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BEHAVIORAL ECONOMICS FOR SUSTAINABLE DEVELOPMENT

MASUDEM

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MASTER STUDIES IN SUSTAINABLE DEVELOPMENT AND MANAGEMENT

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Authors

Anetta Čaplánová

University of Economics in Bratislava, Slovakia

Eva Sirakovová

University of Economics in Bratislava, Slovakia

Suppanunta Romprasert

Srinakharinwirot University, Thailand

Sasikarn Chatvijit-Cook

Srinakharinwirot University, Thailand

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ABOUT THE AUTHORS

PROF. ANETTA ČAPLÁNOVÁ, PHD.
Author of Chapter 1,3,4

Prof. Anetta Caplanova, PhD. is the MASUDEM project coordinator and participating researcher. She is an accomplished economist with expertise in behavioural economics, public finance and education systems.
She is experienced in project management, she prepared many proposals for funding of research, teaching and training activities. She has abundant international exposure in Europe, and globally with special focus on South-East Asian region. In addition to her academic work, Prof. Caplanova has served as a consultant for various government agencies and international organizations, providing expert advice in fiscal policy, education systems, social science research and other areas related to her expertise.
Her contributions to the policy community have helped to shape fiscal policies in Slovakia.
Prof. Caplanova is a highly respected economist who has made significant contributions to the field. Her expertise, dedication, and passion for work continue to inspire and influence new generations of economists.

EVA SIRAKOVOVÁ, PHD.
Author of Chapter 5,6,7

Eva Sirakovová is an assistant professor at the Department of Economics, Faculty of Economics and Finance, University of Economics in Bratislava, Slovakia. In her scientific research activities, she focuses on the integration of knowledge from behavioural economics and the public sector economics. A significant part of her research involves examining the possibilities of applying alternative mechanisms for providing and financing public goods at the local level, along with the associated socio-economic implications. She also engages in the application of behavioural interventions in the activities of local governments and in the formulation of their local policies. In her teaching activities, she teaches several courses e. g. Principles of Microeconomics, Principles of Macroeconomics, and Behavioural Economics. Additionally, she supervises bachelor's and master's theses with a focus on behavioural economics. She also uses her knowledge of behavioural economics as a member of research teams for domestic and international projects.

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ASSOC. PROF. DR. SUPPANUNTA ROMPRASERT
Author of Chapter 2,8,9,11

Associate Professor Dr. Suppanunta Romprasert received a bachelor's in Psychology with the distinguish from Srinakharinwirot University (SWU), Thailand. Bachelor and Master of Economics from University of Saskatchewan (U of S), Canada. Master of Science in Human Resource Development including PhD in Economics from National Institution Development and Administration (NIDA), Thailand. She has experiences on academic teaching in Macroeconomic, Statistic, Finance. Also, working on the research is around her expertise in Business Economics Analysis, Social Sustainable and Community Development, Behavioural Assessment, and Creative Economy Management.

SASIKARN CHATVIJIT-COOK, PHD
Author of Chapter 10,12

Dr. Sasikarn Chatvijit-Cook is currently a lecturer at the department of Hospitality and Tourism Management (HTM) in the International College of Sustainability Studies, Srinakharinwirot University, Thailand. She received a bachelor degree in Advertising from Burapha University, Thailand, followed by Master of Science and Ph.D in Consumer, Apparel, and Retail Studies from University of North Carolina at Greensboro, United States. She has academic experiences in teaching consumer behaviour, marketing, advertising, and business data analytics courses in the U.S. and Thailand. Her research area is centered on consumer behaviour, with emphasis on sustainable practices such as non-ownership consumption, luxury consumption and ethics, as well as sociology of consumption. Her publications are available in the journals including International Journal of Retail Distribution and Management, Journal of Brand Management, and Journal of Business Research.

Reviewers
prof. Keith Willett, Professor Emeritus, Oklahoma State University, Stillwater, OK, USA
prof. Beata Gavurova, PhD., Technical University of Košice, Slovakia
Lili Hattinger, Eötvös Loránd University, Hungary
Dr. Johan Arifin, Universitas Islam Indonesia, Indonesia

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CONTENT

INTRODUCTION

This book represents an in-depth exploration of how human behavioural insights can be used to advance sustainability. As the mankind faces critical environmental issues, innovative and effective strategies are essential for promoting sustainable management and actions. This resource is aimed to serve as an academic inspiration integrating a behavioural perspective into environmental sustainability.

