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Beyond Rationality: A Comprehensive Exploration Of Decision-Making In Economics And Finance

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Abstract:

This paper conducts a comprehensive exploration of decision-making concepts in economics and finance, tracing the evolution from the concept of Rationality and Rational Choice Theory (RCT). The study extends beyond traditional frameworks to cover the downfall of rationality in economics and finance theories giving rise to bounded rationality and satisficing theory. It also covers the Dual Systems in Human Decision-Making, substantiating this basis with evidence from the fields of psychology and neuroscience. Further, going beyond rationality, some key theories/concepts are explored such as prospect theory, heuristics, biases, and social-cultural norms, etc., that explain the cognitive processes behind decision-making and bring forth the external influences that influence decisions in economics and finance. Through an extensive study of available literature, uniting diverse perspectives and ongoing insights that stretch beyond conventional economic and financial paradigms, this paper aims to provide an inclusive understanding of the theoretical and conceptual development of decision-making over the years.

Keywords: Decision-Making, Rationality, Prospect Theory, Heuristics, Biases, and Social-Cultural Norms.

1. Introduction

At the core of economics and finance, decision-making plays a crucial role by influencing individual choices, shaping market dynamics, and carrying significant implications for policies.

Understanding decision-making processes holds a profound significance that transcends the confines of economic and financial realms. Historically grounded in the principles of rational choice theory, the exploration of decision-making has experienced a significant transformation. This transformation finds its roots in the transformative realm of behavioral economics. Insights gleaned from this exploration not only enrich economic and financial theories but also cast a far-reaching influence on realms as diverse as public policy, psychology, and other disciplines. As we delve into the nuances of this evolution, a new perspective emerges, reshaping our understanding of decision processes. This review paper seeks to navigate the intricate trajectory of decision-making concepts, charting their evolution from normative rationality to the assimilation of behavioral insights. The subsequent exploration of this evolution promises to unveil its far-reaching implications on economic and financial theories.

2. Background of Decision-Making Concepts

The concept of decision-making is integral to both economics and finance, serving mutually as a theoretical construct and a practical reality. In this field, the initial presumption is that human behavior conforms to the idea of 'Homo economicus' or Economic Man[1]. Following this, human beings came to be perceived as rational man, a maximizer who settle for nothing less than the best, (Simon, 1978). Vriend (1996) contends that rationality in economics comprises essential elements such as self-interest, omniscience, conscious deliberation, and the representative agent. Similarly, Mill (1968), within the realm of Finance, posits that the foundation of the traditional financial framework rests on a self-interested orientation, rational decision-making, and the maximization of utility. Following this notion, humans are assumed to have the capacity to meet these criteria, emphasizing the belief that an individual can independently make decisions with full information, consistent preferences, unlimited willpower, and self-interest. This perspective is exemplified by theories like Rational Choice Theory, a precursor to Decision Theory.

[1] An ethological work by Persky (1995) suggests that the origins of the term *Homo Economicus* dates to 1836 by John Stuart Mill. The term is employed as a theoretical abstraction to describe an agent who, within the scope of available opportunities, strives to optimize his self-interest by making the best possible choices (Illiashenko, 2017).

3. Rational choice theory and the Decision-Making Models

The study of decision-making is fundamentally centered around the concept of rationality (Simon, 1978; Hickson and Khemka, 2014), and many theories and concepts in this field are built upon these foundational ideas. At the heart of modern economic theory is the Rational Choice Theory (RCT) (Ulen, 1999) known as a typical way of analyzing behaviour (Oppenheimer, 2008). The roots of RCT trace back to Thomas Hobbes' Leviathan (1651), where he explained the workings of political institutions through individuals' choices driven by universally shared 'appetites' and 'aversions' (Oppenheimer, 2008). This foundational approach continued through influential thinkers and utilitarians, evolving into what we now recognize as classical Rational Choice Theory. Adam Smith, building on Hobbes' idea of self-interest, asserted in The Wealth of Nations (1776) the connection between individual choices and social welfare. Utilitarians then took ahead with formalizing this link to an interpersonally comparable utility (numeraire), ultimately leading to Pareto's optimality. Preferences were later streamlined into a generalized value structure defined by assumed logical properties, giving rise to classical preference theory. Contemporary microeconomics and public choice theories are grounded in this classical preference theory.

Preferences have formal properties, including being pairwise, complete, transitive, and reflexive. These properties mean that individuals make comparisons between alternatives, ensuring a complete ranking. Additional assumptions include the notions of maximization, stability (preference orders remain constant over time and scenarios), and uniqueness (individuals having a single preference ordering). These properties and assumptions aim to explain individual choice behavior by understanding preferences and the consequences of choices.

Expected Value (EV):

Expected Value (EV) is a concept in decision theory that represents the average outcome or value of a decision when it is repeated many times. It is often used in situations involving uncertainty, where numerous outcomes can occur with different probabilities. The concept entails choosing actions with the highest total value which is calculated by multiplying

each possible outcome by its probability of occurrence and summing these values. Mathematically, the EV of variable X with probability distribution P(X) is calculated as:

Discrete random variable	Continuous random variable
• $E(X)=\sum[X*P(X)]$	• $E(X)=\int[X*f(x)]\,dx$

Where: E(X) is the expected value of X; X is the random variable representing the possible outcomes; P(X) or f(x) represents the probability distribution function of X. Expected Value guides rational decision-making by assessing potential outcomes, aiding investment and strategic choices. It quantifies expected outcomes for decision analysis and is applied in diverse fields, shaping decisions, risk assessment, and resource allocation.

Expected Utility Theory (EUT):

The mathematical foundation of Expected Utility Theory (EUT) can be traced back to Gabriel Cramer (1728) and Daniel Bernoulli (1738), who aimed to address the Petersburg paradox (Schoemaker, 1982). Bernoulli recognized that the value of a monetary gain varies among individuals and demonstrated that expected value theory is normatively incorrect. He introduced a utility function and computed the expected utility instead of expected financial value. Lengwiler (2008) outlined two key components of EUT: individuals should be guided by the expected value of the utility of potential outcomes, and the additional utility from more of the same diminishes at a decreasing rate (decreasing marginal utility).

