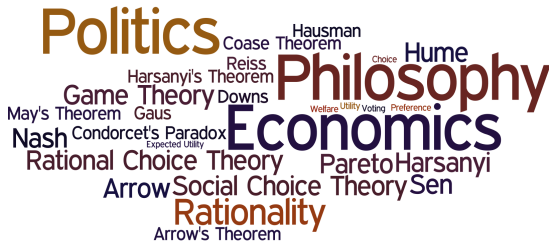


PHPE 400

Individual and Group Decision Making

Eric Pacuit
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pacuit.org



Ellsberg Paradox



Lotteries	30	60	
	Blue	Yellow	Green
L_1	1M	0	0
L_2	0	1M	0

Ellsberg Paradox



Lotteries	30	60	
	Blue	Yellow	Green
L_3	1M	0	1M
L_4	0	1M	1M

$$L_1 \ R \ L_2 \text{ if and only if } L_3 \ R \ L_4$$

Let r be any integer between 30 and 60 (i.e., $30 \leq r \leq 60$) and $q = 90 - 30 - r$

$$\left(\frac{30}{90} \cdot 1M + \frac{r}{90} \cdot 0M + \frac{q}{90} \cdot 0M\right) \quad P \quad \left(\frac{30}{90} \cdot 0M + \frac{r}{90} \cdot 1M + \frac{q}{90} \cdot 0M\right)$$

iff

$$\frac{30+r}{90} \cdot \left(\frac{30}{30+r} \cdot 1M + \frac{r}{30+r} \cdot 0M\right) + \frac{q}{90} \cdot 0M \quad P \quad \frac{30+r}{90} \cdot \left(\frac{30}{30+r} \cdot 0M + \frac{r}{30+r} \cdot 1M\right) + \frac{q}{90} \cdot 0M$$

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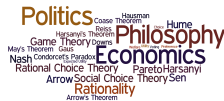
iff

$$\frac{30+r}{90} \cdot \left(\frac{30}{30+r} \cdot 1M + \frac{r}{30+r} \cdot 0M\right) + \frac{q}{90} \cdot 1M \quad P \quad \frac{30+r}{90} \cdot \left(\frac{30}{30+r} \cdot 0M + \frac{r}{30+r} \cdot 1M\right) + \frac{q}{90} \cdot 1M$$

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$$\left(\frac{30}{90} \cdot 1M + \frac{r}{90} \cdot 0M + \frac{q}{90} \cdot 1M\right) \quad P \quad \left(\frac{30}{90} \cdot 0M + \frac{r}{90} \cdot 1M + \frac{q}{90} \cdot 1M\right)$$

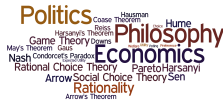
Ambiguity Aversion



I. Gilboa and M. Marinacci. *Ambiguity and the Bayesian Paradigm*. Advances in Economics and Econometrics: Theory and Applications, Tenth World Congress of the Econometric Society. D. Acemoglu, M. Arellano, and E. Dekel (Eds.). New York: Cambridge University Press, 2013.

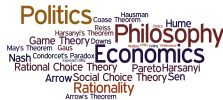
Flipping a fair coin vs. flipping a coin of unknown bias

Evaluating Rational Choice Axioms



What should we make of the patterns found by psychologists and behavioral economists? Are these descriptive issues relevant for decision theory or rational choice theory?

Evaluating Rational Choice Axioms

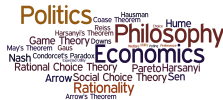


What should we make of the patterns found by psychologists and behavioral economists? Are these descriptive issues relevant for decision theory or rational choice theory?