This text is focused on reveal the intricate ways in which behavioural economics sheds light on environmental decision-making. It investigates the psychological mechanisms that drive people's choices and demonstrates, how these can be strategically influenced toward greener practices. The material discusses the application of behavioural nudges, the structuring of incentives, and the design of choices that are instrumental for affecting pro-environmental behaviours.

A series of case studies and empirical examples are used to showcase the successful application of behavioural economic principles to ecological concerns. These range from reducing energy consumption through innovative feedback loops to enhancing recycling efforts through the influence of social norms, or the role of economic instruments like carbon pricing for addressing greenhouse gas emissions. Such instances illustrate the potential of behavioural economics to reshape environmental initiatives.

The book emphasizes the synergy between multiple disciplines, merges insights from psychology, economics, and environmental sciences to stimulate comprehensive approaches to sustainability challenges. It prompts readers to critically evaluate the integration of policy, corporate responsibility, and community involvement in constructing a sustainable future.

Being based on the contemporary research and forward-thinking perspectives, the book provides readers with the intellectual discourse necessary for initiating meaningful environmental change. Whether the goal is to shape public policy, drive sustainable corporate practices, or stimulate community-level environmental action, the text offers a blueprint for employing behavioural tactics to bring ecological benefits.

Thus, this book is not only designed to inform but also to motivate readers towards action. It is intended to contribute to creating a generation of informed, proactive individuals ready to apply behavioural insights to promote a culture of sustainability. The strategies and concepts outlined will empower readers to contribute to the advancement of a sustainable world and make decisions that are beneficial for both the environment and global economy.

Anetta Čaplánová
Main author

CHAPTER 1: FOUNDATIONS OF BEHAVIOURAL ECONOMICS

Behavioural economics bridges psychology and economics to understand how individuals make decisions. Instead of simply presuming that humans always opt for logical choices, this discipline studies genuine reasons behind human actions, which can be influenced by emotions, biases, and other factors. This chapter provides an introduction into the fundamental principles of behavioural economics, following its evolution from initial observations of unexpected decision-making behaviour to key studies that reshaped our perception of economic choices. Moreover, we will also highlight the significant role of behavioural economics in the society efforts to promote sustainability. As we become increasingly aware of global challenges, behavioural economics provides insights on how human behaviour can be directed towards more sustainable choices and solutions. Thus, the chapter will provide readers with robust grasp of central concepts of behavioural economics and of their relevance for promoting sustainable economies and societies in the current period.

1.1. Brief Overview of Traditional Economic Theory

Classical economics which represents a starting pillar of modern economic thought. It has begun with the ground-breaking book by Adam Smith "An Inquiry into the Nature and Causes of the Wealth of Nations" (1776) and the year of its publication is also aligned with the date of the birth of economics as a scientific discipline. In this book, Smith introduced the principle of the 'invisible hand', emphasizing that individuals always follow their own self-interest, enter exchange with others on the market and each of them following their own interest will ensure not only their own prosperity and the prosperity of their families, but also prosperity of the nation and lead to a collectively optimal outcome for the society. The focus on the economic nature of an individual following their own interests and the belief that in most cases the private market can ensure efficient allocation of resources has affected many economists and policy makers and found the reflection in many subsequent economic theories. Adam Smith in his book "The Theory of Moral Sentiments" (1759) touched also upon psychological explanations for economic behaviours. However, these perspectives were largely overshadowed by the rise of neoclassical economics.

One of those theories was neoclassical economics, which emerged in the late 19th century and through its marginal revolution laid foundations of modern microeconomic theory and the basis for rational decision making of economic agents. At the same time, neoclassical economics significantly advanced economic thought by introducing mathematical rigor in economic analysis, introduced concepts of marginalism and optimization to analyse individual decision-making on the markets and brought a more analytical and mathematical approach to understanding economic phenomena. The analysis of neoclassical economics is based on the following methodological assumptions:

1. **Rationality**: Neoclassical economics assumes that individuals act rationally, always strive to maximize their utility (for consumers) or profit (for producers) under the given constraints.
2. **Marginalism**: The concept of marginalism suggests that economic decisions are made at the margin. Individuals when making the decisions always compare additional benefits and costs of consuming or producing one additional unit of a good or service.
3. **Equilibrium**: Markets, in their interaction of the supply and the demand, tend to move towards a state of equilibrium. At equilibrium, at a given price the quantity demanded equals the quantity supplied.
4. **Methodological individualism**: According to neoclassical economists, the economic outcomes are a result of individual choice. The aggregate behaviour of the economy is perceived as the sum of individual actions.
5. **Exogeneity of Preferences**: Preferences are considered stable and exogenously determined. They are not influenced by external factors such as social norms.