John von Neumann and Oskar Morgenstern (1947) established a rational decision criterion in their book (second edition of "Theory of games and economic behaviour") which uniquely satisfies a set of reasonable priori axioms, laying the foundation for EUT as a cornerstone in rational decision-making. Their numerical utility definition is designed to be valid in the calculus of expectations, justifying the maximizing expected utility. The key concept involves eliciting a decision maker's preferences over risky acts, referred to as lotteries, wherein the decision maker can accurately express pairwise preferences between any two objects. Regarding representation of the preference relations, the preferred is represented by the symbol > represents 'preferred'; symbol ≥ represents 'at least as preferred as' the symbol ~ represents indifference.

This theory assumes decision makers maximize expected utility and introduced constraints on rational preferences, implying decision makers behave as if calculating expected utilities. They also assume decision makers can express pairwise preferences between different lotteries, enabling them to compare uncertain outcomes. They presented conditions for rational preferences:

1. Completeness: A > B or A ~ B or B > A
2. Transitivity: If A > B and B > C, then A > C

To state the next axiom, let p be some probability strictly greater than zero.

3. Independence: A > B if and only if ApC > BpC

Let p and q be some probabilities strictly greater than zero and strictly smaller than 1.

4. Continuity: If A > B and B > C then there exist some p and q such that ApC > B > AqC.

The preference relation > satisfies vNM 1-4 if and only if there exists a function u that takes a lottery as its argument and returns a real number between 0 and 1, which has the following properties:

- A > B if and only if u(A) > u(B).
- u(ApB) = pu(A) + (1 − p)u(B).
- For every other function u′ satisfying (1) and (2), there are numbers c > 0 and d such that u′ = c . u + d.

Expected Utility (EU) considers varying values of a commodity for decision makers, assessing both monetary and non-monetary aspects in competing outcomes. The formula ∑ piu(xi) multiplies probability by assigned value for rational decision-making.

Subjective Expected Utility (SEU):

Subjective Expected Utility (SEU) extends Expected Utility Theory (EUT) by incorporating individuals' subjective beliefs and judgments about probabilities and utilities in decision-making under uncertainty. Unlike EUT, SEU acknowledges the presence of imperfect information and personal assessments in individuals' decision processes. Ramsey (1931) and De Finetti (1937) were the first to propose using subjective probability to quantify a decision maker's understanding of uncertain events. Savage (1954) later integrated this notion with Von Neumann and Morgenstern's expected utility, establishing the logical foundation for contemporary Bayesian

decision theory under uncertainty (Etner et al., 2009), whereas the theory also provides a consistent framework for decisions involving 'risk' (Karni, 2005).

The SEU framework presupposes two key conditions (Simon, 1983): First, the decision maker must have a well-defined utility function capable of assigning cardinal numbers to express preferences for various future scenarios. Second, the decision maker must be faced with a clearly defined set of alternatives for selection. According to Radner (2015), the fundamental components of the SEU model include: a collection of alternative states-of-the-world, or states, providing descriptions of different world scenarios; a range of alternative acts, represented as functions assigning outcomes to each state or to sets of states (events); a selection of alternative consequences, detailing the outcomes experienced by the decision maker.

Savage demonstrated analytically that if a decision-maker adheres to rationality axioms and believes an uncertain event has outcomes xi with utilities u(xi), their choices can be explained by a utility function combined with subjective probabilities P(xi). The resulting subjective expected utility is mathematically represented as $\sum i \ uxi \ P(xi)$. The EUT is recognized as a normative decision theory. The SEU framework serves both descriptive and normative purposes in decision-making. Unlike EUT, SEU accommodates subjective and imperfect information, offering a more flexible model under uncertainty. However, challenges arise, including potential bias in subjective probability assessments and the necessity for accurate quantification of subjective beliefs. Ongoing research in decision theory and behavioral economics addresses these challenges associated with SEU.

4. Beyond Normative Models: Unraveling Decision-Making Anomalies in Economics and Finance

The basis of rational decision-making reformed our understanding of how individuals seek to maximize well-being through their choices. However, this notion has met a gamut of reproaches across various dimensions. Many researchers comprehended the systematic contrast in the behaviour of economic agents than what is envisioned by the rational agent view (Tversky, 1969; Kahneman and Tversky, 1979, 1984; Tversky and Kahneman, 1981; Baron, 2008), and that, the decision-making models are impractical. Simon et al., (1987)

contend that the identical behaviours of people is unlikely, and the model are partly inconsistent with human decision processes (March, 1978) thereby systematically mis predicting human behaviour (Shiller, 1999; Galotti, 2002). Many researchers deny far-reaching calculations (Simon, 1979; Anderson, 1983; Hastie and Dawes, 2001; Gilovich and Griffin, 2010), whereas others advocate that people lack boundless time to make complex computations (Tissington and Flin, 2005; Sinclair and Ashkanasy, 2005; Salas et al., 2012; and Sadler-smith, 2016) and concluded it to be incomplete (Hastie, 2001). Heracleous (1994) opines that the RCT can be applicable in a reasonably simple problem but not in the real world since there are multiple decision-makers, irregularities, dynamic markets, ambiguity, and more.

The normative paradigm faced challenges as assumptions of consistent preferences and unwavering rationality came under scrutiny. For instance, Expected Value theory posed challenges for decisions involving non-monetary outcomes (Shanteau and Pingenot, 2009). Experiments were conducted to test the descriptive plausibility of normative decision models, namely the EUT (Preston and Baratta, 1948; Mosteller and Nogee, 1951). The systematic defiance of independence was demonstrated by Allais' (1953), Edwards (1954), Morrison (1967), MacCrimmon and Larsson (1979) and Kahnemann and Tversky (1979). Additionally, the St Petersburg paradox[2] by Bernoulli (1738, translated in 1954) revealed that individuals were hesitant to pay a significant amount to participate in the game even though the potential winnings were theoretically infinite, thereby undermining the consistent maximization of expected monetary value. Further, failure of transitivity was evidenced by May (1954) and Bell et al., (1988). Simon (1959) contends that complications multiply when utility function are extended, and the model becomes inadequate when the perception and cognition of the decision-maker intervene with his objective environment (Simon, 1957).

