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# A brief introduction to experimental economics vs. experimental psychology

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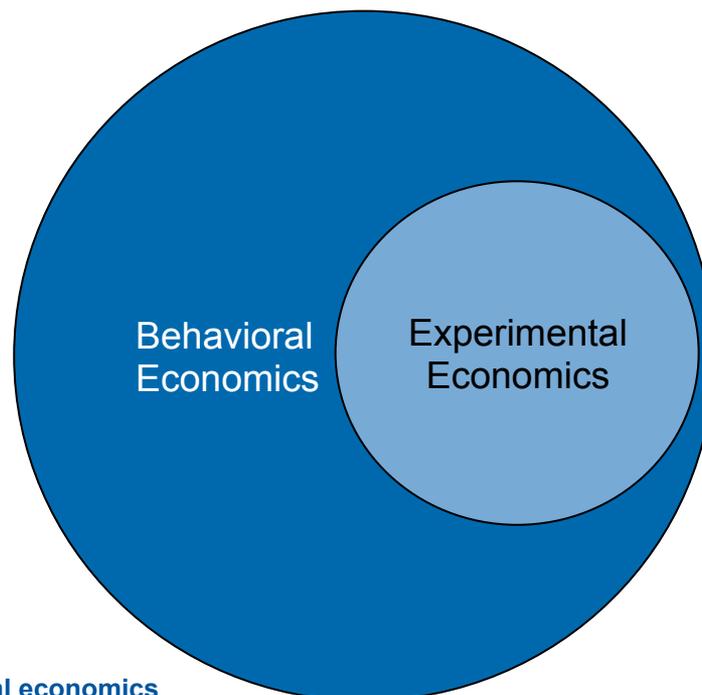
1. Experimental economics (vs. behavioural economics)
2. Economic games
3. Research practices in experimental economics (as compared to experimental psychology)





# Experimental economics vs. behavioural economics

- **Behavioural economics:** Effects of social, cognitive, and emotional factors on perceptions and decisions in economic settings  
(= game theory + psychology)
- **Experimental economics:** Application of experimental methods to study behavioural economics



# Investigating economic behaviour with economic games



- Creates a simplified, well-defined model of real-life situation of interest
- Captures the essential features of and excludes nonessential details
- Illuminates the functional bases of motivational and behavioural processes that take place in the situation of interest
- Objective measure: in a behaviourist fashion, the observable behaviour itself serves as the variable of interest
- Mathematical formalisation allows for theory-based point predictions: equilibrium solutions
- Facilitates interdisciplinary exchange

(see e.g., Handgraaf & Raaij, 2005 *J. Econ. Psychol.*; Murningham & Wang, 2016 *Organiz. Behav. Hum. Decis. Proc.*; Thielmann, Böhm, Ott & Hilbig, in prep.)

# What is an “economic game”?



- Interaction between **players**, each with an individual set of **strategies**, corresponding to **payoffs**
- Payoffs can be ranked based on the utility they provide to the players
- **Rational** behaviour: utility-maximising behaviour considering also the other player(s) strategies (assuming that others are utility-maximisers as well)
- Prominent theoretical accounts that link utility to behaviour:
  - Game Theory (von Neumann & Morgenstern, 1944)
  - Interdependence Theory (Kelley & Thibaut, 1978)

# What is an “economic game”?



## ■ Example: Prisoner’s Dilemma Game

		Player 1	
		Cooperate	Defect
Player 2	Cooperate	2, 2	0, 3
	Defect	3, 0	1, 1

**Structural properties:**  
 $[D,C] > [C,C] > [D,D] > [C,D]$   
and  
 $[C,C] > ([D,C] + [C,D]) / 2$

# A taxonomy of games by player type



Opponent Actor	Nature	Individual	Unitary group	Non- cooperative group
Individual	I	I-I	I-U	I-G
Unitary group	U	U-I	U-U	U-G
Non- cooperative group	G	G-I	G-U	G-G

