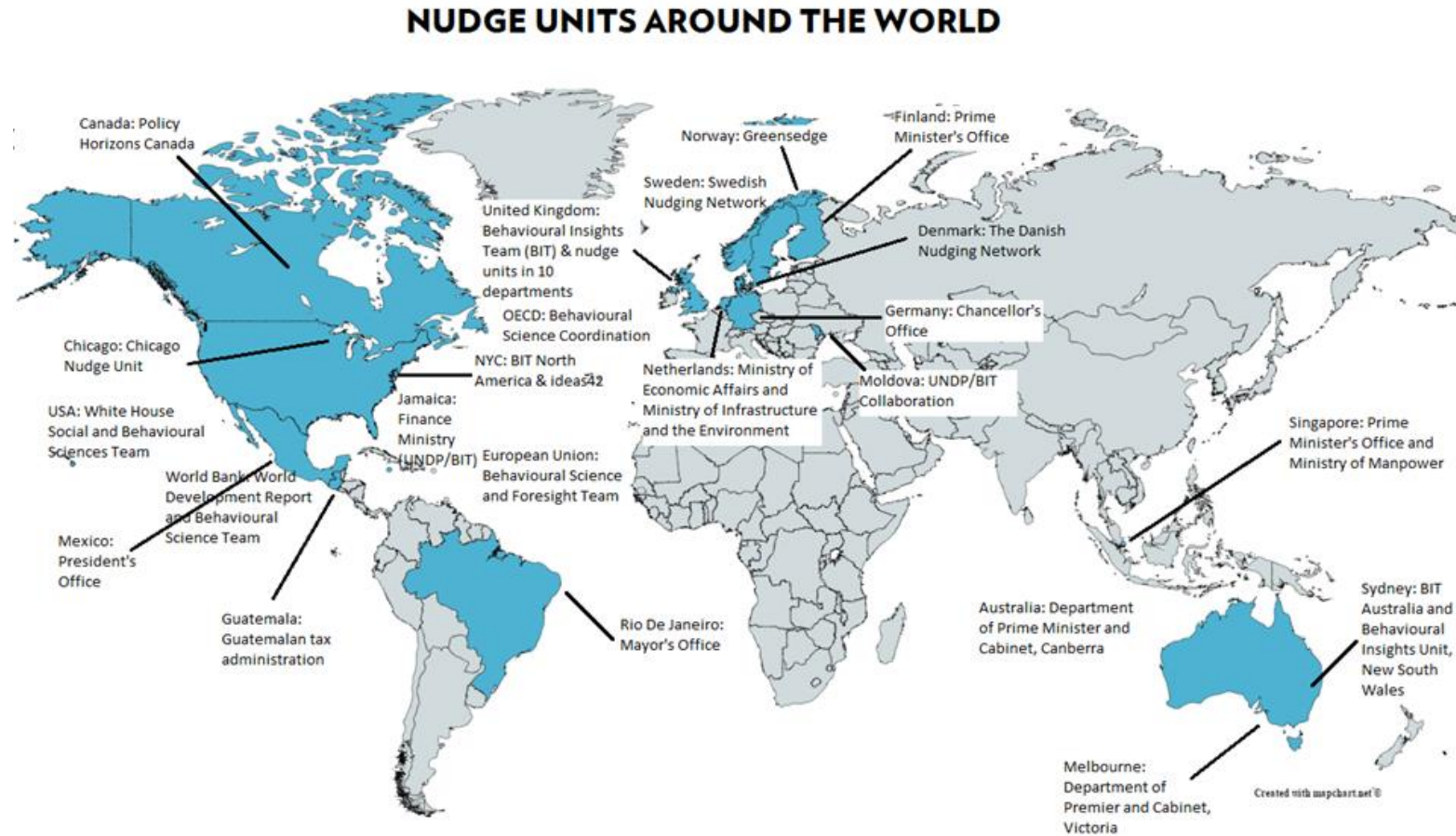
# Use knowledge as a “force for good” (examples)

Nudge: *any aspect of the **choice architecture** that alters people's behavior in a **predictable** way **without** forbidding any options or **significantly changing their economic incentives**. To count as a mere nudge, the intervention must be easy and cheap to avoid. Nudges are not mandates. Putting fruit at eye level counts as a nudge. Banning junk food does not.*





# Behavioral insights teams and nudge units



Source: Behavioural Insights Team, UK.