The methodology used by neoclassical economics is predominantly deductive. Using axiomatic principles, like those of rationality and optimization, neoclassical economists derive theoretical models, which are empirically tested using mathematical and statistical tools. The development of neoclassical economics was also associated with the increasing use of calculus in economic analysis. The utilization of mathematical tools allowed for precise formulation of economic relationships and optimization problems. Such concepts as utility functions, indifference curves, and isoquants became central to neoclassical analysis.

Neoclassical economics has been instrumental in shaping economics and its theory laid foundations to standard microeconomics, the theory has also been criticized especially for its heavy reliance on mathematical formalism, which detracts from the inherently qualitative nature of human behaviour. Additionally, its assumption of perfect rationality has been contested, with the empirical evidence of irrational and heuristic-driven human behaviour.

1.2. Behavioural Economics versus Neoclassical Economics

Experiencing a dynamic development in the latter half of the 20th century, behavioural economics challenges some neoclassical assumptions. Being rooted in the interdisciplinary insights, especially from psychology, behavioural economists argue that human decision-making is often irrational and influenced by many cognitive biases.

As the behavioural economics has been gaining the prominence, it challenged several assumptions of the neoclassical paradigm.

- **Rationality assumption** that economic agents are perfectly rational, optimizing their utility or profit based on complete information. Behavioural economists, drawing from psychological insights, have empirically shown that individual decisions often deviate from this rational behaviour. Such concepts as loss aversion, framing effects, or the endowment effect highlight the non-linear and sometimes counterintuitive patterns of decision-making of individuals in real settings.
- **Static preferences** pointing out that individual preferences are exogenous and fixed have also been challenged by behavioural economics. Behavioural studies demonstrate that preferences can be endogenous, influenced by societal norms, framing, and the choice set presented. For instance, the anchoring effect reveals how initial exposure to a number (i.e., an anchor) can influence subsequent decisions and valuations of individuals.
- **Overemphasis on equilibrium** of neoclassical economics, where markets always move towards an equilibrium state, where the demand meets the supply, does not consider the dynamic complexities and frictions, which play an important role in real-world markets. Behavioural economics points out to market inefficiencies, bubbles, and prolonged disequilibria, which can be driven by collective behavioural biases.
- **Underestimation of social and emotional factors** caused by the individualistic focus of the neoclassical model does not consider the influence of social, cultural, and emotional factors on decision-making. Behavioural economics incorporates these dimensions into its analysis, and studies, e.g., how peer effects, altruism, and emotions such as fear, or envy can significantly affect economic choices.
- **Narrow scope of utility**, since neoclassical theory defines utility in a rather confined manner, focusing primarily on material or monetary gains. Behavioural economics adopts a more holistic view through its recognition that individuals derive utility from various sources, including fairness, equity, or the act of giving, and thus, challenges the neoclassical model based on purely self-interested agent framework.
- **Inadequate Treatment of Time** assuming consistent time preference. Behavioural insights introduce such concepts as hyperbolic discounting, where individuals may have inconsistent time preferences, which can be explained e.g., by present gratification at the expense of future benefits.

Thus, behavioural economics put into the spotlight the inconsistencies, biases, and complexities of human behaviour, and pinpointed out to the need for a more inclusive, empirically

grounded, and structured economic framework aligned with real-world observations. The classical/neoclassical paradigm, with its emphasis on mathematical formalism, allows to clearly predict behaviour of economic agents and creates foundations for the use of economic modelling. Behavioural economics supported by empirical observations, provides insights into the often-irrational human choice, and makes the economic theory more aligned with real-world observations. Thus, while the classical/neoclassical framework lays the foundations for economic theory with its clear, rational assumptions, behavioural economics introduces the intricacies of human behaviour and bridges the gap between theoretical predictions and real-world economic behaviour.

Table 1.1 Neoclassical Economics versus Behavioural Economics

Neoclassical Economics	**Behavioural Economics**
Perfect Information**: Individuals operate with perfect information, leading to decisions that maximize utility.**	**Heuristics and Biases**: Individuals employ mental shortcuts that can result in systematic biases.
Consistent Preferences**: Rational individuals have stable and transitive preferences.**	**Framing Effects**: Choices can differ based on how information is presented, challenging stable preferences.
Utility Maximization**: Individuals aim to achieve the highest satisfaction (consumers) or profit (producers).**	**Loss Aversion**: Fear of losses can overpower potential gains, leading to non-optimal choices.
Cost-Benefit Analysis**: Benefits and costs are weighed for every action, with actions taken if benefits outweigh costs.**	**Time Inconsistency**: Individuals often show inconsistent preferences over time, favouring immediate rewards.
Forward-Looking Behaviour**: Decisions consider not only current circumstances but also future consequences.**	**Social Influences**: Decision-makers are influenced by societal norms, peer pressures, and cultural contexts.
Absence of Behavioural Biases**: There are no systematic biases in decision-making.**	**Limited Information and Bounded Rationality**: Individuals might not process all available information, opting for satisficing outcomes instead.

