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Crafting Neuro Economic-Managerial Decisions

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Abstract: Decision-making is a region of intense study in neuroscience, and cognitive neuroscience, In real, World decision processes, management decisions emerge from complexly interlinked, This paper explores how brain absorbs information, recognises and frames problematic situations, and chooses appropriate responses, Brain structures suggest that brain considers various sources of information before making decision,*Brain imaging technologies have stimulated neuro (managerial) studies of internal order of mind and its links with bandwidth of human decisions,*How is (managerial) decision making processes carried out in brain? What are the limits of understanding thinking as a form of computing? How does previous experience alter behavior? Do we interpret research findings when neuro (managerial) logical results conflict? Theoretical explanations posit that human brain accomplishes this through neural computations. Deciphering such transactions require understanding of neuro processes that implement value - dependent decision making. This leads to formulation of a 'neuro - management decision making paradox'. The goal is a speculation of how brain implements decisions that is tied to behaviour. There are unsolved research issues; how does Manager decide in a state of vacillation, Risk and Probability? How does Manager decide in state of VUCA (Uncertainty, Vulnerability, Complexity and Ambiguity? How do we make decisions? How do human brains compute and represent abstract ideas? What counts as explanation of how brain works (what are function, algorithm and implementation)? This paper attempts at addressing current pace of advances in methods (fMRI, BOLD, EEG, ECG, etc), where we are going and what we ought to research next. This Paper attempts to explore phenomena through individual action, decision -making and reasoning processes. Objective is to put forward a model for neuro - management decision, in which interaction between variables of neuro - management decision processes are addressed through series of measurements of brain activity at time of decisions. Attempt is to describe a regular model for decision making process with intent of linking neuro - psycho and management levels of analysis capable of predicting observed behaviour. This provides conceptual framework for understanding and conducting Neuro (managerial) management research at intersection of neuro (managerial) science, management and psychology, offer solution through measurements of brain activity at time of decisions, linking and spanning neuro(managerial) biological and psychological and management levels of analysis.

Keywords*: Cognitive Neuroscience,* Brain Imaging, *Coherent Brain Dynamics, VUCA, Fmri, BOLD, EEG, ECG*

I. INTRODUCTION

What are minds for? Human brain is the most complex thing that we know of within our own World. Perhaps it is the most complex thing in the universe! Why have we as a species been blessed with such a gift? What is it for?How much of our managerality is determined by our brain? It's a question that's perplexed philosophers for centuries and scientists for decades,This is the old character versus nurture debate, Despite all the recent advances in the cognitive and neurosciences, there's still much about the human brain that we do not know, We are still quite a ways off from understanding how the brain produces phenomenal experience or qualia, It's what makes us the unique, self-reflective creatures that we are, Decision-making is a region of intense study in neuroscience, and cognitive neuroscience, In real, World decision processes, management decisions emerge from complexly interlinked, There is a need to explore how brain absorbs information, recognises and frames problematic situations, and chooses appropriate responses.

How are decisions carried out in brain? Question is how manager make decisions. Brain considers sources of information before decision. In particular, the processes by which individuals reach decisions have been ignored. Problems confronting decision makers often embody conflicting values. Manager often fail to design 'rational' decisions. When faced with obscure decision, individuals engage in strategic simplifications of decision problems. How do parts of the brain that govern decision-making coordinate their activity when making a decision? This paper explores certain neuro-underpinnings in managerial decision modeling. Brain structures suggest that brain considers various sources of information before making decision, Brain imaging technologies have stimulated neuro (managerial) studies of internal order of mind and its links with bandwidth of human decisions, how is (managerial) decision making processes carried out in brain? What are the limits of understanding thinking as a form of computing? How does previous experience alter behavior? Do we interpret research findings when neuro (managerial) logical results conflict?

Imaging is an important aspect of dynamic capabilities and there is an increasing amount of evidence of how evolutionary patterns are shaped, There are yet unsolved problems in (managerial) cognition, although some of these problems have evidence supporting a hypothesized solution, and the field is rapidly evolving, What are the general implications of neuro (managerial) management? There are unsolved research issues; how does Manager decide in a state of vacillation, Risk and Probability? How does a Manager decide in state of VUCA (Uncertainty, Vulnerability, Complexity and Ambiguity? How

do we make decisions? How does human brain compute and represent abstract ideas? What counts as explanation of how the brain works (what are function, algorithm and implementation)? This paper attempts at addressing current pace of advances in methods (fMRI, BOLD, EEG, ECG, etc), where we are going, and what we should research next. This provides conceptual framework for understanding and conducting Neuro (managerial) management research at intersection of neuro (managerial) science, management and psychology, offer solution through measurements of brain activity at time of decisions, linking and spanning neuro(managerial) biological, psychological and management levels of analysis, volatility, uncertainty, complexity and ambiguity of general conditions and situations, The deeper meaning of each element of VUCA serves to enhance the strategic significance of VUCA foresight and insight as well as the behavior of groups and managers in organisations.

II. MANAGERIAL ACTIVITY

Managers make (economic) decision makings in complex situations. Neuromanagerial economic decision making needs a decision maker (Manager) responsible for economic decision making. This maker has number of alternatives and must choose the best alternative (or optimised combination). When this has been made, events may have occurred (maker has no control). Each (combination) of alternatives, followed by an event, leads to a result with some quantifiable significance. Cognitive neuroscience research suggests that diverse preference orderings and decisions possibly will surface depending on which brain circuits are activated. This perchance contradicts the microeconomic postulate that one complete preference ordering provides sufficient information to predict decision and behaviour.