# Policies that work

## The Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel 2019



Ill. Niklas Elmehed. © Nobel Media.  
**Abhijit Banerjee**  
Prize share: 1/3



Ill. Niklas Elmehed. © Nobel Media.  
**Esther Duflo**  
Prize share: 1/3

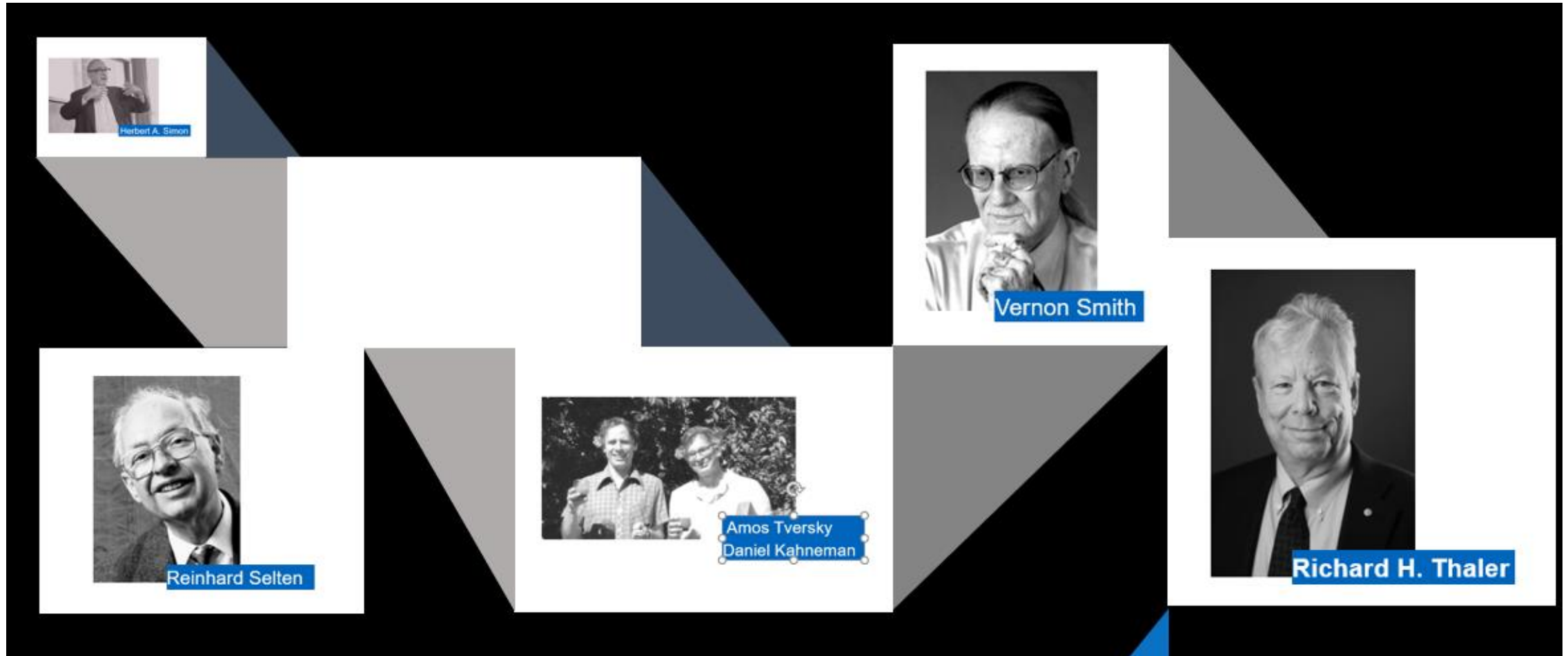


Ill. Niklas Elmehed. © Nobel Media.  
**Michael Kremer**  
Prize share: 1/3

The Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel 2019 was awarded jointly to Abhijit Banerjee, Esther Duflo and Michael Kremer "for their experimental approach to alleviating global poverty."