Any apparent violation of an axiom of the theory can always be interpreted in three different ways:

1. the subjects' preferences *genuinely* violate the axioms of the theory;

Evaluating Rational Choice Axioms

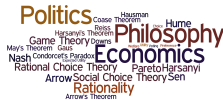


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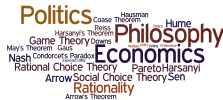


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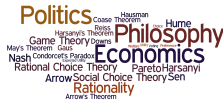
1. the subjects' preferences *genuinely* violate the axioms of the theory;
2. the subjects' preferences have changed during the course of the experiment;
3. the experimenter has overlooked a relevant feature of the context that affects the subjects' preferences.

Recommending Behavior



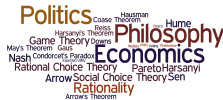
- On the one hand, the fact that many people have faulty reasoning about probabilities or deviate from EU theory does not mean that the theories are wrong (Hume's Law: *is* **does not** imply *can*). It could simply be that people are not naturally good at all kinds of reasoning, which is part of the reason why we study rational choice in the first place.

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- ▶ On the other hand, *ought* **does** imply *can*, meaning that if we're going to say that people should follow EU theory, it needs to be possible that they actually do so.
- ▶ The question then becomes, 'Can people consistently follow EU theory? If not, when and why not?'

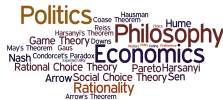
Explaining/Predicting Behavior



Stability: Individuals' preferences are stable over the period of the investigation.

Invariance: Individuals' preferences are invariant to irrelevant changes in the context of making the decision.

A Dilemma

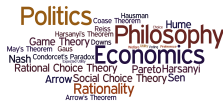


Rational choice theory faces a fundamental dilemma:

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Rational choice theory faces a fundamental dilemma:

1. Only assume the formal axioms (completeness, transitivity, independence, etc.) without assuming stability or invariance. However, this makes the theory ineffective for explanatory and predictive purposes, as preferences may constantly change or be context-dependent.
2. Alternatively, economists might assume stability and invariance, but this would transform rational choice theory into a substantive framework shaped by assumptions that reflect *the economist's* perspective.

Suppose you have a kitten, which you plan to give away to either Ann or Bob. Ann and Bob both want the kitten very much. Both are deserving, and both would care for the kitten. You are sure that giving the kitten to Ann (x) is at least as good as giving the kitten to Bob (y) (so either $x P y$ or $x I y$). But you think that would be unfair to Bob. You decide to flip a fair coin: if the coin lands heads, you will give the kitten to Bob, and if it lands tails, you will give the kitten to Ann.

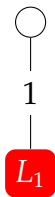
(J. Drier, "Morality and Decision Theory" in *Handbook of Rationality*)

If $L_1 P L_2$, then for all $0 \leq p < 1$,

$$(1 \cdot L_1) P (p \cdot L_1 + (1 - p) \cdot L_2)$$

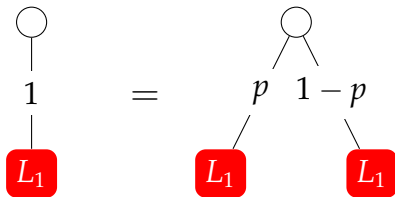
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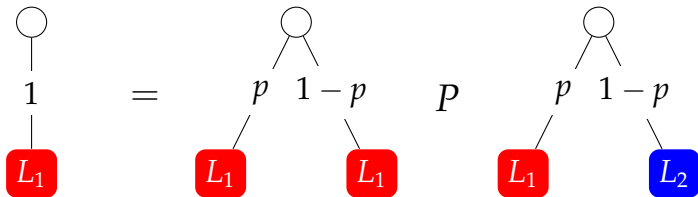
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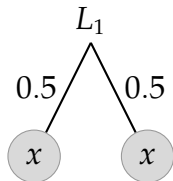