Interpretation of Managerial activity in terms of neuroscience is typically concerned with the neurophysiological underpinnings of Managerial neurodecision Managerial economic behaviours. One key insight is *modularity* of human brain (not all brain circuits get activated when executing response to given circumstances). Same stimuli may generate different behavioural responses depending on which brain circuits are activated. If hypothesis is accurate, different brain circuits can guide to different decisions depending on which brain structures and circuits are activated. Consequently, there would be various (possibly conflicting) preference orderings. Furthermore, if a particular brain circuit could act relatively insulated, distinctive preference ordering would result (closed system).

III. HUMAN BRAIN TECTONICS

Human resources rely on cautious mock-up of neuromanagerial economic decision making modeling. Tactic consists in construction models to display relationship between cause and neuro incongruity. Freedom provided by introspection technique leads to a model selection problem. Neuro - management neuromanagerial economic decision making-making, regarded as a mental process (cognitive process), result in selection of path of action among alternative circumstances. Each neuromanagerial economic decision making-making process produces neuromanagerial economic decision making. Process is regarded as incessant process integrated with situation. Investigation is concerned with rationale of neuromanagerial economic decision making -making, reasonableness and invariant neuromanagerial economic decision making. These reflect compensatory interface of neuromanagerial economic decision making -related expanse.

Specific brain structure potentiates neuromanagerial economic decision making - makings depending on strategy, traits and framework. Therefore, neuromanagerial economic decision making is a reasoning or emotional process which can be rational or irrational, based on explicit / tacit assumptions. This leads to formulation of a 'neuro - management neuromanagerial economic decision making paradox'. Explorations on brain mechanisms juxtapose link between brain and behaviour, known as Cognitive Neuroscience, to study neuronal activities, connections between neurons, plasticity of brain and relationship between brain and behaviour. These inherit methods as how brain encodes, processes information, stores representation in mind to craft actions in reaction to stimuli. These embrace sensation and perception of information, interface linking information in dissimilar modalities, matrix of memory and dispensation of information. Deduction is based on postulation that individual cognitive functions are based on neural activities in brain.

Neuromanagerial economic decision making involves detection of need, discontent within oneself, decision making to change and mindful perseverance to execute decision making. How are neuromanagerial economic decision making carried out in brain? What are the general implications? Primary argument is that neuromanagerial economic decision making-making is coupled with factors of uncertainties, compound objectives, interactive intricacy and apprehension that makes neuromanagerial economic decision making-making course of action difficult. There is the requirement for strategic neuromanagerial economic decision making-making. Questions include; how to choose in situations where stakes are high with multiple conflicting objectives? How to plan for dealing with risks and uncertainties involved? How to craft options better than originally available? How to become better neuromanagerial economic decision making makers? What resources will be invested? What would be the potential responses? Who will make this neuromanagerial economic decision making? How should they be evaluated? How will one decide? Which of the things that could happen would happen? How can we ensure neuromanagerial economic decision making will be carried out? These questions are crucial for understanding complex human behaviours.

The human brain is the most complex organ in the body. The human brain is one of the most complex objects of scientific research. Understanding the brain, its cognitive functions, and the related conscious experience requires cooperation of quite a number of different disciplines. The number of connections in the brain exceeds the number of atoms in the universe. The brain is foremost a control structure that builds an inner illustration of outer world and uses this depiction to make decision, goals and priorities, formulate plans and be in charge of activities with objective to attain its goals. Cognitive Neuroscience relies on non-invasive techniques to look at neural activities at different brain regions when Managers perform cognitive tasks. The techniques offer information concerning brain activity during diverse cognitive processes but not about underlying relationship linking brain expanse and cognitive functions. It is mysterious whether activities in brain regions are essential to analogous cognitive functions. These have confines.

IV. VOLATILITY, UNCERTAINTY, COMPLEXITY AND AMBIGUITY

We are living in a World where volatility and uncertainty have become the new normal. We look at the World through a lens, which we call VUCA, which stands for 'Volatile, Unstable, Complex, and Ambiguous.' VUCA**,** as prescribed in Wikipedia,is describes or reflects on ischemic failures and behavioural failures,which are imperative to organisational failure, At some level, capacity for VUCA management and leadership hinges on enterprise value schemes, assumptions and natural goals, A 'prepared and resolved' enterprise is engaged with strategic agenda that is aware of and empowered by VUCA forces, The capacity for VUCA leadership in strategic and operating terms depends on a well, developed mindset for gauging the technical, social, political, market and economic realities of the environment in which people work, Working with deeper smarts about the elements of VUCA may be a driver for survival and sustainability in an otherwise complicated World,

- V= Volatility, The character and dynamics of change, and the character and speed of change forces and change catalysts,
- U=Uncertainty, The lack of predictability, the prospects for surprise, and the sense of awareness and understanding of issues and events,
- C= Complexity, The multiplex of forces, confounding of issues and disorder and confusion that surround an organization,
- A=Ambiguity, The haziness of reality, the potential for misreads, and the mixed meanings of conditions; causeandeffect confusion,

These elements present the context in which organisations view their current and future state, They present boundaries for planning and policy management, They come together in ways that either confound decisions or sharpen the capacity to look ahead, plan ahead and move ahead, VUCA sets the stage for managing and leading, The particular meaning and relevance of VUCA often relates to how people view the conditions under which they make decisions, plan forward, manage risks, foster change and solve problems, In general, the premises of VUCA tend to shape an organisation's capacity to:

