Scalable - Vector Based Soundings in Neuro – Decisions

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Abstract

Mental events, however, distributed, provide the defining problems of the social sciences. What are our basic cognitive operations? How do we use them in judgment, economic decision, action, reason, choice, persuasion, and expression? Do economic decision makers know what they need to know? How do economic decision makers choose? What are the best incentives? When is judgment reliable? Can negotiation work? How do cognitive conceptual resources depend on social and cultural location? How do certain products of cognitive and conceptual systems come to be entrenched as shared knowledge and method?

Key Words: Brain Waves, Scalable - Vector Based EEG, Alpha Activation, Economic’ Algorithmic, Economic Decision, ECG and Behavioural Feedback

Introduction

In the fast and globalizing world, businesses and organizations face conditions requiring greater chaos, calamity, catastrophe, curiosity, creativity and complexity (C⁶) from entrepreneurs than that needed in even the relatively recent past. Rapidly changing technologies and emerging experimental-economic models have also converged in an intriguing digital wave creating yet further challenges and opportunities for entrepreneurs requiring innovative and genuine strategic thinking for success. In the contemporary world of business, conventional experimental-economic paradigms are being superseded by new thinking and approaches based on the understanding of C⁶. Two new developments have seen contributions from the behavioural and biological sciences that have, in turn, produced fresh theories and concepts, together with unique contributions to experimental methods. The recent expansion of experimental-entrepreneurial science has bridged what were previously contrasting fields into a single, unified discipline within which C⁶ conditions may be resolved. However, choice making involving C⁶ conditions cannot be undertaken as a matter of course, namely, the adoption or replication of pattern-based logics: a simple exercise that is repeated over and over. Simple replication logics are inadequate for such rapid and holistic internal organizational and external environmental changes. Consequently, there is a need to understand the chessboard like dynamic conditions matrix to reveal the experimental-entrepreneurial mechanisms producing fluid intellect, or the lack thereof: the ability to reason and solve new problems independently of previously acquired knowledge.

Economic decision-making is critical. What typifies the notion of causality in the sciences of mind and brain? Are dissimilar notions a prerequisite for different experimental approaches? Are there variances in notions that are explicitly and implicitly presumed? What counts as causal evidence in entrepreneurial economic decision sciences? What role is played by information and physical mechanisms in identifying causal claims of entrepreneurial sciences of mind and brain? The foundation of stimulus has been neuro-entrepreneurial economic decision explorations (merger of philosophies from cognitive science and management). Neuro-entrepreneurial economic decision-making has arisen as an interdisciplinary determination to bridge this gap. Extension of neuro entrepreneurial management sciences counterparts advance of cognitive science. The interface between entrepreneurial business and brain sciences is not smooth with misconceptions in potentials on either side with the question of how all the dissimilar magnitudes come to offer continual diversity and competitive superiority. Neuroentrepreneurial discoveries posture a challenge to the usual management viewpoint. The conventional understanding that entrepreneurial preferences in C⁶ are made through rational or logical thought process is being questioned experimentally. How choice preferences advance through the brain pathways; how brain considers sources of data and, what intrinsic processes embody conflicting values are shaped through repeatedly producing
Fluid intelligence refers to the capacity for flexible problem-solving, abstract reasoning, and the ability to adapt to novel situations (Cattell, 1963). This cognitive ability is important in many aspects of life, including academic and professional success, and has been linked to various measures of brain structure and function (Duncan et al., 2000). Research has also shown that fluid intelligence is not fixed and can be improved through various interventions, including cognitive training programs and physical exercise (Jaeggi et al., 2008; Colcombe et al., 2004). Additionally, some studies have suggested that certain types of experiences, such as musical training or exposure to a second language, may also enhance fluid intelligence (Schellenberg, 2004; Bialystok and DePape, 2009).

While the exact neural mechanisms underlying fluid intelligence are still not fully understood, research suggests that it may involve complex interactions between different brain regions and neural networks (Duncan et al., 2000; Gray and Thompson, 2004). Fluid intelligence (Gf) is a fundamental aspect of cognitive abilities, involving reasoning, problem-solving, and abstract thinking abilities, which is essential for adapting to novel or complex situations (Cattell, 1963; McGrew, 2009). The concept of fluid intelligence has been widely studied in the fields of psychology, neuroscience, and cognitive science, with research indicating that Gf has significant implications for various aspects of life, including academic and occupational success, and general mental health (Deary et al., 2010; Gottfredson, 1997; McGrew, 2009).

