



Neuro - Probabilistic Functionalism Endoscopy in Brunswik's Lens Decisions

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Received: September 05, 2023

Published: September 18, 2023

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Introduction

- Convergence of neurosciences with psychology and economics
- Human decision making
- Types of decision-making situations
- Rational
- Bounded rationality
- Intuitive

Focus of the study

Motivation

- Daniel Kahneman
- The Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel 2002
- Born: 5 March 1934, Tel Aviv (Israel)
- Prize motivation: "for having integrated insights from psychological research into economic science, especially concerning human judgment and decision-making under uncertainty"
- Prospect theory
- Behavioural economics model that shows how people decide between alternatives that involve risk and uncertainty (e.g., % likelihood of gains or losses). It demonstrates that people think in terms of expected utility relative to a reference point rather than absolute outcomes.
- Developed by framing risky choices and indicates that people are loss-averse; since individuals dislike losses more than equivalent gains, they are more willing to take risks to avoid a loss.
- Kahneman, D. (2011). *Thinking, fast and slow*. London: Allen Lane.
- Kahneman, D., and Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica*, 47, 263-291.

Two systems of thinking.

Thinking fast

Fast, automatic, frequent, emotional, stereotypic, unconscious.

Thinking slow

Slow, effortful, infrequent, logical, calculating, conscious.

Heuristics and biases

We tend to associate new information with existing patterns or thoughts

Overconfidence

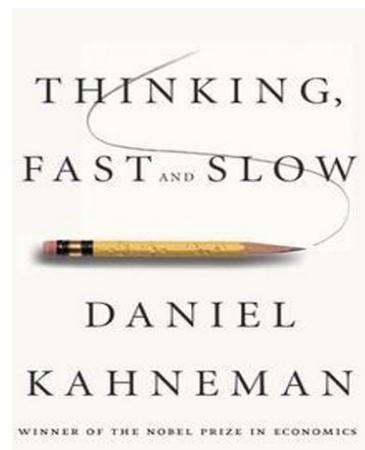
Choices

Based on reference points (frames)

Text Box

Experienced

Measured



The decision making environment

- VUCA (Volatility, Uncertainty, Complexity, and Ambiguity) has been succeeded by BANI (Brittle, Anxious, Non-linear, and Incomprehensible) (Jamais Cascio)
- Brittle-easy to shatter, prone to total and sudden failure.
- Anxious-having fear.
- Non-linear-Disconnection between cause and effect
- Incomprehensible – Extremely difficult to understand.

Brunswik Lens Model

- Brunswik Lens Model (1957) based on probabilistic functionalism (theory of perception)
- Behaviour is not based on “rule of one variable” but based on variety of stimuli received by a person.
- Multiple cues that are imperfectly correlated with each other and provide overlapping (correlated) information about the stimulus.
- The lens collects the information and refocuses it so that the perceptual system probabilistically “achieves” the correct percept.
- The Model depicts the relationship between living things and their environment.
- The two main tenets are:
- Representative Design, which means that any study includes ALL variables (or stimuli) ; and,
- Idiographic-statistical approach, which means using models as they exist in life instead of in isolated cases.
- By using the Lens Model, we get an understanding of the “how” of what’s going

Role of the brain in human decision making

Brain is truly a complex system

- We can understand brain to a certain extent at purely biological level, but we experience things as people and our thoughts control a great deal our lives. It would be interesting to know how thoughts are linked to physiology and general well-being.

Can we see what is happening in brain?

- Yes, we can, using imaging technology.
- What role is played by biological and physical mechanisms?
- Attempt to understand biological processes underlying decisions.

- Is it possible to construct mathematical models of biological processes in the brain, and create models that aid decisions? ‘New electroencephalographic (EEG) electromagnetic tomographic analysis (ETA) imaging techniques provide a mechanism for exploring decisions, while. Individual is directly engaged in everyday choice making, by exposing precognitive emotional responses to identified thoughts, feelings and actions’. Thomas Collura

Research Questions and Methodology

Research Questions

Firstly, how decision choices are explored?
Secondly, what part of brain aids decision?

Methodology

Combination of theoretical and experimental approaches

- Empirical exploration of brain wave activity through alpha waves to understand choice making under conditions of uncertainty and capacity to switch complex left-hemispheric thinking and explorative right-brain thinking
- Fluid intellect processes mapped via EEG to provide evidence of ‘exploratory’ and ‘geometric’ processes in fluid intellect
- Experimental sample of 03 respondents

Results

- Patterns observed amongst small sample
- Alpha activation shows repeatability and specificity in cognitive responses

Implications

- Output as contribution to investigative/behavioural research and computational economics
- Aim of expanding computational models and extension to business theories and applications
- Replication to complement and/or explain results
- Neuro Soundings, Neuro-Feedback, Brain Waves, EEG Waves and Choice Construction are ‘Pillars’ of data-driven platform that aid entrepreneurial decision making

Recommendations

- Need to extend theoretical and empirical fundamentals of behavioural economics / neuroeconomics, by means of lab-based studies by analyzing cognitive, affective, motivational factors underlying entrepreneurial decision making
- Need to assess underlying mechanisms of decision-making processes by means of fundamental tools : eye movements, heart rate or skin conductance to forecast decisions
- Need to meta-analyse role of neuroimaging, psychological and EEG/ERP, (event-related potential: measured brain response that is the direct result of a specific sensory, cognitive, or motor event). fMRI (Functional MRI is a type of MRI scan that can show which areas of your brain are most active).

Conclusion

- Alpha Wave analysis offers conceptual and philosophical framework to observe neural soundings in decision making
- The paper provides interdisciplinary insight to re-define neuroentrepreneurial decision making
- Employing mathematical models for brain dynamics and behaviour could significantly contribute to peep into orientation in brain
- Neuroscience is at inflection point to make groundbreaking progress in understanding of brain
- Brain mathematics needs to increasingly play central role and not.