- Anticipate issues that shape conditions
- Understand consequences of issues and actions
- Appreciate interdependence of variables
- Prepare for alternative realities and challenges
- Interpret and address relevant opportunities

Uncertainty pervades neuromanagerial economic decision making. Nearly all real-world decisions involve some form of psychological uncertainty, whether about the likelihood of an event or about the nature of future preferences. Most studies in neuromanagerial economic decision making neuroscience literature – like in its counterparts in the socio - Managerial sciences – have examined the effects of risk; for reviews see Knutson and Bossaerts (2007), Platt and Huettel (2008), Rushworth and Behrens (2008). While definitions vary across contexts, a 'risky neuromanagerial economic decision making' involves potential outcomes that are known but probabilistic, such that risk increases with variance among those outcomes, potentially normalized by the expected value (Weber et al., 2004). Uncertainty can have other forms, however. Outcomes may be known but occur with unknown probability; such neuromanagerial economic decision makings reflect ambiguity (Ellsberg, 1961). Only a handful of studies, so far, have investigated the neural basis of ambiguity (Smith et al., 2002; Hsu et al., 2005; Huettel et al., 2006; Bach et al., 2009). And, still other states of uncertainty might be evoked in cases where the outcomes themselves are unknown, as is the case in complex real-world neuromanagerial economic decision makings. So far, neuromanagerial economic decision making neuroscience research has established weak, albeit numerous, links between uncertainty and its neural substrates.

To meet the challenges of a complex World, strategic planners need to understand the differences between the four elements of VUCA. In a VUCA World, what's the point of strategy? Strategy does still have a purpose, but building one in a VUCA environment requires more nuanced thinking. Today's turbulent environment of volatility, uncertainty, complexity and ambiguity means new challenges for government managers and policymakers,VUCA environments require that we learn from big, picture thinkers from different disciplines and industries, And such learning can reduce the 'U' in VUCA, uncertainty, Volatility has to do with the nature, speed and magnitude of change, Volatility or turbulence is a phenomenon that is occurring more frequently than in the past, Uncertainty relates to the unpredictability of issues and events, Information about the past and present are less and less useful in anticipating the future, making it extremely difficult for decision, makers to forecast and allocate resources effectively, Complexity, the multiple and difficult,to,understand causes of problems, poses another challenge, Ambiguity adds to the other three factors, Ambiguity makes it difficult to understand the meaning of fast, moving, unclear and complex events,

Leadership agility and adaptability are now required skills if organisations are to succeed in a VUCA World, Leaders must be able to make continuous shifts in people, processes, technology and structure, This requires flexibility and speed in decision-making – the ability to diagnose, decide and deploy resources quickly , and preferably proactively rather than reactively, Theorists of some of the success factors we have identified around leading effectively in a VUCA World: always retain a clear vision against which judgments can be made, with agility to flex and respond appropriately to rapidly unfolding situations, provide clear direction and consistent messaging against a backdrop of continually shifting priorities, supported with the use of new virtual modes of communication where necessary, anticipate risks but don't invest too much time in long, term strategic plans, don't automatically rely on past solutions and instead place increased value on new, temporary solutions, in response to such an unpredictable climate, think big picture, make decisions based as much on intuition as analysis, capitalise on complexity, if your talent management strategy is working, then you should be confident that you have the right people in the right place, this will enable you to rapidly break down any challenge into bite size pieces and trust in the specialist expertise and judgment of those around you, be curious, uncertain times bring opportunities for bold moves, seize the chance to innovate, encourage networks rather than hierarchies – as we reach new levels of interconnection and interdependency collaboration yields more than competition, leverage diversity – as our networks of stakeholders increase in complexity and size, be sure to draw on the multiple points of view and experience they offer,

doing so will help you expect the unexpected, never lose focus on employee engagement, provide strategic direction, whilst allowing people the freedom they need to innovate new processes, products and services, get used to being uncomfortable, resist temptation to cling on to outdated, inadequate processes and behaviours, take leaps of faith and enjoy adventure.

V. HOW ARE DECISIONS CARRIED IN BRAIN ?

How are decisions carried out in brain? Question is how manager make decisions. Psychological models of decision-making explain that humans gradually accumulate evidence for a particular choice over time, and execute that choice when evidence reaches a critical level. Brain considers sources of information before decision. In particular, the processes by which managers reach decisions have been ignored. Problems confronting decision makers often embody conflicting values. Manager often fail to design 'rational' decisions. When faced with obscure decision, managers engage in strategic simplifications of decision problems. How do parts of the brain that govern decision-making coordinate their activity when making a decision? This paper explores certain neuro-underpinnings in managerial decision modeling.

In neurosciences, how the brain processes different sensory stimuli (such as images or sounds) and which are the neural basis involved in deciding what we perceive, have been the deeply studied in the past decades. Impairments in decision-making are at the core of a variety of psychological and neurological impairments. Brain accumulates evidence when faced with a choice and triggers an action once that evidence reaches a tipping point. But, how do we know where we are, where we have been and where we are going? It's important to understand intricacy of managerial brain. Brain is main organ of nervous scheme. It has the same general structure as brains of other mammals, but with developed cerebral cortex. Model of brain function can explain a wide range of anatomical and physiological aspects of brain schemes.