Kahneman and Tversky (1979), while critiquing EUT, argued that individuals perceive the potential for loss differently from gain, mentioning Allais paradox as the most

[2] Bernoulli proposed that humans find value not just in financial outcomes, but in the perceived satisfaction linked to those outcomes. This concept formed the basis for the development of behavioral economics.

notable counterexample to EUT[3]. Another substantial decision theory, the SEU faced challenges when Ellsberg paradox was introduced (Ellsberg, 1961), revealing cases where people's choices defy SEU theory, challenging the conventional assumption that individuals consistently maximize expected utility in decision-making[4]. The paradox stems from ambiguity aversion, wherein individuals favor options with known risks over uncertain ones, even if the uncertain choice could yield greater overall benefit. Turpin and Marais, (2004) consider that, to a large extent, a decision-makers even with a strong analytical background do not rely on formal decision support tools. Likewise, it is claimed that "there has never been any hard evidence showing that we live up to such normative standards, nor does any theory with thoughtful empirical support entail that we do", (Swoyer, 2002). With all these backdrops, consequently, alternative descriptive-explanatory models were proposed and tested (Edwards, 1954; Slovic, 1967; Payne, 1973; Libby and Fishburn, 1977; Kahnemann and Tversky, 1979), giving rise to the development of behavioural economics as a new discipline.

The Limits of Rationality in Standard Finance: Unveiling the Downfall

While economics provides a foundation on theories and decision-making models, finance theories tailor their focus to the intricacies of areas like markets, investments, and risk management. The basic assumptions of 'economic man' play a substantial role in financial theories, where individuals are viewed as economic agents. As such, rational investor, full information, and efficient market are at the very base of the theories of finance's assumptions. The failure of rationality is demonstrated by many Scholars such as Tversky and Kahneman (1974), Thaler (1994), Statman (1995, 1999), Gao and Schmidt (2005), Evans (2006). The repeated patterns of irrationality, inconsistency and incompetence in decision-making were evidenced by Bernstein (1996).

The Efficient Market Hypothesis (EMH) is based on perfect information and rational investors (Peters, 1996) yet it failed to explain the market behaviour (Waweru et al., 2008). Statman (1995) argues that the standard finance is so weighted

[3] Kahneman and Tversky's article became one of the most cited articles in *Econometrica*, adding to the popularity of the Allais paradox.

[4] MacCrimmon (1968) also reported violation.

down with anomalies, falling on a spectrum between partial efficient and partial inefficient (Statman, 1999). Revealing the volatility of stock prices, Shiller (1981) claims it is far more unpredictable than could be simplified by standard financial theories, and points at psychological and cultural factors influencing investor's perception, and so, creating bubbles in the stock markets. Traditional finance assumes that the investors are risk-averse whereas their decision alters the way a piece of information is presented (Tversky and Kahneman, 1981; McNeill et al., 1982). People also do not follow the homogenous expectations, and it has been demonstrated by Statman (1995) where people exhibit distinct for dollar in dividends and a dollar in capital. Further, people think that good stocks are the stocks of good companies when it comes to stocks preferences, exemplifying the representativeness heuristic (Solt and Statman 1989). Studies on the escalation of commitment (sunk cost) confirm that people might be trapped in losing courses of action even to the extent of losing substantial amounts of money (Arkes and Blumer, 1985; Brockner, 1992; Staw and Hoang, 1995).

With the failure of humans to be rational and the growing market inefficiencies, the flaws in traditional finance were evidenced. The explanations of the humans to fail to be rational have been provided by ideas from behavioural economics and the study of market inefficiencies were witnessed in time. For instance, Shiller (1981) showed that the volatility of stock market is much larger than can be elucidated by rational factors; De Bondt and Thaler's (1985) worked on stock market overreaction using a convincing behavioural explanation to anomaly. The empirical collapse of standard finance theories led to the development of key concepts and theories to be known as behavioural finance. The renowned researchers like Amos Tversky, Daniel Kahneman and Richard Thaler are called the founding fathers, often referred to as the "biases literature". This new field stems from subjects like psychology, economics, finance, neuroscience, sociology, cognitive science, decision sciences, etc., and takes to another level in understanding the human decision-making process.

Bounded Rationality and Satisficing Theory: A Paradigm Shift Beyond Traditional Framework of Decision-Making

Defying the boundaries of traditional decision-making models, the vast landscape of irrational decisions unfolded, questioning the longstanding principles, i.e., human choices are exclusively rational and predictable. In this dynamic exploration, we delve into the complexities of decision-making, where the unexpected, the emotional, and the unpredictable shape the narrative of human choices, revealing a nuanced perspective that transcends the boundaries of conventional understanding.

Bounded Rationality: The normative decision theory's failure in practical human life unfolded for the search of an alternate explanation. In the quest, Simon published two papers positioning as a basis for the development in the theory of choice (March, 1978): the first one examined the informational and computational limits of human beings, the second one explored the simple payoff functions and search rules in an unreliable environment (Simon, 1956). The limitations involved computational ability, information processing, time, the organization, full application of memory and the like. Simon (1955), as a critique to the normative model, proposed bounded rationality based on human limitation. This concept does not abandon the rationality model completely, rather it considers how people make decisions in real life problems (Radner, 2015) thereby acknowledging our limitations which prevents us from being fully rational (Simon, 1957). Bounded rationality delivers a more accurate framework for understanding how people make decisions in a multifaceted and uncertain world, admitting that they frequently employ heuristics, satisfice, and adjust their approaches to cope with the confines of their cognitive resources.

Satisficing Theory: Advancing the concept of bounded rationality, Simon (1957) incorporated the limitations of the decision-maker in the theory and termed "satisficing" to the process of attaining alternatives through "heuristic search" and "stop rule," as well as "adjustable aspirations". Since the greatest solution may be indefinite and one cannot remain for eternity expecting to find such a resolution, the satisficing theory suggests people adjusting to aspirations and choosing the one which meets the sufficient criteria. Given the elevated cost of gathering extensive information through exhaustive searches, the satisficing theory proposes a conventional idea: decision-makers stand to gain more by accepting a

compromised solution rather than engaging in an indefinite search for the absolute 'best' solution (Bwisa et al., 2014).

