

# Are Economics Laws Compatible with Free Will?

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# Outline

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- Neuroeconomics
- Free will and predictability

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## Edgeworth's *hedonimeter*

- Measure individual's utility gained from choices.
- Alas, no MRIs in the 19th century.



# Economics as a behavioral science

- Mostly deductive effort.
- Preferences = complete order over alternatives.
- Axiom: homo economicus chooses best alternative.
- Theorem: Complete order is equivalent to order of values from “utility function.”
- Theorem: Utility function can be backed out uniquely (modulo linear transformation) from individual’s actual choices.
  - Approximate estimation which becomes exact as the number of choice events converges to  $\infty$ .

# How economists treat data

- Utility function plus noise:  $U(i|d) + \epsilon$ .
  - $i$ : alternative
  - $d$ : observable individual characteristics
- Dual interpretation:
  - probability of choice
  - frequency of choice: law of large numbers
- Analogous (?) to classical mechanics v quantum physics.  
What does  $\epsilon$  stand for: free will, indeterminacy, or measurement error? Who cares?

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# Neuroeconomics

- Measure brain activity associated to choice.
- Look for correlation w.r.t. “utility mapping” backed out from revealed preference.

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- 85% don't really think about it.
- 5% think of neuroscience as a complement to classical model.

## Example: time preferences

- Choice between:
  - Case 1: (a) \$10 today and (b) \$20 tomorrow;
  - Case 2: (a) \$10 tomorrow and (b) \$20 day after tomorrow.
- Classic economics implies same choice (exponential discounting).
- Empirical evidence: (a) relatively more popular in Case 1 (hyperbolic discounting).
- Alternative theory: two selves in conflict:
  - “me” now
  - “me” a year from now.
- Glimcher's experiment:
  - same brain areas in Cases 1 and 2;
  - brain activity proportional to estimated utility.

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# Model complexity

- Commonly heard complaint:
  - Economics models' predictive power very weak, certainly by standards of classical mechanics.
  - Reason is humans are free, whereas particles are not.
- Claim: model complexity, not free will, accounts for most of unpredictability.

	Simple model	Complex model
Non-behavioral	lab experiment	weather, climate
Animal behavior	animal lab exp.	
Economic behavior	car purchases	global economy



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  - Very important at the personal level.
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- No theory of everything will emanate from physics alone.
- Science is not the only source of knowledge.
- Metaphysics is hot!