Size of brain comes from cerebral cortex, especially frontal lobes, which are associated with executive functions. The area of cerebral cortex devoted to vision, visual cortex, greatly enlarged as compared to other animals. Basic structural design of brain is constructed through a process that begins early in life and continues into adulthood. Simpler circuits come first and more obscure brain circuits endow with basic blueprint. Certain neurons seem to represent the accumulation of evidence to a threshold and others represent the evidence itself, and that these two types of neurons interact to drive decision-making. Experiences influence how or whether genes are expressed. Imaging studies suggest that differences in cognition and behaviour (might) relate to differences in brain connectivity. Perceptive the coverage to which two brains can differ is crucial in basic neuroscience research.

What is mind? The decision-making mechanism consists on a loop, ie a connection back and forth between these two types of areas. Where does it come from? How are brain, mind, matter, and energy related? How do they interact? Why does this interaction seem to be the source of our suffering? What could we learn about being managerial if we were to weave the psychological sciences, neurosciences, biological sciences, and the physical sciences into a single integrated depiction? Can we create a comprehensive model of mind and brain so that we may be able to perceive and influence the network of interactions that we are embedded within and influenced by? What is the most elementary way in which we can describe their interaction so that we may understand who we are and ultimately improving the quality of managerial life?

An emerging theme in decision neuroscience is that organisms need to make a number of value-related computations to make even simple choices. Consider the case of action-based choice exemplified by the goalkeeper's problem. First, he needs to assign a value to each action under consideration. These signals, known as action values, encode the value of each action before choice and regardless of whether it is subsequently chosen or not, which allows them to serve as inputs into the decision-making process. Second, these action values are compared to generate a choice. Third, the value of the option that is selected, known as the chosen value, is tracked to be able to do reinforcement learning. In particular, by comparing the value of the outcome generated by the decision to the chosen value, the organism can compute a prediction-error signal that can be used to update the action value of the chosen option. Note that while the action values are computed before the decision is made, the chosen value and outcome of the comparator process signals are computed afterward.

A basic question, intimately tied to the problem of action choice, is that of how actions are assembled into organised sequences. Theories of routine sequential behaviour have long acknowledged that it must rely not only on environmental cues but also on some internal representation of temporal or task context. It is assumed, in most theories, that such internal representations must be organised into a strict hierarchy, mirroring the hierarchical structure of naturalistic sequential behaviour Based on recent neuroscience evidence, we model the brain as a dual-scheme organisation subject to three conflicts: asymmetric information, temporal horizon, and incentive salience. Under the first and second conflicts, we show that the uninformed scheme imposes a positive link between consumption and labour at every period. Furthermore, decreasing impatience endogenously emerges In decision-making, purposes must first be established, purposes must be classified and placed in order of importance, substitute actions must be developed, the substitute must be evaluated against all the purposes, the substitute that is able to achieve all the purposes is the tentative decision, the tentative decision is evaluated for more possible consequences, the decisive actions are taken, and additional actions are taken to prevent any adverse consequences from becoming problems and starting both schemes (problem scrutiny and decision-making) all over again.

There are steps that are generally followed that result in a decision model that can be used to determine an optimal production plan and in a situation featuring conflict, role-playing may be helpful for predicting decisions to be made by involved parties. Each of these factors leads to a fresh perspective. A neural level focuses on the basic forebrain functions and shows how processing demands dictate the extensive use of timing-based circuitry and an overall organisation of tabular memories. An embodiment level organisation works in reverse, making extensive use of multiplexing and on-demand processing to achieve fast analogous calculation. An awareness level focuses on the brain's representations of emotion, attention and

consciousness, showing that they can operate with great economy in the context of the neural and embodiment substrates.

Each step in the decision-making process may include social, cognitive and cultural obstacles to successfully negotiating dilemmas. It has been suggested that becoming more aware of these obstacles allows one to better anticipate and overcome them. Neuroscience and social science have witnessed tremendous advance in Neuroeconomics and Neuromanagement since the birth of these interdisciplinary fields at the turn of Century. In order to explain the cognitive and neural underpinning of managerial decision-making, the ability to process multiple substitutes and to choose an optimal course of action, especially in a managerial context. Nerve management is contemporary developments in cognitive neuroscience, neural imaging technology progress, and the traditional management research across a field of study, through study of manager in their daily management behaviour such as consumption, investment, production, circulation, financial management, managerial activities such as various acts of the neurophysiologic underpinning, thereby from brain science perspective on managerial management activities of the mechanisms behind, and brings forward corresponding management measures and strategies. And neuroeconomics, nerve management emphasis on exact situations, manager differences and the operational level of behaviour, study different conditions managed object evolution rule and achieve the most effective management method. Decision makers must have vast amounts of information in order to make use of the rational comprehensive decision-making technique. There needs to be an ability to predict the future consequences of decisions made. Also, problems confronting decision makers often embody conflicting values. In addition, it is tough to ignore the sunk costs of former decisions, these may foreclose many substitutes.