Satisficing is an adaptive approach and a common decision-making strategy which people often make based on intuition, rules of thumb, or quick assessments rather than running exhaustive analysis. They incorporate new information learned from past experiences and adjust their criteria for satisfaction. Satisficing involves trade-offs between the decision outcome and the effort invested in decision-making. By admitting a good enough option, people save time and effort**.** The concept of satisficing helps explain deviations from the rationality notion and offers insights into how individuals route complex decision environments. It provides a valuable background for understanding how people make decisions balancing the pursuit of satisfactory outcomes given their limited cognitive resources. The advent of concepts like Bounded Rationality and Satisficing theory marked a significant shift towards recognizing that the decision-makers often face restraints in processing information and optimizing choices.

5. The Dual Systems in Human Decision-Making

The idea of two thinking processes that the brain draws upon, currently being addressed as dual-process theory was introduced in the work of William James (Cummings and Freeman, 2019). James (1890) believed that thinking was either “associative” or based on “true reasoning”. Accordingly, the first is based on heuristics developed from past experiences while the latter relies on rules of analysis. However, the idea of two cognitive systems (System 1 and System 2) in decision-making and reasoning is a more contemporary development associated with scholars like Daniel Kahneman and Amos Tversky.

Regarding the generic dual-process framework, Kahneman (2011) refers to it as system 1 and system 2 whereas Stanovich (2011) terms it as type 1 and type 2 but conveys essentially the same. Researchers proposed that the two-processing system interact in a default-interventionist structure (Evans, 2008; Evans and Stanovich, 2013). System 1 facilitates the continuous flow of our feelings, associations, intentions, preparations for actions, and alike. It effortlessly extends a continuous representation of the world, enabling us to simultaneously perform several simple tasks (Kahneman et

al., 2011). However, it can divert us from the correct course also.

Given the highly accessible nature of intuition-based thoughts, dual-process theories propose a strong inclination for them to dominate judgments and preferences, unless it is being overruled by System 2 (e.g., Kahneman, 2011; Stanovich, 2011). For instance, when new information is received, System 1 arrives at a conclusion before System 2 even commences deliberation. System 2 is activated to evaluate the information deliberately only when the emotional effect of the System 1 processing or individual disposition towards rational thinking conveys the decision into consciousness (Kahneman and Fredrick, 2002; Evans and Stanovich, 2013). In such circumstances, System 2 faces two choices: either endorse the decisions made by System 1 or challenge the decision by presenting a rational alternative. The dual-process theory not only unveils the particulars of our cognitive processes concerning intuitive and deliberate thinking but also underscores the extensive realm where individual decisions unfold, showcasing the substantial potential for biases to influence our choices.

6. Unmasking Decision Forces: Exploring Economics and Finance Beyond Rationality

'Unmasking Decision Forces' venture spans the realms of economics and finance, delving into a rich tapestry of psychological phenomena and cognitive biases. From the foundational principles of Prospect Theory and the efficiency of Heuristics to the intricate dance of other concepts, we navigate through the corridors of decision psychology. As we embark on this comprehensive exploration, the goal is to illuminate the subtle forces that guide our decisions, recognizing the interplay of psychology, biases, and socio-cultural influences within the intricate tapestry of economics and finance.

6.1 Prospect Theory:

Kahneman and Tversky (1979) developed prospect theory out of critique to expected utility theory as an alternative to descriptive model of decision making under uncertainty. They essentially gave light to the incidence, causes, and effects of human error in rational decision (Pompian, 2012) which then became the backbone of behavioural finance (Kapoor and Prosad, 2017). Prospect theory implies that people tend to evaluate prospective gains and losses relative to a reference

point (the status quo). The authors demonstrated people over-weighing the outcomes that are certain and under-weighing outcomes that are merely probable–an occurrence which they called certainty effect. This tendency contributes to the unique behaviour of the decision-maker, exhibiting risk aversion in choices concerning sure gain and risk seeking in choices concerning loss – the Reflection Effect. Further, while simplifying the choice between alternatives, people give more attention to the components that differentiate and neglect the common attributes– referred to as isolation effect. The isolation effect[5] highlights how individuals often overlook shared components and emphasize distinctive ones leading to varying preferences.

The essential aspect of this theory is that variations in wealth or welfare, rather than final states, are the focal points of value. In decision-making under risk, individuals initially establish a baseline and then assess outcomes as gains or losses. The value function departs from linearity, taking on an S-shaped curve. Gains exhibit concavity (risk aversion), losses show convexity (risk seeking), and losses are typically weighed more heavily than gains (loss aversion). The prospect theory has been extremely persuasive in understanding deviations from traditional economic models of rational decision-making. It highlights the role of reference points, emotions, and psychological biases in molding human choices under uncertainty. Prospect theory has suggestively deepened our understanding of how individuals assess and respond to risk, redesigning the discourse in economics, finance, and behavioral sciences. Its undergoing impact continues to guide researchers in breaking the complexities of human decision-making.

6.2 Heuristics approach to Decision-Making:

The seminal work of psychologists Amos Tversky and Daniel Kahneman in the landscape of human decision-making has led to the exploration of heuristics, the mental shortcuts ingrained in our cognitive processes. As we proceed, we unravel the concept of heuristics in this journey, recognizing the mental shortcuts as powerful tools that people employ to simplify difficult decision problems and traverse the uncertainties inherent in the human cognitive process. Heuristics are mental

[5] Also known as the "isolation heuristic" or the "distinctiveness effect".

shortcuts or rules of thumb that people use to simplify decision-making. Tversky and Kahneman (1974) introduced three heuristics namely Representativeness, Availability, and Anchoring and Adjustment:

Representativeness: While making decisions, people tend to look for traits consistent to previously formed prototype or stereotypes (Kahneman and Tversky, 1972).

Availability: Tendency to rely on readily available information, often easily recalled or recent, while making decisions (Tversky and Kahneman, 1973). People habitually look for obtainability of instances or scenarios in making judgments.

Adjustment and Anchoring: People in many situations make estimates by initiating from an initial value (anchor), and after that, change towards the final answer. As per Tversky and Kahneman, anchoring refers to the individuals' inclination to rely more intensely on the initial piece of information when making decisions.