Recent research has also examined the neurobiological underpinnings of Gf, with studies indicating that Gf is associated with a distributed neural network, including prefrontal, parietal, and temporal cortices (Duncan et al., 2000; Gray and Chabris, 2003). These brain regions are involved in attentional control, working memory, and cognitive flexibility, which are key components of fluid intelligence. Research has also demonstrated that Gf is not a fixed trait but can be improved through various interventions, including cognitive training programs and educational interventions (Melby-Lervåg and Hulme, 2013; Kizilirmak et al., 2021). Additionally, certain lifestyle factors, such as physical activity, sleep, and diet, have also been linked to Gf (Best et al., 2018; Cheval et al., 2019; Erickson et al., 2011).

Fluid intelligence (Gf) refers to an individual's capacity to solve problems, reason, and think abstractly. It has been linked to several important life outcomes, such as academic and occupational success, and mental health. The concept of fluid intelligence was first proposed by Raymond Cattell (1963), who suggested that it was a key component of general intelligence. Since then, numerous studies have been conducted to better understand the nature of fluid intelligence, its underlying neural mechanisms, and how it can be improved. One prominent theory of fluid intelligence is the neural efficiency hypothesis (Neubauer and Fink, 2009), which suggests that individuals with higher fluid intelligence are more efficient in their use of neural resources, allowing them to perform complex cognitive tasks with less effort. This hypothesis is supported by neuroimaging studies that have found that individuals with higher fluid intelligence have greater activation in regions of the brain involved in working memory and attentional control, such as the dorsolateral prefrontal cortex (Gray and Chabris, 2003; Kane et al., 2005).

Other studies have investigated the role of genetics in fluid intelligence. For instance, twin studies have suggested that genetic factors account for a substantial portion of individual differences in fluid intelligence (Deary et al., 2009). More recently, genome-wide association studies (GWAS) have identified specific genetic variants associated with fluid intelligence (Snijders et al., 2017). These findings have important implications for the development of interventions aimed at enhancing fluid intelligence, as they suggest that genetic factors may need to be taken into account. Research has also examined the effects of various interventions on fluid intelligence. One approach that has received considerable attention is cognitive training, which involves engaging in exercises designed to improve cognitive abilities. Several studies have...
found that cognitive training can lead to improvements in fluid intelligence (Au et al., 2015; Melby-Lervåg and Hulme, 2013). However, the effects of cognitive training are limited, with some studies suggesting that gains in fluid intelligence may not generalize to other domains (Simons et al., 2016).

In addition to cognitive training, other interventions that have been studied include physical exercise and mindfulness meditation. Physical exercise is associated with improvements in cognitive functioning, including fluid intelligence (Erickson et al., 2011). Similarly, mindfulness meditation has been found to improve cognitive control and attention functioning, which are important components of fluid intelligence (Moore and Malinowski, 2009). Overall, the study of fluid intelligence has led to important insights into the nature of cognitive abilities and their neural basis. While much progress has been made in understanding the factors that contribute to individual differences in fluid intelligence, much remains to be learned about how it can be improved and how it relates to other aspects of cognitive functioning. The study of fluid intelligence continues to be an active and exciting area of research, with implications for a wide range of domains, from education and occupational training to the development of interventions aimed at enhancing cognitive abilities.

