# Mathematical Exposition on Eye Movements in Decision Dynamics

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Abstract- Mathematical exploration on mathematical decision-making has extended from mathematical decision behaviourist approach to cognitive approach that focuses on mathematical decision processes that ensue prior to response. In neural computational simulations, each mathematical decision during mathematical decision task is represented by node of neural activity. Mathematical decision related neural activity has components of intensification of activity and mathematical decision inception for neural activity to overcome for mathematical decision to be completed. A way to investigate computational mathematical decision making is to scan positioning of mathematical decision behaviour leading to judgment point. Eye movements are central measure of mathematical decision. Eye movements are indissolubly linked to optical consideration, as both are prime tools for choosing stimulating shares of chromatic prospects for enriched perceptual and rational processing. Investigating eye movements is expedient in providing evidence of orientation of mathematical decision behaviour replicating computational mathematical decision during mathematical decision formation. Role of eye movements, intentional or reflex, help in gaining, possessing and tracing visual inducements, during mathematical decision formation is not entirely clear. Current proof suggests that orientation of eye movement itself may not be an essential constituent. Rather, it can be because of intensification in contact to incitement as an e influential factor in mathematical decision formation. Purpose of present scholarship is to survey foregoing conclusions that eve movements have contributory stimulus on mathematical decision formation in a rational fashion. We review experiential mathematical studies that employ eye movement monitoring as process tracing and tracking method with gazing in mathematical decision - making research. Using Kowlerian Model, we present a mathematical investigation that explains experimental methods and mathematical analysis with contemporary eye tracking savoir-faire. This paper countenances a specific hypothesis about role of eye movements in mathematical decision; understanding how eye movements are premeditated, carried out notwithstanding recurrent vicissitudes in optical assortment that eye movement harvest. One major effort understands how to decide, deal with risks and uncertainties, create options better than originally available, potential responses to problems and evaluate strengths and weaknesses of each prospective action using apparatus of eye tracking / tracing and gazing.

Keywords: Mathematical decision Making, Eye Movement, Kowlerian Model, Tracking Method and Gazing

# 1. INTRODUCTION

Mathematical decision making is a multifarious, rational process defined as choosing a particular course of action. Mathematical decision making is thought to be synonymous with management and is a criterion on which management expertise is judged. Much of any Manager's time is spent disparagingly probing issues, deciphering complications and creating mathematical decisions. Mathematical decision making is usually activated by a problem frequently controlled in a

manner that does not focus on eliminating underlying problem. The quality of mathematical decisions that Managers make is the factor that often weighs comprehensively in achievement or managerial catastrophe. One expansively used problemsolving model is 'traditional' problem-solving prototype. Seven stepladders trail; identify problem, gather data to analyse causes and consequences of problem, explore alternative solutions, evaluate alternatives, select appropriate solution, implement solution and evaluate results.

In managerial mathematical decision-making models; first, Managers must ascertain mathematical decision to be made, which needs to be convoluted in mathematical decision process, timeline for mathematical decision and areas or upshots to be achieved. Second, Managers endeavour to identify as many substitutes as conceivable. Alternatives are scrutinised in step three. In step four, substitutions are rank ordered on basis of analysis in step three so that a choice can be attempted. In step five, strategy is generated to implement appropriate options or combinations of choices. In the final step, experiments to efficacious operation of preferred options are acknowledged and stratagems are established to cope those threats. Assessment is conducted of practice and consequence criteria, with effect benchmarks characteristically replicating mathematical decision - warranting cases in rung one.

