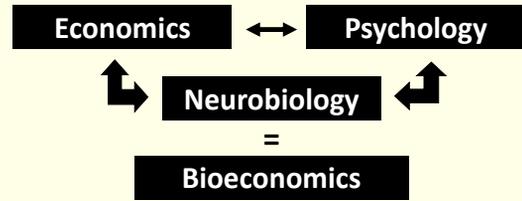


Bioeconomics & Decision Making (BDM)

CHEW Soo Hong

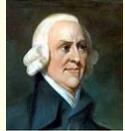
Experimental Economics II
SHUFE



- L1: Decision Making – Theory & Evidence
- L2: Neurobiology of Reward
- L3: Bioeconomics of Individual Decision Making
- L4: Bioeconomics of Social Decision Making

Classical Economics

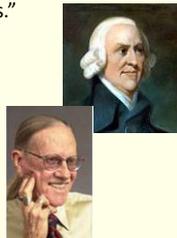
- Homo economicus
 - “It is not from the benevolence of the butcher the brewer, or the baker that we expect our dinner, but from their regard to their own interest. We address ourselves, not to their humanity, but to their self-love, and never talk to them of our own necessities, but of their advantages.” Adam Smith, *The Wealth of Nations*, 1776



4

Experimental Economics

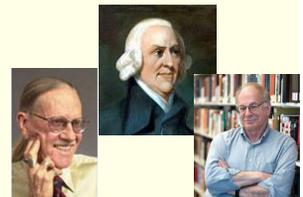
- Homo economicus
- Experimental economics: Lab-based validation
 - “for having established laboratory experiments as a tool in empirical analysis, especially in the study of alternative market mechanisms.”



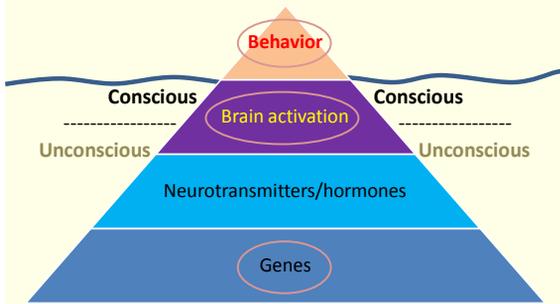
5

Behavioral Economics

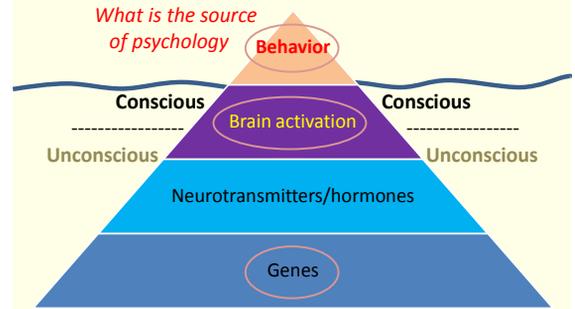
- Homo economicus
- Experimental economics
- Behavioral economics: Psychological considerations
 - “for having integrated insights from psychological research into economic science, especially concerning human judgment and decision-making under uncertainty.”



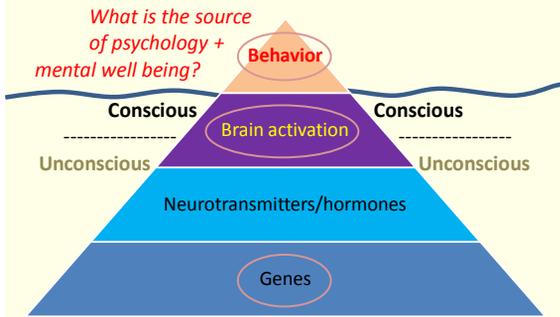
Decision Making Iceberg



Decision Making Iceberg



Decision Making Iceberg



Homo/Bio-Economicus

	Unbounded	Bounded
Consciousness	Full	Limited
• Attention • Encoding • Storage • Recall		• Admits possibility of fantasy & delusion
Computational Ability	Unbounded	Bounded
Preference-Choice Coherence	Complete	Limited
	• Only conscious choice	• Admits influence of the unconscious

Keynes' Take?