**Problem Statement**

Evidence emerging from experimental-entrepreneurial economics suggests that sound choice making using fluid intellect depends on the prior arousal of synaptic processing. In mainstream experimental-economics, it is assumed that individuals are rational and use their experimental-economic intellect to capitalize on utility. This assumption has served as the very foundation of classical economic models for over 150 years: the foundations of economic theory assumed the brain as being a ‘black box’. Consequently, the concepts of utility and preference emerged as the explanation for such ‘invisible’ reasoning. However, what could be regarded as being heretical theories reject the idea that individuals always act to maximize utility. Advocates of heretical experimental-economic theories argue that models involving such equilibriums are not only inaccurate but do not reflect real-world choice making. Few unifying efforts have been undertaken, and those that do focus on the information-gathering function of fluid intellect. Notwithstanding this significant advance, the inquiry of how we make judgments continues to pose a challenge for empirical research: for while the brain is no longer the inaccessible ‘black box’ some processes remain opaque. What then are the limitations and possibilities in an atmosphere of \( C^6 \)? Does \( C^6 \) offer new opportunities? Does \( C^6 \) lead to specific restraints? Does \( C^6 \) create yet new configurations, arrangements and process? How do entrepreneurs cope/deal with \( C^6 \) in the process of organizational growth? Do extant techniques of futures, forecasting and foresight represent and govern \( C^6 \)? What are the potential impacts of industrial revolution to experimental-economic development? In this domain, what then are the heretical approaches that may be being drawn subconsciously to counter \( C^6 \)?

**Research Issues**

The conventional understanding that entrepreneurial preferences in FLUID are made through rational or logical thought process is being questioned experimentally. How decision preferences advance through the brain pathways; how brain considers sources of data and, what intrinsic processes embody conflicting values are shaped through repeatedly producing ‘rational’ preferences. Yet the notion that such entrepreneurial preferences are always made through rational or logical thought processes is being challenged by these experiments. The convergence of neuro-economics with the broader disciplines of business, in particular those involving decision making, such as neuro-governance have evolved in the form of dynamic conditions sciences producing a more complete framework for the study of such complex issues. Notwithstanding considerable developments, inquiry of how we make economic decisions stays to posture significant trials for methodical explorations. Erecting an economic decision infers that there is an alternate choice to be factored in. And in such a circumstance, we want not only to detect as many of these substitutions as conceivable but select the one that (1) has a peak prospect of efficiency and, (2) best fits with the goal line, needs, routine, and ethics.
The core idea central to experimental-economics is the empirical exploration of brain wave activity (in contrast to the brain being regarded as a 'black box')). This approach represents a step change to the understanding of choice making, especially under conditions of uncertainty. The human brain’s production of Alpha, Beta and Theta waves is known as a pre-conscious activity. In doing so the measurement of these waves has become the fundamental approach of experimental-economics.

1. How entrepreneur makes a choice via experimental - conditions?
2. What do brain waves depict in experimental - conditions?

Motivation

- How to build interpretable models that aid incentive - based economic decision?
- How to ensure that interpretable models are stout to adversarial attacks?
- How to detect and correct biases in interpretable models?
- What parts of brain aids incentive - based economic decision?
- What brain - waves depict in interpretable models - based decisions?

Rationale

Paper efforts to deliberate landscapes for replicative studies. Present attempt underwrites in direction of providing outline for steering economic decision investigations, proposition explanation through measurements of stimulus at stretch of economic decision and designate typical inter disciplinary prototype for neuron-stimulus-based incentive - based economic decision construction.

Aim and Objective(s)

Through the brain’s wiring diagram, the paper highlights the potential cause - effect linkage between biology and management in explaining how Entrepreneurs deal with judgment dynamics. The purpose of this paper is to focus on the role of neuro - dynamics to understand business leadership strategy. The aim is to exhibit empirical mosaics in 'neuro-trajectory feedback tectonic shifts(s)’ of 'business' economic decision circuit'. The primary aim is to archetype neuro entrepreneurial neuro-feedback by using brain waves (ECG). The objective is to monitor the undercurrents of neurobiological in understanding economic decision behavior. An effort is to elucidate how neural investigations appreciate 'mental tectonic shifts' in entrepreneurial economic decision-making. The primary aim is to model experimental-entrepreneurial fluid intellect at an explorative as opposed to complex deductive task level by mapping brain waves using electroencephalograph (scalable - vector based EEG). The aim is to firstly combine experimental-entrepreneurial science with common psycho-experimental-economic modeling approach. And secondly, to seek empirical evidence of the multiple neural systems involved in fluid intellect. The output from which is a contribution at the nexus of investigative/behavioral research and computational economics with the aim of expanding the use of computational models and replication to complement and/or explain results for choice makers.