# Heterogeneity of motives in economic games



Game	Type	Structure	Motives underlying	
			Pro-social choice	Selfish choice
Dictator game	Constant-sum game	A dictator is asked to divide a fixed amount at will between herself and an unknown recipient.	Fairness, altruism	Greed, competitiveness
Ultimatum bargaining game (proposer)	Constant-sum game*	A proposer is asked to divide a fixed amount between herself and an unknown recipient. The recipient can, in turn, accept versus reject the proposer's offer.	Fairness, altruism, fear	Greed, competitiveness
Prisoner's dilemma game	Social dilemma	Two individuals decide whether to cooperate or defect. Mutual cooperation leads to the highest joint outcome; unilateral defection leads to the highest individual outcome.	Fairness, altruism, trust, social welfare	Greed, fear, competitiveness
Assurance game	Social dilemma	Two individuals decide whether to cooperate or defect (similar to the PDG). Mutual cooperation leads to the highest individual outcome.	Fairness, altruism, greed, trust, social welfare	Fear, competitiveness
Public goods game	Social dilemma	Group members are asked to contribute to a public good which is, in turn, multiplied by a factor larger than one and shared equally across all group members (irrespective of their individual contribution).	Fairness, altruism, trust, social welfare	Greed, fear, competitiveness
Common-pool resource dilemma game	Social dilemma	Group members decide how much to harvest from a shared resource. If the collective consumption exceeds the size (and reproduction rate) of the resource, it gets depleted.	Fairness, altruism, trust, social welfare	Greed, fear, competitiveness
Trust game (trustor)	Social dilemma <sup>†</sup>	A trustor decides how to divide an endowment between herself and a trustee. The amount the trustor transfers is usually tripled and added to the trustee's earnings. As a response, the trustee can transfer any amount back to the trustor.	Fairness, altruism, greed, trust, social welfare	Fear, competitiveness

*Note:* Fairness:  $\min(|\text{own} - \text{other/s}|)$ ; altruism:  $\max(\text{other/s})$ ; trust: expectation that other/s play/s  $\min(\text{other/s})$ ,  $\min(\text{other/s} - \text{own})$ , or  $\max(\text{own})$ ; social welfare:  $\max(\text{own} + \text{other/s})$ ; greed:  $\max(\text{own})$ ; fear: expectation that other/s play/s  $\max(\text{other/s})$ ,  $\max(\text{other/s} - \text{own})$ , or  $\min(\text{own})$ ; competitiveness:  $\max(\text{own} - \text{other/s})$ .

\*The UBG is a special case of a constant-sum game given that the payoff for both players can be 0 (if the recipient rejects the offer). However, for the proposer, the different strategies lead to a constant sum of payoffs.

<sup>†</sup>The TG is a social dilemma from the perspective of the trustor, and a constant-sum game from the perspective of the trustee.