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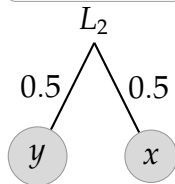
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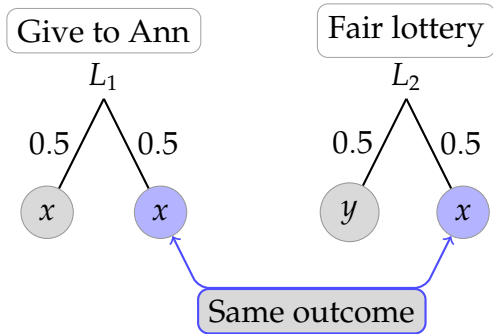
Give to Ann



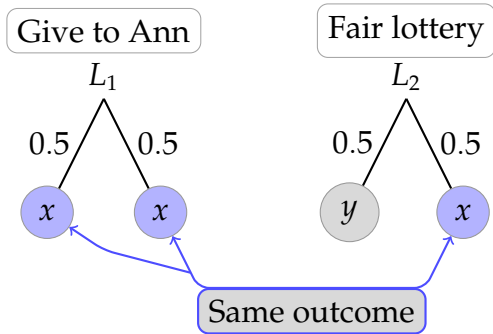
Fair lottery



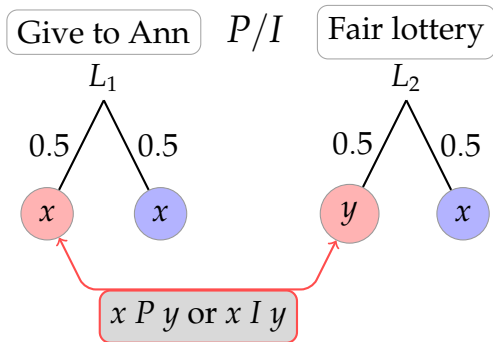
- ▶ x is the outcome “Ann gets the kitten”
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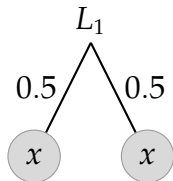


- x is the outcome “Ann gets the kitten”
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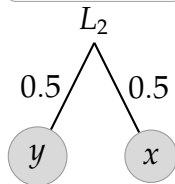


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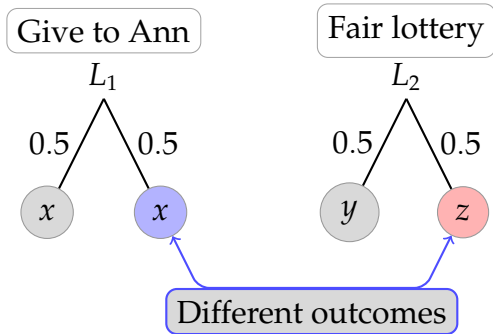
Give to Ann



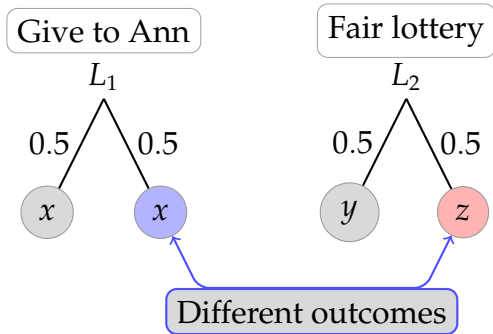
Fair lottery



- ▶ x is the outcome “Ann gets the kitten, *in a fair way*”
- ▶ y is the outcome “Bob gets the kitten”



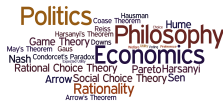
- ▶ x is the outcome “Ann gets the kitten”
- ▶ z is the outcome “Ann gets the outcome, *fairly*”
- ▶ y is the outcome “Bob gets the kitten, *fairly*”



If all the agent cares about is who gets the kitten, then $L_1 P L_2$

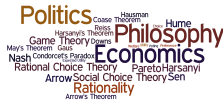
If all the agent cares about is being **fair**, then $L_2 P L_1$

Summary



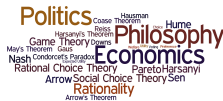
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Summary



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 - ▶ The principles of stability or invariance are not satisfied.
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