Managerial mathematical decision-making is an expanse of penetrating scholarship in neuromanagement and rational neuroscience. Effective management is a result of persistent efforts in multiple dimensions be it the formulation of strategies or the smooth functioning of day-to-day activities (Satpathy; 2015). There is significant preponderance in espousal of perceptions grounded on physiognomies in exploration into Managerial mathematical decision dynamics. Why does mathematical decision making differ among Managers? How should Manager idyllically make mathematical decisions? How can we help Manager making better (not necessarily ideal) mathematical decisions while still compelling into account humanoid cognitive precincts? How do we make human mathematical decisions? Are foundations for these mathematical decisions continually time-honoured in reason? How brain (via. eyes) absorbs data, recognises and frames challenging circumstances and selects apposite responses. Brain (via. eyes) structures suggest that brain (via. eyes) considers countless bases of information before making mathematical decision. Brain (via. eyes) imaging know-hows have inspired neuro (managerial) studies of core order of attention and its relations with band-width of hominoid mathematical decisions. How is (managerial) mathematical decision making processes carried out in brain (via. eyes)? What are the limits of understanding thinking as a form of computing? How does previous experience alter Managerial mathematical decision behaviour? What happens in brain (via. eyes) or is activated when Managers make mathematical decisions or are in process of making mathematical decisions? Is study of mathematical decision-making via neuromanagement processes significant for Managers? How is a 'fair mathematical decision' appraised by brain (via. eyes)? Is it possible today to predict mathematical decision intents? Can we moderate managerial behaviour affecting brain (via. eyes)?

Many Managers seek material than required thus triggering 'delay' because of time essential to process information. This spoils efficacy of mathematical decision. In this state, neuromanagement seeks to explicate mathematical decision-making, ability to process multiple alternatives and choose optimal course of action. It studies how management Managerial mathematical decision behaviour shape understanding of brain (via. eyes) and monitor models of management. What are the coherent brain (via. eyes) dynamics underlying prediction, control and mathematical decision making? Conjectural explanations posit that human brain (via. eyes) accomplishes this through neural computations. Deciphering such transactions necessitate understanding of neuro processes that implement value-dependent mathematical decision making. This leads to formulation of a 'neuro-management mathematical decision making paradox'. The goal is a guestimation of how brain (via. eyes) implements mathematical decisions that is tied to Managerial mathematical decision behaviour.

Imaging is a vital facet of vibrant competences and there is a cumulative quantum of signal as to how evolutionary configurations are shaped. Contributions of cognition inquiry to managerial mathematical decision strategy process research, key experiments of strategy process, drill - research, how cognition research could be applied to improve, promising intersections of research streams are some exciting (future) boulevards to explore. There are yet unsolved problems in (managerial) cognition, even though several of these have evidence supporting hypothesised solution (Satpathy; 2015). What are the general implications of neuro (managerial) management? There are unsolved issues; how does Manager decide in a state of indecisiveness, Risk and Probability? How does Manager decide in state of VUCA (Vulnerability, Uncertainty, Complexity and Ambiguity)? How do we make mathematical decisions? How does human brain (via. eyes) compute and represent abstract ideas? What counts as explanation of how brain (via. eyes) works (what are function, algorithm and implementation)? Accepting that functional reasonableness cannot be accomplished, verdures mathematical decision-makers with another judgment: what to do next?

Managers are transformation proxies, not just mathematical decision makers. Consequently, steps before and after a mathematical decision are as important as concrete choice of action. Preliminary steps embrace crafting rigidity for change, understanding positions of various constituencies and developing support for chosen action. Steps after mathematical decision include naming change monitor and ascertaining monitoring methods. Therefore, mission of good information system is broader than just collecting data to make choice. Designers of evidence systems must understand not only how Managers think but how mathematical decision process will be implemented in Manager's environment. Manager should develop methodical, logical approach to problem solving that begins with static goal and ends with evaluation. Over - choice occurs when many equivalent choices are available. Managerial mathematical decision choice involves mentally making a mathematical decision, judging merits of multiple options and selecting one or more of them. When choosing amongst options, Managers must make judgments about quality of each attribute. Evaluability causes mathematical decision reversals between shared and distinct valuations. Finest tactic to improve mathematical decision making is to admit that mathematical decision behaviour contrast when choice set size (number of choices to choose from) is low contrasted with when high. These points towards mathematical decision chronicling as technique for mathematical decisions.

# 2. RESEARCH METHOD

Eye Tracking Methodologies: Since development of eye tracking methodologies, researchers have been able to get prevue into cerebral processes involved with performing task (making mathematical decision). The advantage is that they consent to go beyond studying consequence of task (choice) and monitor progression through which Manager goes about making a choice. Because where someone is looking and what they are paying Managerial (attention) are securely joined (there is an eye-mind link), researchers track mathematical decision maker's (attention) throughout a trial. With this evidence, they can examine classification with which mathematical decision maker samples data about mathematical decision options and duration of time spent making allowance for them. These methods will be useful in adjudicating between contradictory models with divergent accounts. Eye tracking methods are not a cure-all and restricted in capacity to support inferences about mathematical decision-making.