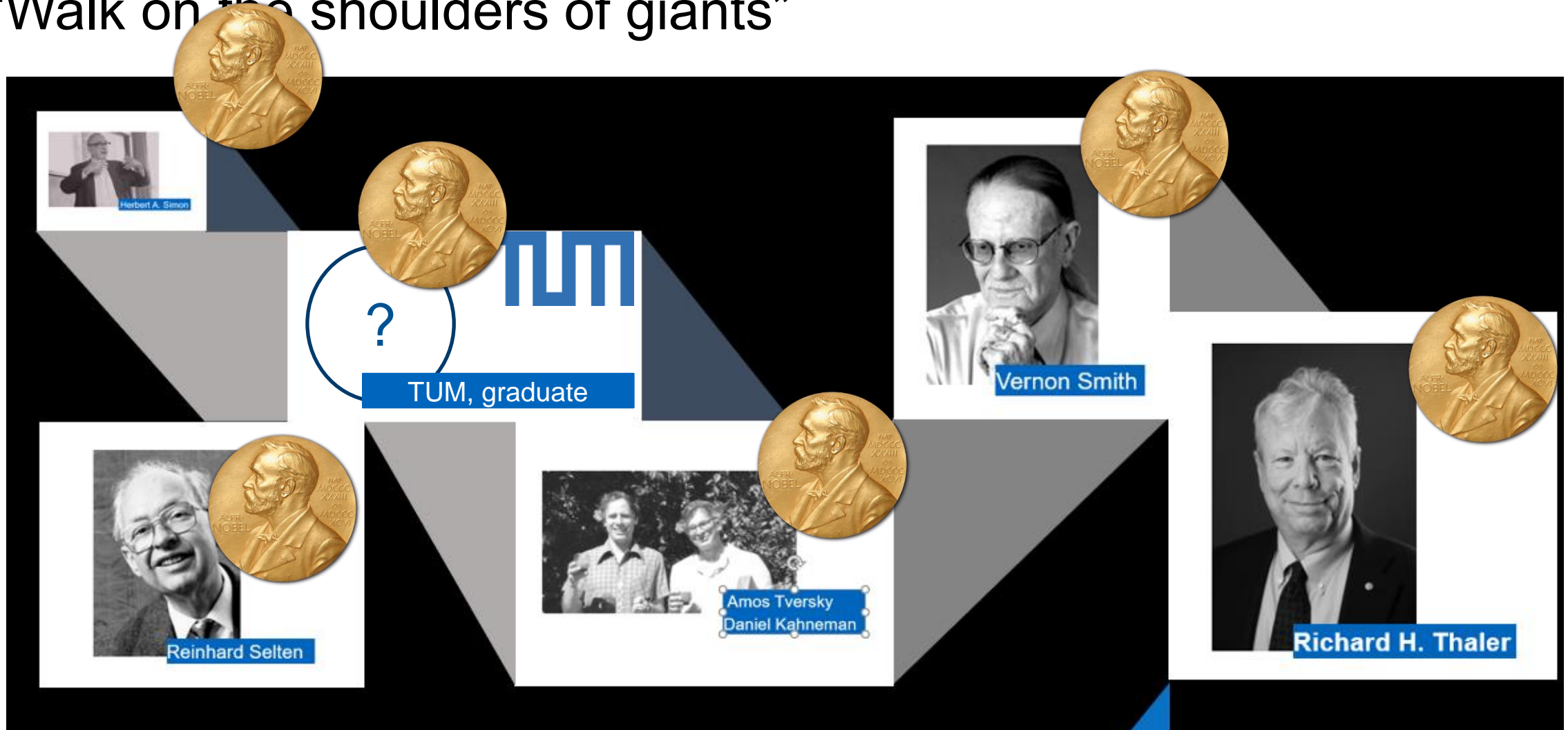
<https://www.nobelprize.org/prizes/economic-sciences/2019/summary/>  
<https://www.youtube.com/embed/opDIEvmlx4A>