Design/Methodology/Approach

Two specific research questions are pursued. Firstly, how incentive - based economic decision choices is explored and secondly, what part of brain aids incentive - based economic decision making? On closer scrutiny, methodological and philosophical issues lead to issues like: What is a powerful neuronal explanation? How can behavioural sciences be integrated with management? Are there reliable empirical methods for testing hypotheses recognized across various disciplines? Methodology includes neuro - based opinions to imitate thinking of neurobiology in ‘economic’ algorithmic research. It is conjectured that to realize economic thoughts and feelings, to measure those, there is a call for using scalable - vector based EEG (Electro - Encephalo - Graph) to demonstrate operational models. Methodology includes brain wave examination protocols via scalable - vector based EEG. Conductors were used to record electrical activity that affords evidence about circumstances and cognitive processes in brain. A single subject was preferred.
for experimentation. Physiological neuro-stimulus responses were calibrated to appreciate neural motion and how brain structures respond to sounding. Of brain waves, Alpha and Gamma waves have been factored as catalyst in guiding towards near optimal economic decision scenario.

The study of dynamic conditions fluid intellect making and problem solving has attracted attention from researchers and academics across a broad range of disciplines. This extension to fluid intellect research required the study of neuro-economic FLUID conditions and the consequential behaviour of 15 entrepreneurs and provides an introductory setting for future research on how ill-structured problems are, and can be, solved. Neuro-entrepreneurial behaviour in FLUID conditions offers a solution to the lack of understanding of fluid intellect through the measurement of brain activity. It provides a conceptual and arguably idealistic framework for research at the intersection of physiological brain-based models. Knowledge of neuro-entrepreneurial responses to FLUID conditions should shed light on the causes of behaviour (and neuro-entrepreneurial anomalies) and help build theories capable of explaining and predicting the application of and outcomes from fluid intellect. Combining the conventional disciplines above gives an interdisciplinary insight into the fundamentals of neuro-entrepreneurial fluid intellect that has eluded researchers to date. New imaging technologies have created the opportunity for more complex studies of the mind. The research contributes to the understanding of neurological design and begins to answer the unknown of entrepreneurial responses to FLUID conditions. The research concludes with specific propositions and guidance for future studies. An alternative taxonomy opening new vistas for future replication studies is then presented.

This paper advances theoretical models, grounded on an axiomatic groundwork of neurofeedback, to the entrepreneurial economic decision. For this, research purposes towards achieving condensed and abstract models of economic decision. This research combines research fields of economic decision science with aid of analysis techniques of big data in new fields of behavior. As regards methodology, the paper draws to evaluate the influence of the cerebral in shaping economic decisions connected with economic decision strategy. The methodology includes a neurofeedback procedure via ECG (electro-cardiogram). These waves afford evidence about circumstances and cognitive processes in the central nervous system. Scalable - vector based EEG analysis is supplemented with response – evidences and reference runs as a part of simulations (by the fourth author). The paper highlights some experiential results from CDS (by the third author). In light of debating theories and applications in economic decision-making, Alpha Wave responses have been considered to appreciate the neural activity and how brains respond to tectonic shifts. The paper advances some economic modeling in a decision scenario. The conceptual framework is a pedestal of ‘economics of choice’ (by the first author).

The approach adopted in this research is to combine the theoretical and experimental contributions with a specific focus on the individual’s capacity to switch between complex left-hemispheric thinking and explorative right-brain thinking. In doing so the research provides an extension to relevant aspects of business theories and applications of experimental-entrepreneurial science to fluid intellect (gf). An attempt is made to observe brain waves in action using experimental-based techniques. Physiological responses are measured by observing neural activity through Alpha Waves and Theta Waves, and how brains respond to stimulus presentation. Fluid intellect processes are mapped via a scalable - vector based EEG, with conductors used to record the actual electrical activity of the brain. These waves provide evidence about ‘Exploratory’ and ‘Mathematical’ task circumstances and cognitive processes used in fluid intellect. The physiology of fluid intellect responses are measured identifying actual neural activity and how brains respond to appropriate stimuli. Experimental-based psychoeconomic pointers present themselves as being an effective and scientifically based method of exploration. With experimental-based psycho-economic pointer methodology via an scalable - vector based EEG, electrodes are attached to the heads of entrepreneurs to record electrical activity in their brains via an scalable - vector based EEG. These wave patterns are observed to alter depending on the prevailing mental and physical conditions. The method relies on replicating the targeted behaviour that corresponds to the a priori knowledge of the composition of brainwaves. A sample of 15 entrepreneur(s) - respondents contributed to the experimental research. Results
are such that patterns are observed amongst this relatively small sample, suggesting that knowledge has been produced.