VI. QUESTIONS IN DECISION SPECTRUM

Overall, this multi-dimensional and thus potentially integrative approach combines neuro-biological, socio - Managerial and trans-cultural dimensions of decision-making and trust into a 'stratified image' of the human being and its behaviour(s). Important to this paradigm is the need to characterize the interaction of physical, psychological, cultural, and even spiritual cognitions that establish various decisions, and which relate decisional-actions and outcomes to evaluations of trust. We opine that this explicitly experimental (heuristic) neuro-bio-psycho-socio - Managerial model of trust encompasses at least six dimensions:

- A neural level that proposes the neural networks involved in ecological / economic decision-making;
- A biological attribute that describes the evolutionary and developmental bases and relevance of decision-making and trust;
- An anthropological component that defines and describes the collective meaning and basic value of trust for human beings as a self-conscious species among other (conscious) species;
- A psychological aspect that provides a definition of trust pertinent to the specific cognitions, emotions and character of an individual;
- A philosophical dimension that regards the rational dimension of trust in the sense of an in-depth scrutiny of causes and origins as related to effects;
- A socio - managerial level of influence, that describes dependent inter-relations with others, respective past and present experiences of these inter-relations;

But why would specifically neurological experiments be relevant to causal knowledge concerning the Managerial neuroeconomic decision making realm? Practitioners and philosophers have advanced a number of arguments. First, neuromanagerial economic decision makings holds out the promise to unify within the socio - Managerial sciences: uncovering the neural underpinnings of decision making would get us a theory that is applicable to all human behaviour in all socio - Managerial contexts. We could use the same theory to causally explanation for, not just rationalize post hoc, pro-socio - Managerial behaviour as well as for self-regarding Managerial neuroeconomic decision making decisions. Second, neuromanagerial economic decision makings evidence has been thought to establish the reality of key Managerial neuroeconomic decision making variables; for example, some measurable neural phenomenon of decision (activation patterns in VTMPFC) is said to be the physiological referent of utility, thus vindicating a realist interpretation of Managerial neuroeconomic decision making theory.

In this paper we show that neuromanagerial economic decision makings do none of these things. First, it does little to unify socio - Managerial phenomena because knowledge of neurological mechanisms of decision-making is not explanatorily relevant for all or even most socio - Managerial scientific phenomena. Moreover, unification as such cannot be used as an evidential argument for the probable truth of neuromanagerial economic decision making hypotheses. Second, that neuromanagerial economic decision makings provides 'the mark of the real' for typical socio - Managerial scientific explanation rests on the mistaken intuition that causal relations are more real the closer we get to describing them in a purely physical vocabulary. Without this assumption, the finding that there is a correspondence between a psychological entity and a particular brain area does not, by itself, make the psychological entity any more real. Third, neuromanagerial economic decision makings do not automatically improve Managerial neuroeconomic decision making explanations, because mechanistic details are not always explanatorily relevant for socio - Managerial and Managerial neuroeconomic decision making phenomena.

Mechanistic details only improve the explanation of the original socio - Managerial scientific explanandum if knowledge of them effectively increases our ability to make causal and explanatory inferences about the explanandum. Thus far, however, this has rarely been the case in neuromanagerial economic decision makings. Consequently, just the fact that some neural variables are directly manipulated does not necessarily mean that Managerial neuroeconomic decision making relevant variables are been controlled. Moreover, the argument that unlike behavioural experiments, neuromanagerial economic decision makings experiments obviate the need for matching the subject's and the experimenter's models, and hence afford more reliable causal inferences, overestimates the current status of neurological theories of decision making.

We argue that the relevance of neuroscientific findings is mostly to be understood in terms of triangulation of evidence by independent means of determination. Triangulation is a standard term in the methodology of the socio - Managerial sciences. It refers to the use of multiple different and independent sources of evidence or theoretical perspectives to check whether a putative phenomenon is an artifact of some particular method or perspective. The epistemic rationale of triangulation is thus to distinguish the real from the artefactual by controlling for errors and biases of particular methods. Conceiving neuromanagerial economic decision making experimentation as triangulation explicates what is correct behind some of the arguments discussed above. For example, a finding that a certain brain area is involved in altruistic punishment does not, as such, render socio - Managerial preferences more real by providing a physical realiser, but provides additional confirmatory evidence through another independent means of determination (i.e. imaging studies of the brain or the measurement of hormonal levels in the body) of the involvement of socio - Managerial preferences in the explanation of altruistic punishment.

A similar point applies to unification: when appraising neuromanagerial economic decision making hypotheses, the sound evidential principle of triangulation should be distinguished from the common intuition that neuromanagerial economic decision making hypotheses are likelier to be true in virtue of explaining much by little. The latter mixes evidential and explanatory virtues. Unification in this case is relevant only insofar as a unifying hypothesis related to diverse sources of evidence actually has more, and mutually independent, evidence. Our claims apply beyond the case of neuromanagerial economic decision makings: the epistemic contribution of neuroscience to socio - Managerial scientific theories and explanations lies in the generation of (further kinds of) evidence for the triangulation of socio - Managerial scientific hypotheses.

The irrationality of human decision-making attracts the fierce interest of two very different fields: neuroscience and economics. Economic theories of human decision-making are essentially based on two parameters: what something is worth and the probability of its occurrence. Neuroscientists, on the other hand, think of decision-making as a product of physical neural circuits: sensory information enters the brain, journeys through the brain where a decision is 'made,' and eventually exits the brain to evoke bodily responses. Economics ignores these biological, more proximal roots of behaviour, whereas neuroscience ignores the economic goals that ultimately guide our decisions. These two approaches have recently been integrated in the hybrid field of Managerial neuroeconomic decision making. Managerial neuroeconomic decision making attempts to unify abstract economic variables with neuroanatomical, and thus understand physical mechanisms by which our brains make decisions.