The Affect Heuristic: The affect heuristic is a mental shortcut whereby our current emotion manifested in the form of fear, surprise, pleasure, etc., influences the problem solving and decision-making. The affect heuristic got significant focus and consideration when Finucane et al., (2000) demonstrated the inverse relationship between benefit and risk perception. The early initiation of the concept is traced to Robert B. Zajonc's (1980) work where he posited that our initial responses to stimuli typically involve automatic affective reactions. Later, Finucane et al., (2000) re-examined their previous findings and confirmed that the relationship occurs when people rely on emotional responses.

Familiarity Heuristic: The Familiarity heuristic grounds from the concept of availability heuristic of Tversky and Kahneman's work. As per familiarity heuristics, the instances that promptly come to mind are given significant consideration in judgment, as they become more familiar in memory and are perceived as more important. This concept features that people often use a mental shortcut with a belief that what has worked earlier still applies, notably when dealing with a lot of mental pressures.

Elimination by aspects: The Elimination by Aspects (EBA) theory of choice, proposed by Amos Tversky (1972), suggests that individuals make choices through a sequential process of eliminating alternatives based on specific aspects or attributes. This theory emphasizes that each alternative is a set of aspects, and the decision-makers don't assess all attributes simultaneously but instead use a step-by-step elimination process. Selection of an aspect is determined by its probability, proportionate to its significance, and the alternatives not covered by the selected aspect are then eliminated. If, based on a selected aspect, no alternatives are eliminated in the elimination process, a new aspect is chosen for the next round, and this continues until only one option remains. Tversky's research on EBA contributed to our understanding of how individuals simplify complicated decision problems by breaking them into convenient steps.

They expressed the view that although these heuristics are economical and effective, they do lead to systematic errors. Their work revolutionized our understanding of how individuals traverse uncertainties and make choices. Their contributions in this field have made a lasting impact, leading to extensive recognition, and inspiring many works in the following years.

6.3 Biases and Decision-Making:

Embarking on the exploration of decision-making, cognitive biases are unveiled as underlying elements shaping our choices. Each revelation illuminates the complex interplay between the human mind and the decisions made. Rooted in cognitive limits, human psychology, and diverse factors, biases play a vital role in shaping how decisions unfold. We delve into key concepts that lay the foundation for a nuanced understanding, paving the way for an insightful examination of cognitive biases.

Theory of cognitive dissonance: The Cognitive Dissonance Theory is focused on how people try to reach internal consistency. The theory proposed by Leon Festinger (1957) suggests that we have an inner drive seeking our attitudes and behaviour to be in harmony and avoid disharmony (dissonance). Cognitive dissonance arises when a decision maker experiences mental conflicts in their beliefs, assumptions, values, attitudes, behaviours or ideas, or when presented with evidence contradicting them, resulting in

psychological stress. Mental conflict produces mental discomfort referred to as "pain of regret" by Shiller (1999). When discomfort arises, people strive to resolve it (reduce discomfort) by avoiding new information or creating convoluted arguments to uphold their beliefs and restore balance.

Attribution Theory (Self-Serving Bias): Attribution theory was introduced by Fritz Heider (1958) when he revealed that in vague situations, individuals tend to make attributions based on their own requirements. The behaviour of attempting to maintain a positive self-concept was later termed as 'self-serving bias'. Further extended, it suggests that people often commit systematic errors when assessing or seeking reasons for their own behavior as well as the behavior of others. It is the peoples' tendency to credit their accomplishments to their own abilities and efforts, while attributing disappointments to external factors beyond their control (Campbell and Sedikides, 1999; Hoffmann and Post, 2014).

Confirmation Bias: Confirmation bias suggests that people favor information that confirms their pre-existing beliefs or attitudes. Peter Cathcart Wason (1960) introduced the concept after revealing that the participants in his experiment were simply seeking to confirm their beliefs. Confirmation bias[6] connotes that people look or interpret evidence in ways that favor their existing beliefs, expectations, or a preconceived hypothesis (Nickerson, 1998) leading to overlook evidence thereby preventing to look at situations objectively (Kahneman et al., 2011).

Ambiguity Aversion: Ambiguity aversion suggests the affinity of people to favor known risks over uncertain outcomes, particularly when facing settings with ambiguous or unclear probabilities. Ambiguity, a lack of information, was introduced by Daniel Ellsberg (1961) where the inclination towards known-probability bets over ambiguous ones (even if the ambiguous option may have a better expected outcome) can result in taking suboptimal choices, missed opportunities, or refraining potentially benefiting decisions.

[6] Also identified as myside bias or selective collection of evidence.

Hyperbolic Discounting: Hyperbolic discounting is a time-inconsistent model of temporal discounting where the subjective value of a reward decreases rapidly for a short delay but then decreases more slowly for longer delays. Literature refers to Herrnstein's (1961) work where it was evidenced that varying reinforcement schedules influence the strength of behavioral responses in experimental conditions. The work was taken further experimenting preference reversal by Ainslie and Herrnstein (1981). People exhibit present bias by assigning uneven value to instant rewards, even when the wait is relatively short. Further, the discounting rate is not persistent, leading to inconsistent preferences over different time horizons.

Gambler's Fallacy: Gambler's fallacy[7] is the result of trust in the 'law of small numbers' which was widely known after the demonstration in a study by Amos Tversky and Daniel Kahneman (1971). The authors explored in their research on probability and decision-making and came up that the fallacy is a mistaken belief of the fairness of the laws of chance, leading to erroneous belief. It is the erroneous belief that the probability of an event fallen when that event has just happened, even though the probability of the event is independent (Clotfelter and Cook, 1993).

Loss Aversion: Loss aversion is a cognitive bias, introduced by Daniel Kahneman and Amos Tversky (1979), a phenomenon where people try their best to avoid losses than acquiring equivalent gains. People exhibit greater distress from a loss compared to an equivalent gain; in other words, losses have a more significant impact than gains. People go to notable lengths to avoid losses, habitually making decisions that prioritize averting negative outcomes over pursuing positive ones.