# Examples of settings economic games are applied to

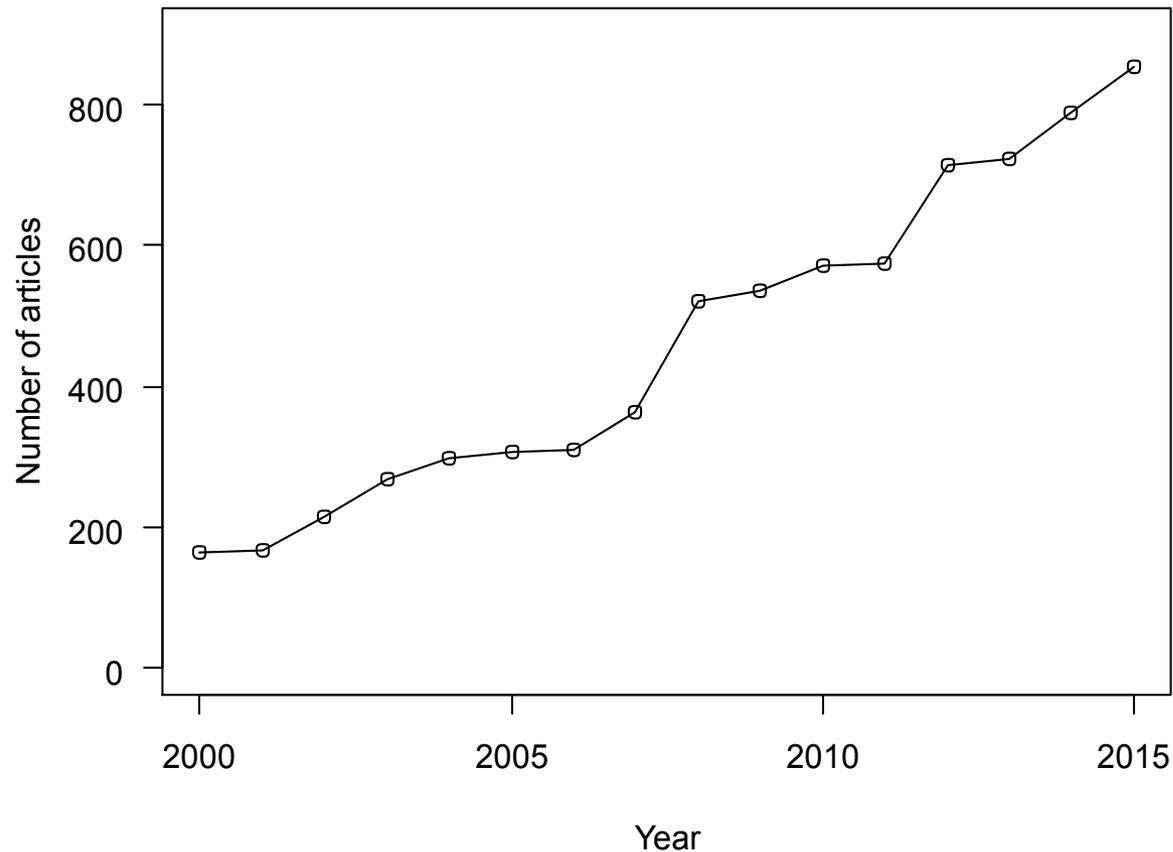


- Vaccination behaviour (e.g., Betsch, Böhm, Korn & Holtmann, 2017 *Nat. Hum. Behav.*; Böhm, Betsch & Korn, 2016 *J. Econ. Behav. Organ.*; Chapman et al., 2012 *Psychol. Sci.*)
- Tax compliance (e.g., Graetz, Reinganum & Wilde, 1986 *J. Law Econ. Organ.*; Kirchler, Hoelzl & Wahl, 2008 *J. Econ. Psychol.*)
- Intergroup conflict (e.g., Böhm, Rusch & Gürer, 2016 *Evol. Hum. Behav.*; De Dreu et al., 2016 *PNAS*; Halevy, Bornstein & Sagiv, 2008 *Psychol. Sci.*; Weisel & Böhm, 2015 *J. Exp. Soc. Psychol.*)
- Specific forms of antisocial behaviour, e.g., corruption (e.g., Barr & Serra, 2009 *J. Pub. Econ.*) and sabotage (e.g., Irlenbusch & Harbring, 2011 *Managm. Sci.*)
- Development of social preferences in childhood (e.g., Blake, Rand, Tingley & Warneken, 2015 *Sci. Rep.*; Buttelmann & Böhm, 2014 *Psychol. Sci.*, Jordan, McAuliffe & Warneken, 2014 *PNAS*)

# Experimental games in psychological research



Search at *PsycInfo* database: (dilemma OR "social dilemma" OR game\*) AND (economic OR "public good\*" OR prisoner\* OR "common good\*" OR commons OR dictator OR ultimatum OR bargaining OR give-some OR take-some OR trust OR intergroup OR "resource allocation") NOT "video game\*\*"



# Research practices in experimental economics vs. experimental psychology



- Participants are uncertain what we (the experimenters) want from them

“The objects of study in our experiments (i.e., people) have desires, goals, presuppositions, and beliefs about what it is we wish to find out. Only when it is explicitly clear that what we are seeking is maximal performance [...] can we even safely assume that our interpretation of the experimental situation corresponds to that of our subjects [...] Even then, however, we may not be able to [...] ‘control for’ factors that are not those we are investigating.”