The basic premise is that somewhere along sensory-motor circuits are the neural substrates that represent 'value' and 'probability.' These areas must interact and influence flow of information along the circuit, thereby prompting a certain decision and its subsequent behaviour. Pressing questions, then, are how and where these abstract variables are combined in the brain, and the dynamics of the neural computation which engenders a 'decision.' Because economists base their models on optimal behaviour, they have the ability to develop a precise, unified framework for interpreting human behaviour; thesis is, essentially, that humans choose alternatives that maximize rewards. Managerial neuroeconomic decision making draws upon the precision and rigor of formal models of economics to go beyond the sensory-motor circuit, allowing opportunities for understanding neural basis of more abstract economic ideas, such as value and the profitability of outcomes (a bit more challenging to study than sensory and motor systems). Thus, principle of economics allows neuroscientists to explore physical mechanisms underlying high level cognitive processes.

But if Managerial decision Economists could develop models that explain for subtleties of human brain, they might be able to predict complex behaviours more accurately. This, in turn, might have any number of practical applications: investment bankers could hedge against financial euphoria like Internet boom; advertisers could sell products more winningly. The idea that understanding the brain can inform Managerial decision Economics is controversial but not new; for 20 years, behavioural economists have argued that psychology should have a greater influence on the development of economic models. What is new is use of technology: economists, like other researchers, now have at their disposal powerful tools for observing brain at work. Functional Magnetic Resonance Imaging (fMRI) has been around since late 1980s; but only in past few years has it been used to study decision-making, which is crux of economic theory. The result is emerging field of 'neuromanagerial decision Economics.' A flurry of recent papers in scientific and economic by Caltech Managerial decision Economics Professor Colin Camerer shows how researchers are using neural basis of decision-making to develop new neuromanagerial decision economic models.

Neuroeconomic decision making has always relied on a careful modeling of decision-makers. They are described by utility functions that represent their goals, and they interact at (Nash) balance. Nevertheless, discrepancies between theoretical predictions and observed behaviour have haunted the field for many decades. The objective of neuroeconomic theory is to build models based on evidence from brain sciences, such as experimental neuroeconomic decision making, but also other fields in neuroscience and neurobiology. Measurement of brain activity provides information about the underlying mechanisms used by the brain during decision processes. In particular, it shows which brain regions are activated when a decision is made and how these regions interact with each other. This information can then be used to build a model that represents this particular mechanism. Contrary to behavioural neuroeconomic decision making, the model does not rely on introspection or plausible assumptions but rather on an existing and documented biological property of the brain.

Deciphering brain - environment transactions requires mechanistic understandings of neurobiological processes that implement value-dependent decision-making. There is a crucial difference between 'thinking about thinking' and actually enhancing brain and mental processes by developing latent potential of each individual. Theoretical explanations posit that human brain accomplishes this through a series of neural computations, in which expected future reward of different decision options are compared with one another and then option with highest expected value is selected. If human brain is often compared with computer, one aspect is crucially missing. Humans define goals for information processing in computers,

whereas goals for biological brains are determined by need for survival in uncertain and competitive environments. How to handle brains behind businesses in age of dramatic alter and growing uncertainty? What then are the coherent brain dynamics underlying prediction, control and decision-making? To cope with this mismatch, behavioural economists have developed new theories of decision-making that are a better fit for the behavioural data than traditional models. The methodology consists in building models to demonstrate the relationship between cause (preference for particular object) and behavioural anomaly. This line of research formulates possible explanations for behavioural data, but it is nevertheless subject to shortcomings. Often the cause is not observable, and there is no evidence of the relationship provided by the model. Most notably, freedom provided by introspection method leads to model selection problem. Also, cause of behavioural anomaly may simply lie elsewhere.

The methodology used in neuroeconomic theory has two advantages. Primarily, evidence from the brain sciences provides precise guidelines for the constraints that should be imposed on decision-making processes. This can help uncover the 'true' motivations for the 'wrong' decisions and improve the predictive power of the theory. Behavioural theories that explanation for biases in judgment build on specific models of preferences over beliefs or non-Bayesian updating processes. Rather than guessing a cause for biases, neuroeconomic theory builds a model based on the existing physiological properties underlying learning and belief formation. In principle, this can help pinpoint biological foundations for anomalous decisions. For example, research in neurobiology demonstrates that the brain cannot encode all the information contained in a signal. A decision is triggered when 'enough' information supporting one alternative is obtained, and the brain uses a variety of biological mechanisms to filter information in a constrained optimal way. In a recent paper we show that these properties of the brain result in a behavioural tendency to confirm initial priors (Brocas and Carrillo; 2009).

As a result, field raises questions that require the engagement of several fields, as investigators must parse out and quantify all the different aspects of thinking that seem to happen simultaneously in order to literally make headway into perceptive the physical underpinning for making decisions. The field is still in its infancy, but one of the driving forces behind the field now is to try to understand more exactly what are the computations performed in different brain areas, and how they are similar or different. Also how do they communicate with each other and how is information transformed as it moves around in brain. How do these different representations about important variables for decision making come together and allow you to form a decision? (Kavli Foundation; 2011)

Quantification of choice has been a major area of research for neuro scientists for several decades. This is, in part, due to the discovery of the 'Matching Law' that stipulates that relative response rate on concurrently available substitutes 'match' the available relative reinforcement rates. This theoretical construct has been developed to describe response allocation in more obscure situations. Manager often fail to design 'rational' decisions. Economics agents are subject to multiple biases that affect the way they perceive events, act upon them and learn from experience. These behaviours cannot be ignored since they have disastrous consequences for organisations. When faced with obscure decision, managers engage in simplifying strategies. Adaptive decision making in real-World contexts relies on strategic simplifications of decision problems. Yet, neural mechanisms that shape these strategies and their implementation remain largely unknown. Although we now know much about how brain encodes exact decision factors, much less is known about how brain selects among multiple strategies for managing computational demands of obscure decision-making task. Expansion of neuroeconomics parallels development of cognitive science (Satpathy;2015).