Risk Aversion: Risk aversion is the inclination towards a sure outcome over a probabilistic one, even if the anticipated value of the uncertain outcome is equal to or higher than the sure outcome. Tversky and Kahneman opine that risk aversion is one of the shortcuts people take in a decision among risky options, exhibiting to search for options with low probabilities of

[7] Gambler's fallacy is also referred as Monte Carlo fallacy after an incident in 1913 when a roulette ball landed on black 26 times in a row. Gamblers mistakenly thought a red outcome was "due" and lost money by consistently betting against black.

losses and moderate probabilities of gains. People choosing a riskless lottery to a risky one is said to be a weak form of risk aversion, whereas choosing less risky lottery to a riskier one is said to be a strong form of risk aversion (Etner et al., 2009). As such, risk-averse people generally do not take risks and prefer outcomes that are certain and stable.

Disposition effect: This concept brings forth the change in our risk perception given the circumstances: more risk-averse after experiencing gains and become risk seekers after suffering from losses. Kahneman and Tversky's prospect theory (1979) is generally referred to by researchers to explain the disposition effect. Authors opine such tendency is due to the early lock in gains as a regret aversive nature of the investors. Shefrin and Statman (1985) has beautifully quoted "disposition effect" as tendencies of investors to "sell winners too early and ride losers too long".

Sunk Cost Fallacy: Richard Thaler (1980) introduced the concept of sunk cost fallacy challenging the economic theory's idea of the historical cost's irrelevance. This concept was extended by Arkes and Blumer, (1985) and defined the fallacy as "an increased inclination to persist in an endeavor after an investment in money, effort, or time has been made." Individuals commit such fallacy as they hesitate to terminate an endeavor, even if it appears to be unproductive, because of the resources invested in it previously (Sweis et al., 2018). This fallacy is related to loss aversion and status quo bias.

Endowment Effect: The Endowment Effect, introduced by Richard Thaler (1980), is a cognitive bias wherein people assign relatively higher value to the things they own compared to the same items they do not own. This tendency leads to a subjective and amplified perception of an item's worth. As such, people often display unwillingness to part with their possessions, even when offered similar valued alternatives.

Framing: Framing as a decision concept is based on the founding work of Prospect Theory which demonstrated change in the preferences in the face of gains and losses. In this following work, Tversky and Kahneman (1981) presented a descriptive model examining the psychological principles governing the perception of decision problems and the evaluation of probabilities and outcomes. Tversky and

Kahneman (1989) demonstrated how change in descriptions of a decision problem repetitively gave rise to dissimilar preferences (risk-averse in certain gains, risk-seeking in losses or negatively framed questions, and an overall dominance of undesirable choices over desirable ones), confirming that the way in which a piece of information is presented affects the decision being made (Tversky and Kahneman, 1981).

Regret Theory: Regret theory was proposed as an alternative theory to prospect theory designed to be more intuitively appealing. It was first developed by Graham Loomes and Robert Sugden (1982) and refers to peoples' behaviour influenced by the expectation of regret associated with making an incorrect decision. Regret is triggered by the comparison of an actual outcome with the payoff one could have from selecting a different option (Bell, 1982). The emotional reaction (Plous, 1993) people feel like sorrow and grief (Statman, 1999) after making an erroneous judgement, is proven to have impacted decision-making ability. Regret's emotional impact can irrationally alter behavior (Shiller, 1999), potentially making investors both risk-averse and risk-seeker.

Conjunction Fallacy: The Conjunction Fallacy, introduced by Tversky and Kahneman (1982), is a misconception while making decision where people mistakenly believe that the co-occurrence of multiple events is more probable than the occurrence of a single event. This fallacy is an outcome because of the dependence on the representativeness heuristic where people choose a conjunctive event as more probable than one of its components. The authors claim that the most evident disparity between probability and representativeness occurs when assessing compound events. This false impression (Illiashenko, 2017) highlights the discrepancy between the principles of probability and representativeness.

Mental Accounting: Mental Accounting is a concept of mental arithmetic (integration and segregation) introduced by Richard H. Thaler (1985). This concept takes the help of prospect theory's value function and proposes to have a set of cognitive operations (organize, evaluate, and keep track of financial activities) at the individual as well as household levels. People do organize things separately, treat differently or places values differently based on some criteria such as the origin of money and its expected use (Thaler, 1999). Whereas

the author concludes that mental accounting violates the economic principle of fungibility, Shiller, (1999) discusses how individuals end up looking separately at small decisions, thus, becoming susceptible to making more irrational decisions.

Status Quo Bias: Status quo bias is an emotional bias, a concept related to the prospect theory's reference point. Decision-makers exhibiting loss aversion strongly incline at the existing point (status quo) since the negatives of deviating from it loom larger than the benefits (Kahneman et al., 1991). Following the years, Samuelson and Zeckhauser, (1988) also demonstrated the concept and referred to as 'status quo bias'. The preference to remain in an unchanged state deters the economist from both buying and selling.

Overconfidence Bias: Overconfidence is a cognitive bias in the peoples' judgments emanating out of misjudgment in the confidence regarding the accuracy of their responses to various stimuli (Pallier et al., 2002). In this erroneous decision, a decision maker overestimates his abilities or the precision of his beliefs often exhibiting higher subjective confidence than objective accuracy (Moore and Healy, 2008). It takes the form of overestimation, overplacement and overprecision. Our internal evaluation of accuracy (Moriarty, 2015) produces unjustified faith about the judgments we make (Pompian and Wood, 2006), leading to a false and distorted calculation, resulting to a systematic error of judgment.

Optimistic Bias: This is another form of cognitive bias where people tend to attribute very high probability of favorable future outcomes or events and underrate the likelihood of negative future outcomes or events (Weinstein, 1980; Sharot, 2011). People frequently display an optimistic bias, considering that positive events are more likely to happen to them and bad events are less likely to occur compared to others, leading to flawed decision making.

Conservatism Bias: Conservatism bias is a cognitive bias where people tend to anchor on their existing beliefs or initial views (Ritter, 2003) and are reluctant to incorporate new information or revise their beliefs at the expense of acknowledging the fresh information (Pompian, 2011). People with conservatism bias are slow in apprising their beliefs (Luo, 2013) leading to

stick with existing views, resist change, and underreact to new evidence. Conservation bias hinders the decision when the situation demands adjustments or modifications (making timely and informed decisions), possibly resulting in missed opportunities or below the best possible outcomes.