This paper does not purport to report findings that are universally and eternally applicable, nor grounded firmly in theoretical or empirical research. It submits to a conjectural puzzle (Meta - explicandum?). It does not address single, well-defined issue, sharply focused on particular disciplinary topic. Instead, it reports on exploratory inquiries, whose coalescing leitmotif is class of real-world complications. The abstract views are based on gaps or inadequacies in scientific canon which can be formulated as questions to pursue where elucidations may lie.

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#### 2.1. Aim

Role of eye movements during managerial mathematical decision construction is not entirely clear. In neural computational simulations of managerial mathematical decision making, preference in judgment task is epitomised by corresponding protuberance of neural bustle. This activity has two idiosyncratic apparatuses: intensification of action and mathematical decision inception for action to overcome in order for choice to be made. A technique to review is to scan orientation of behaviour leading up to mathematical decision point. Investigating eye movements is expedient in providing substantiation of mathematical decision positioning of managerial behaviour replicating computational mathematical decision. Eye movements reproduce escalatory mathematical decision significance, leading to gaze chute in which eye movements dynamically feed value of individual opportunities. Intention of this paper is to shadow preceding suppositions that eye movements have causative stimulus on managerial mathematical decision formation.

## 2.2. Review Of Posits

Exploration on managerial mathematical decision making has protracted from behaviourist methodology to cognitive approach that centers on mathematical decision processes. In neural computational simulations, each managerial mathematical decision task is signified by protuberance of neural activity. Mathematical decision correlated neural activity has constituents of spiraling of activity and mathematical decision initiation for neural activity to overcome for mathematical decision to be completed. A way is to scan positioning of (managerial) mathematical decision behaviour primary to mathematical decision point. Eye movements are crucial measure indistinctly concomitant to ocular reflection as both are chromatic prospects for rational processing. Investigating eye movements is expedient in providing evidence of orientation of (managerial) mathematical decision behaviour reproducing computational mathematical decision in mathematical decision formation. Role of eye movements, deliberate or impulse, help in attainment, retaining and outlining optical stimuli, during (managerial) mathematical decision formation is not clear. Proof suggests that orientation of eye movement may not be a critical constituent. It can be result of amplification in contact to incitement as an persuasive factor in (managerial mathematical decision) formation. Focus has remained on fundamental questions: What mechanisms keep gaze stable with either stationary or moving targets? How does motion of image on retina affect vision? Where do Managers look, why and when performing complex task? How can world appear clear and stable despite continual movements of eyes? What determines mathematical decisions made about where to look? How are these mathematical decisions carried out? How do we maintain percept of clear and stable world despite occurrence of saccades? Purpose is to survey foregoing conclusions that eye movements have contributory stimulus on (managerial) mathematical decision formation in rational fashion. This reviews experiential studies that employ eye movement monitoring as tracking method with gazing in (managerial) mathematical decision - making research. This countenances a specific hypothesis about role of eye movements in Managerial mathematical decision; understanding how eye movements are premeditated, carried out notwithstanding recurrent vicissitudes in optical assortment that eye movement harvest. One major effort is understanding how should Managers' decide, deal with risks and uncertainties, create options better than originally available, potential responses to problems and evaluate strengths and weaknesses of each prospective action using apparatus of mathematical decision making, Kowlerian model, eye movement, process tracing, tracking method and gazing.