Neuroeconomics has bridged the contrasting fields of economics and psychology. Economics, psychology, and neuroscience are converging today into a single, unified discipline with the ultimate aim of providing a single, general conjecture of managerial behaviour. This is the emerging field of Neuroeconomics in which consilience, accordance of two or more inductions drawn from different groups of phenomena, seems to be operating. Economists and psychologists are providing rich conceptual tools for perceptive and modeling behaviour, while neurobiologists endow with tools for study of mechanism. The goal of this discipline is thus to understand the processes that connect sensation and action by revealing the neurobiological mechanisms by which decisions are made. Such union is almost exclusively attributable to changes within economics. Neuroeconomics has inspired change because important findings have posed more of a challenge to standard economic perspective. The important source of inspiration for neuro economist has been neuro judgment research, which can, in turn, be seen as an amalgamation of ideas from cognitive science and economics. Neuroeconomics has primarily challenged customary economics postulation that decision-making is a unitary process a simple matter of integrated and coherent utility maximization suggesting instead that it is driven by interaction between automatic and controlled processes (Satpathy;2015).

What do brain scans really tell us? What are the practical implications of this research? Despite substantial advances, question of how we design and how we ought to craft judgments and decisions has engaged researchers for decades, with different disciplines approaching the problem through characteristically different techniques. However, neuroeconomics decision making has recently emerged as an inter-disciplinary effort to bridge this gap. It has sought to integrate ideas from fields of organisational psychology, neuroscience and neuroeconomics in an effort to specify accurate models of choice and decision. Research investigates neural bases of decision predictability and value, central parameters in economics model of expected utility. Neuro-multiple-schemes approach to decision-making, in turn, influences economics, a perspective strongly rooted in organisational psychology and neuroscience. Integration of these approaches and methodologies offers exciting potential for construction of near-accurate models of decision-making (Satpathy; 2014).

Among the gargantuan questions are; How do neurons code emotional weight of experiences—do some neurons only become active in response to negative experiences while other neurons only fire when we experience something favorably? How do neurons code the numerical value of various options—do more or different neurons fire for an option with bigger rewards than

that for a lesser reward? How does the coding for rewards that you receive immediately differ from that of rewards that are delayed? How do the far-flung different parts of the brain that govern decision-making coordinate their activity when making a decision? What triggers a decision? Is it cumulative buildup of firing neurons that tip balance to final choice? How do we alter decision-making rules when we encounter new information that makes those rules obsolete? (Satpathy; 2015).

VII. GENERAL IMPLICATIONS OF NEURO (MANAGERIAL) MANAGEMENT ?

New brain imaging technologies have motivated neuromanagement studies of internal order of the mind and its links within spectrum of human managerial choices from managerial choice making among fixed gambles to managerial choice making mediated by market and other institutional rules. We are only at the beginning of the enterprise, but its promise suggests a fundamental change in how we think, observe and model managerial choice in all its contexts (Smith; 2002). Neuroscience and social science have witnessed tremendous advance in Neuroeconomics and Neuromanagement since the birth of these interdisciplinary fields at the turn of the century.

Managerial choice neuroscience offers a novel approach to the study of both individual and interactive managerial choicemaking by combining the methods of behavioral experiments, functional neuroimaging, and formal management models. Use of this methodology has the potential to advance our knowledge of existing theoretical accounts of how people make managerial choices and judgments by informing and constraining these models based on the underlying neurobiology. Examining sophisticated high-level behavior at a neural level, such as deciding on how much risk to take with an investment or deciding on a strategy when playing a competitive game with an opponent, can provide important clues as to the fundamental mechanisms by which managerial choicemaking operates. Despite substantial advances, the question of how we make managerial choices and judgments continues to pose important challenges for scientific research.

How can we leverage our brain in business? How can we capitalise / invest on the brain? How can we make the best decision? How can we find the productivity 'hot buttons' in the brain? How can we encourage creative and ethical brain? What is the nature of explanation in Managerial neuro - Economics? What information about the past is relevant to Managerial neuro - economic decision making? What past experiences cannot be 'unlearned' in view of subsequent developments? How does experience influence our decisions? What kinds of experiences would produce better decisions and better adaptation? How does experience transfer to new situations? What learning processes take place during sampling and repeated consequential decisions? How do these processes alter when decisions are interrelated over time? When feedbacks are delayed? When decisions are time-dependent? How do we address consequential and sampling decisions when the 'environment' is dynamic? When it involves other individuals? What learning processes take place during sampling and repeated consequential decisions? How do these processes alter when decisions are interrelated over time? When feedbacks are delayed? When decisions are time-dependent? How do we address consequential and sampling decisions when the 'environment' is dynamic? When it involves other individuals? How do Managers make decisions in dynamic stock management tasks? How do Managers perceive accumulation over time? Why do Managers perform so poorly at control tasks? How can judgments of accumulation be improved? What are the effects of feedback complexity and feedback delays? How are theories represented in computational models? How can we validate and test theories/hypotheses with computational models? What is the value of using video games and simulations in behavioural decision research? How can we best present, measure, and analyse data on human learning? How do Managers make inferences from numbers? How do Managers process logic representations of data relationships? Is the representation of the past in any sense 'rational'? Are affective as well as cognitive processes involved? Can the Managerial neuro - economic present rewrite the Managerial neuro - economic past? What are the implications of memory-dependence for modeling and policy-making? Is there place for emergence in Managerial neuro - economical explanations; in particular, how does one take into explanation downward causality? Is psychology indispensable for understanding of Managerial neuro - economical phenomena? What can and cannot one expect of mathematical modeling in Managerial neuro - Economics? Does Managerial neuro - Economics have an ontologically sound domain? How dissimilar are biological systems and Managerial neuro - economical ones? Is an analysis of various notions of rationality (including bounded rationality) still important, and if so, why? What is bounded rationality? A complete answer to this question cannot be given at the present state of the art. However, empirical findings put limits to the concept and indicate in which direction further inquiry should go. What has philosophy of Managerial neuro - Economics to say about the present crisis? What has philosophy to offer the methodology of behavioural Managerial neuro - Economics and neuromanagerial economics?