Nudge: The concept of "nudge" was popularized by Richard Thaler and Cass Sunstein (2008) where they revealed how "nudges", a small adjustment in the way choices is presented, can influence, and enhance decision-making outcomes without limiting individuals' freedom of choice. The authors refer to “libertarian paternalism” to describe the facility to influence behavior without coercion, and "choice architects" to those who shape choices.

Time Discounting: Time Discounting[8] refers to the tendency of people to devalue rewards or costs that takes place in the future compared to those in the present. People prioritize the present and prefer immediate rewards over larger if the larger rewards are delayed. Further, the bearing of time is more evident in the short term as the decline in the perceived value of future rewards is usually not linear but follows an exponential decay.

Social and Cultural Considerations in Decision-Making:

This section delves into the complex dynamics that shape our choices within the broader tapestry of society. In this exploration, we will look at how individuals find guidance in the actions of others unravelling the threads of social proof, and the compelling force of herding behavior that molds collective decisions. Further, we delve into the reflective influence exerted by cultural norms, traditions, and the subtle pressures exerted by peers. This multifaceted examination throws light on how individual decisions intersect with, and are frequently affected by, the predominant currents of social and cultural influences.

Social proof: Social proof[9] is a term familiarized by Robert Cialdini (1984) wherein people imitate the behaviour of others under a given situation. This concept is considered protruding in unclear situations when people are doubtful of the right way to behave. People observes and tries to get hints regarding the

[8] It is also known as temporal discounting or delay discounting.
[9] Social proof is also referred as informational social influence.

correct behaviour if the nearby peoples know well about the situation. This behaviour of conformity often leads to flawed decision.

Herding Behaviour: The observable impacts of social influence seen in the considerable groups are referred to as the herd behaviour. The concept of herd behavior was introduced by J. MacGregor Burns (1978) where the term "herding" was used to describe “a phenomenon in which individuals in a group tend to conform to the behavior of others, often without questioning the wisdom or rationality of the behavior.” The conformity by way of converging social behaviour (Raafat et al., 2009), imitation to judgements (Kumar and Goyal, 2016), or having the ‘follow the leader mentality’ (Ogunlusi and Obademi, 2019) can perpetuate fabrication, contributing to imprudent choices.

Culture: Culture is regarded as shared-knowledge structure (Triandis, 1972) that gives meaning to inward stimuli and drives outward responses through a social happening. It is defined as a collective norm that the group has learned (Schein, 1992), a social cognition connected to the discerning attention the human mind exhibits (Shiller, 1999). Culture directs peoples’ actions (Trompenaars, 1994), impart preferences, and uncovers itself in how people think, behave, and believe (Oliveira, 2007).

Tradition: Tradition incorporates a collection of customs, beliefs, practices, or values transmitted from one generation to the succeeding one within a specific society or cultural context. Tradition often shapes decision-making by arranging a framework of established norms and values, influencing peoples to align their choices with established cultural practices.

Peer pressure: Peer pressure is the direct influence on individuals by their peers, influencing in the decision-making. Emile Durkheim (1895) acknowledged that the social norms and values employs a formidable influence on individual behavior, actively shaping and reinforcing them. The work of Sherif (1935) exhibited how the view of people’s sanity could be shaped by the viewpoint and behavior of others. Peer pressure compels us to conform to group norms, often prioritizing social approval over careful consideration of the

outcomes, leading to misguided decisions or decisions which are not in the best interests of the decision-maker.

7. Insights Gleaned from this Exploration

The concept of rationality and the decision-making theories resulting from it are still regarded as an optimal standard in decision-making. Decision-making concept has evolved from introducing utility functions to incorporating individuals' subjective beliefs/judgments about probabilities in decision-making. Due to the pitfalls of the human mind to be entirely rational, new applied concepts/theories such as bounded rationality and satisficing theory were introduced. As such, these concepts acknowledge the inbuild limitations of human beings and are more inclined towards the real-world setting where people are restrained from always making optimal decisions. A significant breakthrough to the extent of decision-making was given clarity when researchers brought to light the dual system of our human mind, backed by neuroscience. Accordingly, one system leans towards intuitive judgement whereas the other leans toward deliberative thinking. This gives considerable scope that can guide us to develop effective strategies to influence behavior.

Prospect theory describes how people make decisions in real life and emphasize on framing of choices, loss aversion, the S-shaped value function, and psychological biases which shape our choices under uncertainty. Also, unfolding the notion of reference points is a very valuable insight into decision-making since different people make different choices based on their standpoint. Similarly, certain biases such as conservatism bias and status quo bias, introduced at different points in time where people stick to their existing beliefs or initial views, or are inclined towards their existing point. This exhibition of peoples' tendencies gives clarity to how a decision maker perceives and approaches a decision problem.

The human mind is observed to succumb to formed prototype or stereotypes, heavily relies on available/first information or our mind considers the instances that come to mind. These mental shortcuts known as heuristic emanate from the misjudgment of our mind. These shortcuts are known to be useful at times, particularly for solving simple problems. However, these approaches are not reliable as it leads to making an erroneous choice. Further, biases shape our choices

in distinct ways. For instance, ambiguity aversion manifests as a predilection for known risks, navigating individuals away from uncertain outcomes. Likewise, risk aversion reflects a tendency to favor certain outcomes, even when the alternative equals or surpasses the sure outcome. Gambler's Fallacy presents an interesting twist as individuals falsely perceive a decline in the probability of an event just after its occurrence, despite the event's independence from past outcomes.

Meanwhile, the conjunction fallacy uncovers another cognitive nuance, leading people to mistakenly believe that the concurrent occurrence of multiple events is more plausible than the unfolding of a single event. Together, these biases weave a complex narrative, illustrating the complex interplay between cognitive biases and the potential pitfalls in decision-making. The affect heuristic, driven by our present emotions, serves as a compelling force shaping problem-solving and decision-making processes. Probing into the theory of cognitive dissonance, we uncover the discomfort that arises when faced with conflicting beliefs, and the subsequent strategies our minds employ to alleviate this discomfort.

Mental accounting introduces the concept of mental arithmetic, while the sunk cost fallacy sheds light on our increased inclination to persist in endeavors, even when faced with unproductive outcomes. The endowment effect further stresses our tendency to ascribe greater value to possessions simply because we own them. Finally, hyperbolic discounting and time discounting underscore the complexities of how we perceive and prioritize rewards and costs over time. Together, these biases weave a convincing narrative, emphasizing the profound impact of psychological drives on the decision-making process and triggering reflection on the refined interplay between emotion, cognition, and the valuation of resources.