# “Walk on the shoulders of giants”





# “Walk on the shoulders of giants”



# But first, some logistics

# Readings

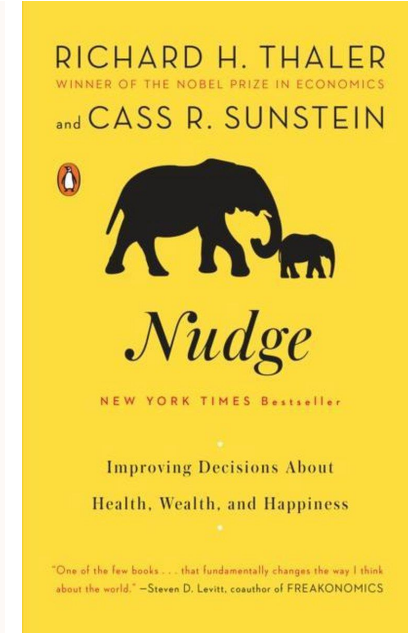
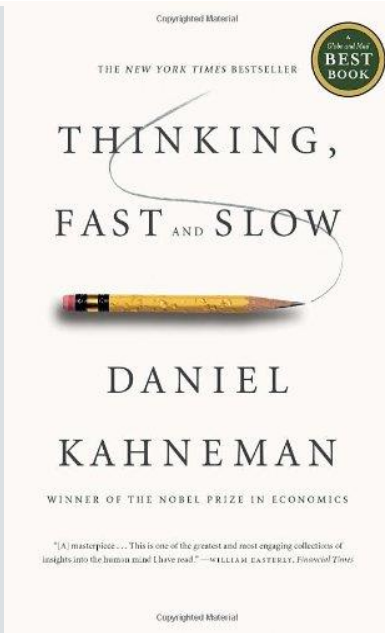
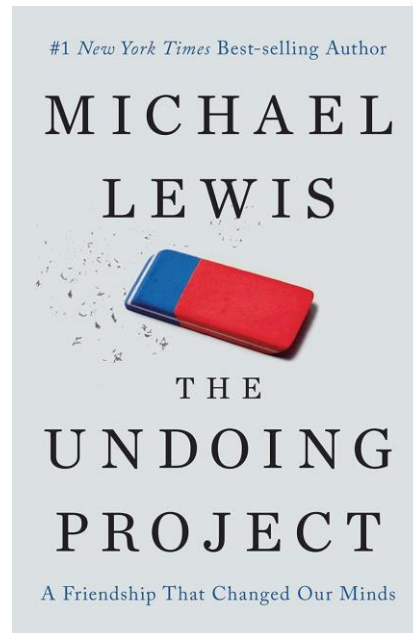
## Textbooks