Some managerial behaviors patently fail to achieve the goals of the organisation in which they are performed, leading often to the downfall of the managers who are responsible for them and sometimes to the failure of the entire organisation in which they arise. Neuromanagement has bridged management and psychology. It challenges standard management assumption that decision-making is a unitary process-a simple matter of integrated and coherent utility maximization. The goal is a mathematical theory of how brain implements decisions that is tied to behaviour. This theory is likely to show some decisions for which rational - decision making is a good approximation (particularly for evolutionarily sculpted or highly learned decision makings), provide deeper level of distinction among competing alternatives and provide empirical inspiration to incorporate nuanced ideas about endogeneity of preferences, individual difference, emotions and endogenous regulation. Researches investigate central parameters viz. neural bases of decision predictability and value in theory of expected utility.

The key question is what level of management is likely to be involved in each decision type? This starts with the premise that most basic decisions (in form of decision makings or effort allocation) can be traced back in structure of macro-scale brain activity, as measured with modern neuroimaging apparatus. Typically, such responses involve regions in brain whose precise function depends upon specific task the brain is solving. This 'context-dependency' expresses itself through (induced) specific plasticity of networks, in parallel to tonic changes in neuromodulatory activity. In turn, this reconfiguration networks

subtends learning and yield (mal) adaptive behaviour. In other words, it is very likely that goal-directed behaviour emerges from interactions that shape spatio - temporal dynamics of macro-scale brain networks (Satpathy; 2015). This means that understanding mechanics of multimodal observation of brain activity (electrophysiology, fMRI) and neuro measurements (explicit decision makings, reaction times, autonomic arousal signals, grip force) poses exciting challenge of quantitatively relating information processing to brain effective connectivity.

Decision usually involves three steps: recognition of a need, dissatisfaction within oneself (void or need), decision to change (fill void or need) and conscious dedication to implement the decision. How are decisions carried out in brain? Do we interpret research findings when neurological results conflict with self-report? What are the general implications of neuro management? Central argument is that decision-making is at core of all managerial functions and future of any organisation lies on vital decisions made. However, there are certain critical issues coupled with factors such as uncertainties, multiple objectives, interactive complexity and anxiety make decision-making process difficult. At times when making a decision is complex or there are many interests at stake, then we realize the need for strategic decision-making. Questions include; how to choose in tough situations where stakes are high and there are multiple conflicting objectives? How should we plan? How can we deal with risks and uncertainties involved in a decision? How can we create options that are better than ones originally available? How can we become better decision makers? What resources will be invested in decision - making? What are the potential responses to a particular problem or opportunity? Who will make this decision? Every prospective action has strengths and weaknesses; how should they be evaluated? How will they decide? Which of the things that could happen would happen? How can we ensure decision will be carried out? These questions are crucial for understanding complex human behaviours (Satpathy; 2015).

CONCLUSION

Real-world problems are often complicated. Psychological scientists have been interested in how people make decisions for several decades, but philosophers and economists have been studying decision making for centuries. Highlighting areas of overlap between cognitive modeling and multi-attribute judgment will stimulate further cross-fertilization and inspire research examining the boundary conditions of various models. Deciphering brain - environment transactions requires mechanistic understandings of neurobiological processes that implement value-dependent organisational decision-making. There is a crucial difference between 'thinking about thinking' and actually enhancing brain and mental processes by developing latent potential of each individual. Theoretical accounts posit that human brain accomplishes this through a series of neural computations, in which expected future reward of different organisational decision options are compared with one another and then option with highest expected value is selected. If human brain is often compared with computer, one aspect is crucially missing. Humans define goals for information processing in computers, whereas goals for biological brains are determined by need for survival in uncertain and competitive environments. How to handle brains behind businesses in age of dramatic change and growing uncertainty? What then are the coherent brain dynamics underlying prediction, control and organisational decision-making?

Organisational cognitive neuroscience is a brave new World of research opportunities. Neuroimaging has attracted most concerns from those critical of neuroscientific research in business and other fields. Organisational cognitive neuroscience research has made a number of inroads into understanding economic decision-making .There is growing interest in exploring the potential links between human biology and management and organisation studies, which is bringing greater attention to bear on the place of mental processes in explaining human behaviour and effectiveness. This represents a multidisciplinary and multi-method approach to the conceptualization of management and organisations. In keeping with the method's dominance, there is a focus on particular concerns when conducting neuroimaging work, and especially functional magnetic resonance neuroimaging (fMRI) based research. While much of the above discussion covered issues that are of particular concern to fMRI and other neuroimaging research methods, studies that which use alternative research methods possess their own unique caveats.

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