“Most, probably, of our decisions to do something positive, the full consequences of which will be drawn out over many days to come, can only be taken as the result of **animal spirits** – a spontaneous urge to action rather than inaction, and **not** as the outcome of a weighted average of quantitative benefits multiplied by quantitative probabilities”

General Theory, 1936

Damasio's Rejoinder to Keynes: *The Somatic Marker Hypothesis*

- Somatic states triggered by primary inducers via amygdala are fast, automatic, obligatory, without much thought/effort before one can figure out what happened.
- Somatic states influence decision making **nonconsciously** via brainstem and ventral striatum and **consciously** via higher cortical cognitive processing.
- **Hypothesis:** Somatic markers direct **attention** towards advantageous options, simplifying decision making.
- **Bottom line:** **Gut feeling** involving somatic markers inducing associated affective states – physiological and neural – can impact decision making!
– *Is this surprising?*

Aumann's (2005) musing re Consciousness

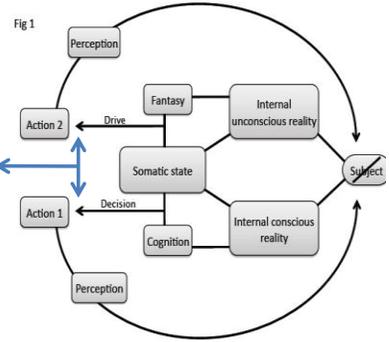
- **Ability to experience**
- **Completely subjective**, distinct other scientific phenomena.
- One can only observe one's own consciousness **and with certainty** not anybody else.
- Delusions, dreams, and ravings **experiences**, thus part of consciousness.
- **The last great frontier of science.**



Conscious

+ Decision

Nonconscious

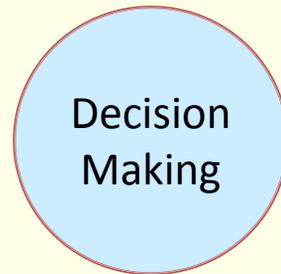


A Keynes-Ansermet-Magistretti Decision Making Schematic

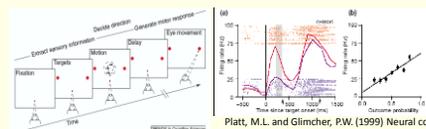
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Towards a Biological Science of Economic Decision Making

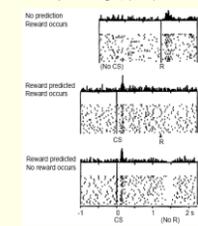


The brain encodes economic values

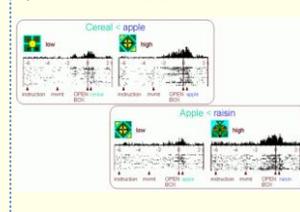


Platt, M.L. and Glimcher, P.W. (1999) Neural correlates of decision variables in parietal cortex. *Nature*.

Schultz-Dayan-Montague, (1997). *Science*



Tremblay, L. and Schultz, W. (1999). Relative reward preference in primate orbitofrontal cortex. *Nature*





The Economist

Do economists need brains?

Jul 24th 2008 | NEW YORK
From *The Economist* print edition

The Case for Mindless Economics

Faruk Gul
and
Wolfgang Pesendorfer

"Neuroscience evidence cannot refute economic models because the latter make no assumptions and draw no conclusions about the physiology of the brain. Conversely, brain science cannot revolutionize economics because the latter has no vehicle for addressing the concerns of economics."

Impossibility theorem



"I hesitate to say that men will ever have the means of measuring directly the feelings of the human heart. A unit of pleasure or of pain is difficult even to conceive; but it is the amount of these feelings which is continually prompting us to buying and selling, borrowing and lending, labouring and resting, producing and consuming; and it is from the quantitative effects of the feelings that we must estimate their comparative amounts."

William Jevons, 1871

Can we NOW measure the neural substrates of decisions?

YES

Bit of Decision Theory & Evidence