**E. Cartwright (2018)** Behavioral Economics (3rd ed) Routledge Advanced Texts

## Academic Papers

**Will be announced in class and exercise**

## Popular Books



# Typical structure of a lecture

1. Discuss an aspect of behaviour through formal theory

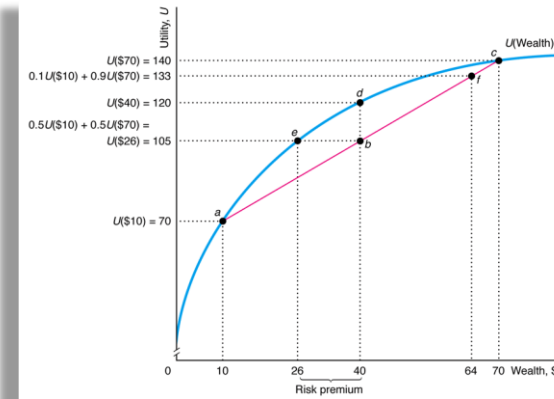
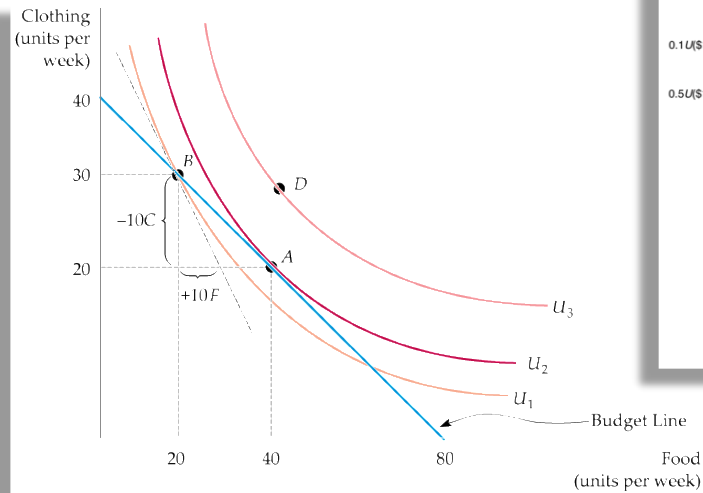
# Typical structure of a lecture

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  - Some lectures will be 'fun' – talk about cool experiments and findings offering intriguing insights into human behaviour

# Typical structure of a lecture

## 1. Discuss an aspect of behaviour through formal theory

- Some lectures will be ‘fun’ – talk about cool experiments and findings offering intriguing insights into human behaviour
- Other lectures will be... less fun...But necessary and useful!



$$MU_X = \frac{\Delta U}{\Delta X} = 4(0.5)X^{-0.5}Y^{0.5} = \frac{2Y^{0.5}}{X^{0.5}}$$

$$MU_Y = \frac{\Delta U}{\Delta Y} = \frac{2X^{0.5}}{Y^{0.5}}$$

1. Optimal Combination:  $MRS = \frac{p_X}{p_Y}$

$$MRS = \frac{MU_X}{MU_Y} = \frac{\frac{2Y^{0.5}}{X^{0.5}}}{\frac{2X^{0.5}}{Y^{0.5}}} = \frac{Y}{X}$$

$$MRS = \frac{p_X}{p_Y} \Rightarrow \frac{Y}{X} = \frac{25}{50}$$

$$\Rightarrow Y = 0.5X$$

2. On Budgetline:  $750 = 25X + 50Y$  substitute  $Y$  with  $0.5X$

$$\Rightarrow 750 = 25X + 0.5(50)X \Rightarrow X = 15$$

$$\Rightarrow Y = 7.5$$

Prospect	If $\gamma = 1$				If $\gamma = 0.67$			
	$w_1$	$w_2$	$w_3$	Utility	$w_1$	$w_2$	$w_3$	Utility
A	0.01	0.66	0.33	2409	0.088	0.577	0.334	2221
B	0	1	0	2400	0	1	0	2400
C	0.67	0	0.33	825	0.666	0	0.334	836
D	0.66	0.34	0	816	0.661	0.339	0	815

Increases the weight in small probabilities

Decreases the weight in large probabilities

# Typical structure of a lecture

1. Discuss an aspect of behaviour through formal theory
2. Present empirical challenge to formal theory
3. Introduce behavioural theory and how it explains the data better
4. Applications to management / policy / marketing ...
5. Applications to own decisions

# Typical structure of a lecture

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# Moodle

- All materials and communication will be organized on Moodle
- Use the discussion forum to ask questions and to get in touch with me and with your colleagues!
- You will get announcements when new material is uploaded as well as before in-person sessions.

# Final exam

- 60 Minutes
- a combination of theory (knowledge of concepts) and calculation (some math involved)
- Some multiple choice questions and some free-response ones
- not open book
- It will be in-person – date will be announced shortly.

## Questions?



**Additional resources**

<https://kopsacheilis.com>



**Contact**

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