(Dawes, 1996, p. 20 *Behav. Brain Sci.*)

- Differences in the degree to which we reduce this uncertainty may affect the reliability and thus, lead to different results
- Arguably, experimental economists is more concerned about this issue than experimental (behavioural) psychologists
  - 89% (*Americ. Econ. Rev. & Quart. J. Econ.*, 18 studies; Camerer et al., 2016 *Science*) VS. 34% (*J. Personal. Soc. Psychol.*, 31 studies; Nosek et al., 2015 *Science*) of replicated effects lie in the 95% prediction interval

# Research practices in experimental economics vs. experimental psychology



- Main differences in research practices of experimental economics vs. experimental psychology regarding (Hertwig & Ortmann, 2001 *Behav. Brain Sci.*)
  - Script enactment
  - Repeated trials
  - Financial incentives
  - Use of deception



- Elaborate and transparent information about the “rules” of the economic game, i.e., players, strategies, and payoffs (*common knowledge*, often secured by reading the instructions aloud) → conscious participation
- If the script is not clear to participants, they are more likely to be influenced by situational cues to infer the sense of the situation (“ad-libbing”)
- Scripts may be content-free or enriched with social context
- Does it matter?
  - Rate of correct solutions in the Wason selection task depends on the role participants are cued in, e.g., finding out about the causal consequences of overtime hours differs between participants in the role of employers vs. employees  
(Ortmann & Gigerenzer, 1997 *J. Inst. Theoretic. Econ.*)



- Many (but not all) economic experiments investigate repeated trials of the same behavioural choice instead of one-shot trials
  - Particularly important with more complex economic games
  - Alternative: entry comprehension questions
  
- Rationale is to increase external validity:
  - most economic decisions are made repeatedly, therefore, individuals adapt from experience
  - Individuals are not used to the laboratory situation and are prone to make decision errors, which they would not make in real-life settings
  
- Does it matter?
  - Base rate fallacy (Kahneman & Tversky, 1973 *Psychol. Rev.*) disappears if participants make repeated decisions with feedback (e.g., Harrison, 1994 *Empir. Econ.*)



- Between 1970 and 1997, not a single experiment was published in *Americ. Econ. Rev.*, in which participants were not paid according to performance (Camerer & Hogarth, 1999 *J. Risk Uncert.*)
- Among the experiments published in *J. Behav. Decis. Mak.* between 1988 and 1997, only 48% used financial incentives (22% if papers are excluded with at least one author who is an economist/affiliated with an economics department) (Hertwig & Ortmann, 2001 *Behav. Brain Sci.*)

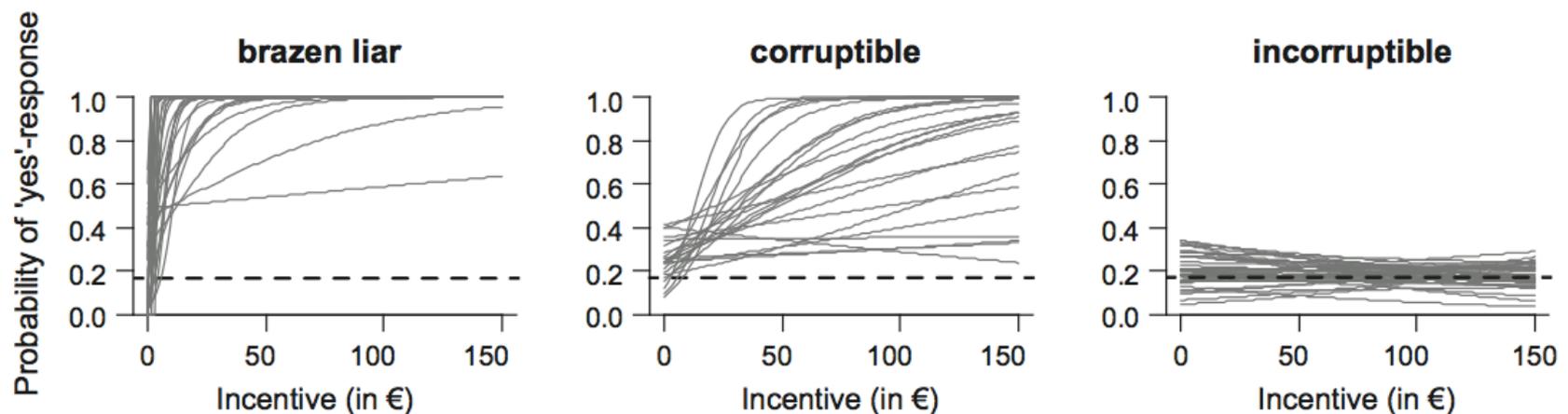
“[...] the question of actual versus hypothetical choices has become one of the fault lines that have come to distinguish experiments published in the economics journals from those published in psychology journals [...]”