Kowler Model: Kowler (Rutgers University, USA) model states that eye movements are integral part of (managerial) interactions with visual world. Tasks, inspecting contents of visual scene, require that Managers bring eye swiftly and precisely to weighty and expedient positions. Eye movements accomplish this with virtually no overt effort or awareness. Model involves (managerial) eye movements and connections between eye movements, perception and cognition. Model is devoted to understanding how eye movements are planned, how they are carried out, how to maintain percept of clear, stable

and coherent world despite continual changes in visual array that eye movements produce. One major effort understands relationship between (managerial) eye movements and (managerial) attention, question of how (managerial) attention is involved in eye movement control and how to attend to visual environment independently of movements of eye. Model emphasises active integration of (managerial) eye movement planning with ongoing visual and cognitive processes. The model incorporates components of visual Managerial (attention), eye movements, eye movements and their role in visual and (managerial) cognitive process, Managerial (attention) during active visual (managerial) tasks, oculomotor control, visual memory, and allocation of visual Managerial (attention), accuracy and precision of visual and cognitive processes in new directions for (managerial) mathematical decision research.

### 2.3. Eye Movement

This refers to voluntary or involuntary movement of eyes, helping in attaining, possessing and tracking optical impetuses. 'Saccade' is quick, concurrent movement of both eyes between two or more phases of fixation in same direction. Cohort of saccade may consider outcome of mathematical decision-making process. Functional models are based on accretion of corporeal corroboration in favour of various alternatives in sprint to (managerial) mathematical decision threshold. Outcome is affected by variables such as value of sensory evidence, probability of alternative movements and reward associated with different movements. Salient progress has been made in studies of visual saccadic mathematical decision making, a system that is becoming a model for understanding (managerial) mathematical decision making in general. In this, theoretical models of mathematical decision making are beginning to be used to describe computations (managerial) brain must perform when it connects sensation and action (Glimcher; 2003).

# 2.4. Eye Tracking

Eye tracking is process of measuring either point of gaze (where one is looking) or motion of eye relative to head. In unassuming terms, eye tracking is measurement of eye activity. Where do (managers) look? What do (managers) ignore? When do (managers) blink? How does pupil react to different stimuli? Application of (managerial) eye movements to user interfaces; both for analysing interfaces, measuring usability and gaining insight into human performance and as actual (managerial) control medium within human (managerial) - mainframe dialogue.

# 2.5. Eye Gazing

(managerial) Eyes and (managerial) gaze are important stimuli for (managerial) interactions. Gaze means 'to look steadily, intently and with fixed Managerial (attention). (managerial) Eye region of represents special area due to extensive amount of (managerial) information that can be extracted. Eye region carries information necessary for emotion recognition. Cognitive and (managerial) Behavioural Neuro - mathematical decision science has recently witnessed explosion of scholarship investigating processing of (managerial) eye region and gaze direction in various tasks and organisational situations. Due to extensive complexity, underlying neural systems subtending these (managerial) processes are far from being agreed.

### 3. (MANAGERIAL) MATHEMATICAL DECISION PERSPECTIVE

Mathematical decision making is crucial for problems requiring mathematical decisions. All operations and body of organisation depend on effective and logical mathematical decisions made by (managerial) authorities. A (managerial) mathematical decision is a coherent collection of (managerial) rules and / or analytics which expresses (helps preset) operational choice of importance to Managers. Mathematical decision management is described as 'emerging important discipline, due to an increasing need to automate high -volume mathematical decisions across organisation and to impart

precision, consistency and agility in (managerial) mathematical decision -making process. Managers need to analyse each and every characteristic of (Managerial mathematical decision dynamics) before reaching any mathematical decision.

Managerial mathematical decision entails; mathematical decision-making under risk and uncertainty, loss aversion and intertemporal choice, reinforcement, hyper scanning and cross brain neuro-feedback, experimental platform, making use of neuroscience and neurophysiological methods, tools and theories to better understand design, development and use of information and communication technologies, impact of measures on (managerial) behaviour and its underlying psychological mechanism, nature of (managerial) cognitive processes engaged in acquiring and processing information, bringing neuro-scientific knowledge into (managerial) development, (managerial) training, (managerial) education, (managerial) consulting and (managerial) coaching, (managerial) neurobiology behind design and innovation, methodological studies of fMRI (functional magnetic resonance imaging, EEG (electro encephalograph), eye tracking and potential application of (managerial) neuroscience in domains of (managerial) innovations. Neuromanagerial mathematical decision scholarship has witnessed tremendous advance. Developments in cognitive neuroscience, neural imaging technology progress, management, through study of Managers - management behaviour, Managerial activities, brain science bring forward management measures and strategies. Neuromanagerial dynamics, mathematical decision management emphasise on specific situations, individual (managerial) differences and operational level of (managerial) behaviour, study different conditions managed mathematical decision - warranting cases evolution rule and achieve effective (managerial) management method. (Managerial) management subjects include neural mathematical decision science, neural personnel management, neural engineering, behavioural neuroscience, neural innovation management, (managerial) pathological behaviour management etc. (Neuromanagement Laboratory, Hangzhou, China; 2014).