Results

A reference – run was done to calibrate the soundings. The general data arrived is as under:

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The above data were treated to a SVG testing. Results, presented below, suggest that neural signatures cannot boil down to a single network or a few brain regions. The study calls into question theories localizable to a specific neural system. The study exhibits key findings and explains how neuro apparatuses explore 'business economic decision - tectonic shifts(s)' through a biological basis. Results exhibit monikers to engage in 'business economic decision - tectonic shifts(s)' thinking using eye tracking techniques that business leadership delineates process information through activation of neuro components.
Contributions
The paper raises fascinating neuro-entrepreneurial issues, theoretical and practical, based on both normative and descriptive levels of analysis. This research brings about positive impacts by enhancing scientific understanding of biological processes as a significant element in business strategy. Activation of 'business economic decision - tectonic shifts(s)' thinking interprets economic decision-making styles and cerebral response to 'tectonic shifts(s)'. This paper effort to deliberate conclusions in direction of understanding neuro-design and proposition to riposte topics in entrepreneur preference undercurrents. Research efforts conclude with characteristic schemes and present directions for future research. Research attempts assist in reconsidering the practicalities of entrepreneur preference dynamic forces by providing an alternate arrangement for rational preference complications. This research would open new panoramas for future replicative scholarships.

The study of dynamic conditions fluid intellect making and problem solving has attracted attention from researchers and academics across a broad range of disciplines. This extension to fluid intellect research required the study of experimental-economic C⁶ conditions and the consequential behaviour of 15 entrepreneurs and provides an introductory setting for future research on how ill-structured problems are, and can be, solved. Experimental-entrepreneurial behaviour in C⁶ conditions offers a solution to the lack of
understanding of fluid intellect through the measurement of brain activity. It provides a conceptual and arguably idealistic framework for research at the intersection of physiological brain-based models. Knowledge of experimental-entrepreneurial responses to C⁶ conditions should shed light on the causes of behaviour (and experimental-entrepreneurial anomalies) and help build theories capable of explaining and predicting the application of and outcomes from fluid intellect. Combining the conventional disciplines above gives an interdisciplinary insight into the fundamentals of experimental-entrepreneurial fluid intellect that has eluded researchers to date. New imaging technologies have created the opportunity for more complex studies of the mind. The research contributes to the understanding of experimental design and begins to answer the unknown of entrepreneurial responses to C⁶ conditions. The research concludes with specific propositions and guidance for future studies. An alternative taxonomy opening new vistas for future replication studies is then presented.

Conclusion

The paper concludes with several propositions that have been generated from a theoretical ‘mosaic’ and presents directions for future research. The paper attempts towards rethinking the foundations of entrepreneurial economic decision dynamics by providing alternative taxonomy for rational economic decision problems. The paper concludes with propositions generated from a theoretical ‘mosaic’ and presents directions for future research. The methodological approach adopted in this research is to combine contributions from both theory and empirical evidence exploring individual capacity to switch between complex left-hemispheric thinking and explorative right-brain thinking. The research depicts relevant aspects of business theories and applications of experimental-entrepreneurial science, particularly with respect to the use of fluid intellect. Being an inventive study, this work contributes to the knowledge and understanding of how entrepreneurs respond to C⁶ conditions by:

- Providing framework for C⁶ behavioural research;
- Offering solution to experimental-economic C⁶ behaviour and,
- Describing common C⁶ behavioural model.

Paper concludes with propositions generated from theoretical ‘mosaic’ and presents directions for future research. Emphasis is upon rethinking foundations of economic decision dynamics by providing alternative taxonomy for decision problems. Research recommends; Trail Making Trial (TMT), Verbal Fluency Trial, VFT Animals category, Clock Drawing Trial (CDT), Digits Forward and Backward Subtests Strop Trial and Wisconsin Card Sorting Trial (WCST) experiments to lend support to this research.

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