(Roth, 1995, p.86 *The handbook of experimental economics*)



- Performance-based financial incentives: Varying payment of participants based on their behavioural choices
  - Incentive compatibility: behaviour in line with the participant's preference maximizes the participant's payoff
  
- Random-lottery incentive scheme: incentive compatibility *in expectation*
  - Lottery among repeated trials
  - Lottery among participants
  
- Why financial incentives?
  - Reduce performance variability
  - Money: universal exchange unit with little satiation
  - Real-world economic decisions are in fact (often) about (the maximization of) money

- Does it matter?
  - On average “performance” goes up, social desirable responding goes down (e.g., Camerer & Hogarth, 1999 *J. Risk Uncert.*; Harrison & Rutstroem, 2001 *Handb. Exp. Econ.*; Hertwig & Ortmann, 2001 *Behav. Brain Sci.*; Mellers, Berretty & Birnbaum, 1995 *J. Behav. Dec. Mak.*)
  - But: Motivational crowding-out (“pay enough or don’t pay at all”; Gneezy & Rusticini, 2000 *Quart. J. Econ.*)
  - Differences between experimental tasks
  - Differences between individuals





## ■ Practical issues:

### **Lab vs. online experiments vs. (lab-into-)field experiments**

- Lab experiments require large number of (connected) cubicles, which allow live matching of interaction partners with feedback over trials
- Online experiments are typically one-shot with ex post matching of interaction partners, however, new software solution allows live online matching, e.g., o-Tree, BoX, Sophie
- (lab-into-)field experiments become increasingly popular

### **Maximizing statistical power (while reducing costs)**

- “ $1/n$  matching”
- strategy method / strategy-vector method (Selten, 1975)
- beware: “cold” decision making, carry over effect



“The use of deception [in experiments] has become more and more extensive. [...] It is easy to view this problem with alarm, but it is much more difficult to formulate an unambiguous position on the problem.”

Kelman (1967)

- Telling participants objectively false things about the purpose or script of the experiment (or accepting that they have a false representations of these issues)
  - According to the APA Code of Conduct (APA, 2002) deception should be avoided if possible
  - If participants have to be deceived, they must be debriefed
  
- Deception should be avoided because
  - Of moral reasons
  - If participants anticipate to be deceived, increases suspiciousness and “second-guessing” → reduces experimental control



- Does it matter?
  - Negative emotions of participants after debriefing (e.g., Allen, 1983 *Psychol. Rep.* Finney, 1987 *J. Soc. Behav. Personal.*)
  - Negative evaluations of the experiment (stronger when evaluator was participant of the respective experiment) (Allen, 1983 *Psychol. Rep.*)
  - Negative effects are smaller if deception is announced ex ante (Christensen, 1977 *J. Personal. Soc. Psychol.*)
  - On the dependent variable, increases variance at a similar second task (Fillenbaum, 1966 *J. Personal. Soc. Psychol.*) or may even have clear negative effects (e.g., group identification and in-group favouritism smaller after deceptive vs. non-deceptive minimal group manipulation; Böhm & Botros, unpublished)



- Using economic games while considering the (high) standards of experimental economics may help to produce **replicable results**, which can be published in **top journals** and are likely to **acknowledged in other fields**
- Whereas script enactment and repeated trials allow some degrees of freedom depending on the particular research question, using **(financial) incentives** and **avoiding deception** appears reasonable and should be seen as “must do’s” when using economic games



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# Thank you for your attention!

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