(Managerial) eye movements are behaviour that can be measured and measurement provides complex means of learning about (managerial) cognitive and visual processing. Although there is impression that Managers can process full visual field in sole paranoia, in reality Managers would be unable to fully process information. Because of perspicacity precincts in retina, eye movements are indispensable for treating details of assortment. As eye movements are principally motor movements, it takes period to plan and achieve a saccade. There is considerable evidence that background of task sways eye movements. What quantum information is processed on any fixation (perceptual extent or functional field of vision) varies as convenience of task.

Why it is that Manager can turn gaze of both eyes concurrently towards right and left and in direction of nose. And that of one eye to left or to right, but cannot direct them simultaneously one to right and other to left? Similarly, Manager can direct them downwards and upwards. Manager can turn them simultaneously in same direction but not discretely. Is it because eyes, though two, are connected at one point and under such conditions, when one extremity moves, other must follow in same direction. This is designed for one extremity to become source of movement to other extremity (Ross; 1927). When Manager fixes his vision on an mathematical decision - warranting cases, axes of both eyes converge on that mathematical decision - warranting cases, meeting at a point on surface. When Manager contemplates the mathematical decision - warranting cases, two axes together move over surface of mathematical decision - warranting cases and together passes over all its parts. And, in broad-spectrum, two eyes are indistinguishable in all conditions and sensitive power is same in both. Their actions and affections are severally always identical.

When one eye of Manager moves for purpose of vision, other eye moves for same purpose with same motion. When one rest, other eye is at rest. Thus it is not possible that one eye should move for purpose of seeing while other remains motionless, nor that one eye should strain to look at mathematical decision - warranting cases without other straining to look at same mathematical decision - warranting cases, unless some obstacle or cover or some other accident intervened, thus

hindering one eye from participating in act performed by other. When both eyes are observed as they perceive visible mathematical decision - warranting cases, actions and movements are examined, respective actions and movements will always be identical (Sabra 1989). Habit of directing optic axes to point in view is so strong that it is difficult to do otherwise. Insomuch as when one eye is shut and other is in motion Manager may feel by fingers laid upon eye-lid, that eye which is shut, always follows motions of eye that is open. But if by squinting or by depressing an eye, optic axes are not directed to same point. Mathematical decision - warranting cases appear double. So what is the implication on Managers mathematical decision modeling? The answer is simple in that the mathematical decision process would be blurred as the blood flow to brain - eye axis is regulated via depressed state and a state of indecisiveness creeps in.

(Managerial) mathematical decision behaviour is consistently inconsistent in its tendency to change over time and repeated mathematical decision accuracy. Repeated mathematical decision making is subject to changes over time such as decreases in mathematical decision time and information use and increases in mathematical decision accuracy. Research on risky (VUCA) (managerial) mathematical decision choice has moved beyond analysing choices only. Managerial (attention) is context-dependent processes that handles and regulate scarcity of Managerial (attention). Such a question calls for interdisciplinary to look at issues raised by the scarcity of Managerial (attention). Models have been suggested that aim to describe underlying cognitive processes and some have tested process predictions. What information (manager) chomps is rather obvious. Selectivity, based on rules of thumb or 'heuristics', tends to guide into promising regions, so that solutions will be found after search of only a tiny part of total space. Satisficing criteria terminate search when satisfactory problem solutions have been found (Simon; 1978).