Confirmation bias, a pervasive tendency, highlights our inclination to favor information that aligns with our pre-existing beliefs, whereas the attribution bias reveals the profound tendency to credit personal accomplishments to internal factors, while attributing distresses to external forces. The overconfidence bias reveals our tendency to overrate our abilities and the precision of our beliefs. Framing sheds light on how a mere alteration in presentation can alter preferences

and decisions. Moreover, the concept of nudges informs a fascinating dimension, demonstrating that subtle alterations in the way choices are shown can substantially influence and enhance decision-making outcomes without compromising individual freedom. As we ponder on these cognitive nuances, a clear theme surfaces: our decision-making processes are complex, persuaded by a multifaceted interaction of biases that shape perceptions, attitudes, and the very fabric of our choices. Distinguishing and understanding these biases is not just an academic exercise; it is a crucial step towards fostering a more informed, resilient, and nuanced approach to decision-making in the multitude of scenarios life presents.

Probing into the complex interaction of social and cultural factors, social proof appears as a powerful force where people imitate the behavior of others under specific circumstances, reflecting the influence of shared actions on individual decisions. Herding behavior illustrates the inclination of individuals to conform to the behaviors of others, accenting the compelling influence of social context. Towards the cultural landscape, culture, as a shared knowledge, directs actions, imparts preferences, and manifests in the very fabric of how individuals think, behave, and believe. Tradition, as a source of customs and values exerts a profound influence, guiding peoples to align their choices with ancient cultural practices. Further, peer pressure becomes a strong force convincing conformity to group norms, often prioritizing social approval over careful deliberation of outcomes. In essence, our judgements are deeply entwined with the impact of social and cultural forces, underlining the significance of understanding these influences for a more nuanced and informed approach to decision-making in our varied and interrelated world.

Decision-making holds as the cornerstone connecting economic and financial theories to practical applications. Traditional decision-making models conventionally root to the notion of rationality and the pursuit of utility/profit optimization. These models methodically examine decisions, anticipating peoples to weigh all available information to make choices that maximize their well-being. Conversely, behavioral decision-making within the domain of behavioral economics changes the focus towards understanding how people approach decision problems and make choices.

Behavioral economics, at the intersection of psychology, sociology, and neuroscience, etc., recognizes the multifaceted nature of human decision-making. This field reveals how individuals tend to employ mental shortcuts (heuristics) and fall victim to systematic cognitive biases. Furthermore, it extends its scope to broader social setup, understanding that external influences from societal norms, cultural factors, and peer interactions shaping the decision-making processes. In essence, while economic decision models emphasize optimization and rationality, behavioral economics breaks down decision problems, acknowledging the psychological underpinnings, heuristics, biases, and the profound influence of social and cultural factors that play a pivotal role in shaping how individuals perceive and decide in complex situations.

8. Conclusion

The failure of rationality concept and the decision theories based on it paved the way for change towards bounded rationality and satisficing theory, recognizing the inherent boundaries and cognitive constraints individuals face in real life. It contends how human beings are limited to make optimal decisions and gives an idea of simple decision-making process followed by people. The dual systems in human decision-making provided a valuable insight into the interplay involving automated, intuitive thinking, and deliberate, analytical processes. This concept brings light how human minds functions automatically, making many decisions without deliberation whereas the deliberated mode of decision-making is activated only when signaled. Further, the prospect theory transformed our understanding of economic and financial decisions by presenting reference points and showing how people evaluate outcomes, accentuating the certainty effect—a liking for known outcomes over uncertain ones. Loss aversion attaches an emotional layer, revealing a typical inclination to avoid losses more than seeking comparable gains. Furthermore, several heuristics contribute considerably to the decision-making process. The mental shortcuts serve as cognitive tools people employ to make complex decisions simple. Each heuristic presents a unique perspective, permitting decision-makers to navigate difficult choices efficiently but also unveil pathways to suboptimal decisions.

As a part of the complex nature of decision dynamics, biases permeate economic and financial choices substantially impacting how decisions are outlined and executed. These cognitive traps underscore the human disposition for flawed judgments and preferences, unraveling a spectrum of biases. While we have covered several biases, the complexity of human cognition means that there are still many more to understand and many to be fully unveiled. Every single bias contributes to the complication in decision-making, and understanding these biases is vital for developing approaches that mitigate their impact, promoting more informed decision-making in diverse contexts. Decision-making is extremely swayed by social and cultural contemplations accentuated the substantial impact of factors like social proof, herding behavior, peer pressure, culture, and tradition on decision-making. Being able to distinguish and being thoughtful to these dynamics are essential for a thorough understanding of decision forces, leading to more thoughtful and adaptive decision-making within social and cultural contexts.

As we conclude this exploration, it is imperative to recognize the intertwined nature of psychological, social, and cultural factors, and calls attention to the ongoing importance of understanding, mitigating, and navigating these factors to enhance the quality of decisions made by individuals and organizations alike. By doing so, we pave the way for informed, adaptive, and considerate decisions that resonate with the dynamic realities of human experience. This paper calls for a continued dialogue, emphasizing the importance of interdisciplinary perspectives in shaping the evolving landscape of decision-making research.

9. Limitations

The study's methodology involved accessing papers/articles from platforms like ScienceDirect, JSTOR, Sage, Springer, ResearchGate, Google Scholar, SSRN, etc. Paper or articles were searched with the key word: ‘rationality, ‘decision-making', ‘decision-theory', ‘decision-making process', ‘normative decision theory’, ‘descriptive decision theory’, ‘expected utility theory’, ‘bounded rationality’, ‘satisficing theory’, ‘behavioural economics’, ‘behavioural finance’, ‘standard finance’, ‘rational choice theory’, etc. As such, resource constraints led to considering only readily accessible journals as the work is limited by platform-specific accessibility and publication

policies. Further, time constraints limited the depth of exploration and might have excluded some of the research, thereby restraining the scope of the study. However, the researcher has attempted to justify by covering major works done in the development of decision-making concepts and theories. Acknowledging these limitations is crucial for interpreting the findings within the study's boundaries.

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