# 4. OPTICAL JUDGEMENT MAKING

Complexity of these (managerial) mathematical decision problems increases with options available and features of each option. Neuro-mathematical decision theorists interested in control of eye-movements are interested in saccades than in fixations (timing, velocity, trajectory and targeting). What can (manager) learn from eye tracking? How (managerial) brain processes images and responds to what they see. How something so complex could happens so fast? How can Managers trust results of a process they, in general, don't thoroughly understand? Why attractive things work better? Link between (managerial) choices and (managerial) preferences is defined by a (managerial mathematical decision) model which makes assumptions about how (managers) make mathematical decisions. This (managerial) model postulates that managers have a full understanding of mathematical decision problem and adoptoptimising behaviour to create mathematical decisions. Based on these assumptions, it is possible to break down choice into influence of specific features.

Theories on (managerial) mathematical decision making have been curiously silent regarding role of (managerial) attention during (managerial) mathematical decision making. This is not to say that no assumptions were made with regard to (managerial) attention, but rather that (managerial) attention has been of no real interest to (managerial) mathematical decision research. (Managerial) Mathematical decision researchers (Orquin et al; 2015) frequently analyse (managerial) attention to mathematical decision - warranting cases to test hypotheses about underlying (managerial) cognitive processes. Generally, fixations are assigned to mathematical decision - warranting cases using (managerial) area of interest (AOI). Ideally, (managerial) AOI includes all fixations belonging to a mathematical decision - warranting cases while fixations to other mathematical decision - warranting cases are excluded. Mathematical decision theories differ with regard to how (manager) understand mathematical decision process and role of attention. Each mathematical decision theory defends inadequate assumptions about basic properties of eye movements and attention. This calls for critical evaluation of relevant mathematical decision theories against prior research on attention and eye movements and assess body of literature on eye movements during (managerial) mathematical decision making.

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In rational models (information acquisition is complete and no information is ignored. All information is fixated, information acquisition is incomplete and attributes are discounted in structural model based on level of attendance). In bounded rationality models, particular heuristic employed by mathematical decision maker determines visual attention, each heuristic result in a particular distribution of attention and underlying heuristic can be inferred from distribution of attention). In evidence accumulation models (fixation process is stochastic and fixations are assigned to alternatives in alternating pattern, fixation patterns should not change over course of mathematical decision process because fixation process is stochastic, fixation should be shorter than mean fixation duration because fixation is interrupted when threshold is reached, fixation durations follow fixed distribution given by difference between best and worst alternative in choice set and fixation is to chosen alternative, choice bias exists in favour of alternatives fixated first and last because these alternatives accumulate evidence, accumulated evidence determines choices, any process that exogenously interferes with accumulation of evidence toward alternative bias mathematical decision in favour of that alternative and finally, information sampling needed to reach mathematical decision increases as options become similar). In parallel constraint satisfaction models, information acquisition consists of screening of information reflected in even distribution of single fixation durations, feature currently highlighted in mathematical decision process receives attention, information sampling needed to reach mathematical decision increases as alternatives become similar which reflects difficulty of maximising coherence and salient alternatives initially attract attention and are, ceteris paribus, likely of being chosen) (Orquin and Loose; 2013).

## 5. CONCLUSION

What are the mechanisms that keep gaze stable with either stationary or moving targets? How does motion of (managerial) cognitive image on retina affect vision? Where do (managers) look - and why - when performing complex (managerial) task? How can the world appear clear and stable despite continual movements of (managerial) eyes? (Managerial) Cognitive processes driving eye movements during (managerial) mathematical decision making are not in any consequential way different from those in similar tasks. (Managerial) Eye movements in (managerial) mathematical decision making are partially driven by (managerial) task demands. Eye movements in (managerial) mathematical decision making are partially driven by stimulus properties that bias (managerial) information uptake in favour of visually salient stimuli. Eye movements do not have causal effect on (managerial) preference formation. However, through properties inherent to visual system, such as stimulus-driven attention, (managerial) eye movements do lead to down-stream effects on (managerial) mathematical decision making. Mathematical decision makers optimise eye movements to reduce demand on (managerial)memory and reduce number of fixations and length of saccades needed to complete (managerial) mathematical decision task. Drivers of eye movements in (managerial) mathematical decision making change dynamically within tasks (Orquin and Loose ; 2013). Attention should be paid for performing experimental procedures in order to evaluate usability, accuracy and reliability of eye tracking systems. Any (managerial mathematical decision) model that aims to describe (managerial) mathematical decision making must reflect that visual information play central role in managerial mathematical decision dynamics.

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