Source: authors

Table 1.1. compares the assumptions of neoclassical methodology with the methodological assumptions of behavioural economics. Neoclassical assumptions provided a coherent and elegant framework for analysing economic behaviour and the models derived from them were mathematically tractable and produced clear, deterministic predictions. However, the overarching assumption of perfect contrasted with the evidence of systematic deviations of individual decisions from this rationality. The observations rooted in psychology together with the anomalies identified in economic experiments, brought forward the realization that while the classical assumptions serve as a useful starting point, they may not always correspond to the specifics of the real-world decision-making.

These observed deviations questioned the universality of neoclassical economic models and opened the way towards more comprehensive understanding of economic behaviour. It became clear that if models are to fully reflect human behaviour, they must consider also cognitive and social complexities that shape human decisions.

1.3. Origins of Behavioural Economics

Behavioural economics combines insights from psychology and economics. As explained above, it challenges the traditional neoclassical model of rational decision-making.

Herbert A. Simon (1916-2001) made significant contributions to various disciplines. In economics his idea of "bounded rationality" reshaped the foundations of the field. His concept of bounded rationality challenges the traditional economic model that assumes that individuals always

make decisions that are in their best interest and optimize their choices based on all available information. Simon argued that human decision-making is constrained by cognitive limitations and the information. As a result, individuals frequently use heuristics or mental shortcuts and focus on the decisions that are "good enough" not truly optimal. This insight bridged psychology and economics, and motivated scholars to consider the ways in which real-world decisions diverge from the models of classical economics. Simon's contribution also spanned to such fields as the decision-making processes, the structure of complex systems, and the behaviour of firms in markets. His interdisciplinary approach and his application of computer simulations to study cognitive processes represent pioneering contributions. He was awarded the Nobel Prize in Economic Sciences in 1978.

Two Israeli psychologists **Daniel Kahneman** (1934 -) and **Amos Tversky** (1936-1996) built upon the contribution of Simon and systematized this research programme. Their work redefined our understanding of economic behaviour, reshaped our understanding of human decision-making, and challenged traditional economic assumptions about rationality. They are the most influential figures in the field of behavioural economics.

Kahneman and Tversky introduced **Prospect Theory** (1979) as an alternative to the traditional expected utility theory. They pointed out that individuals value gains and losses differently, and that they base their decisions on perceived gains rather than perceived losses. Moreover, they pointed out that people's attitudes toward gains may be different from when they face a potential loss. A central idea of their work is that people tend to prefer avoiding losses to acquiring equivalent gains. They estimated that the pain of losing is psychologically about twice as powerful as the pleasure of gaining.

Their work on **heuristics** (i.e., mental shortcuts) (Tversky, Kahneman, 1974) revealed that individuals often use shortcuts in decision-making, which leads to systematic biases in the decisions they take. For instance, the 'availability heuristic' suggests that people base the probability of an event on easy similar examples on their mind.

Kahneman and Tversky (1981) also demonstrated that the way a choice is presented (or "framed") can significantly impact the decision that an individual makes. This notion became known as the framing effect. They pointed out that individuals might respond differently to a choice presented in terms of potential gains than when the same choice is presented as potential loss. The collaboration between Kahneman and Tversky spanned over decades, and their work affected economics, psychology, and other disciplines.

Daniel Kahneman, as a first psychologist, was awarded the Nobel Prize in Economic Sciences in 2002. He was the first non-economist to be awarded this prize. Next to his work with Amos Tversky, he also studied other phenomena including so called endowment effect (1990). Endowment effect points out to the tendency of people to overvalue the items they own, irrespective of what their objective market value is.

Another behavioural scientist, who was awarded Nobel prize for Economic Sciences (2017) is **Richard H. Thaler**. Thaler's pioneering contributions challenge traditional economic assumptions that individuals always act rationally and have self-control. He demonstrated, how real-world decision-making is influenced by cognitive biases, heuristics, and social preferences. One of his seminal papers, "Toward a Positive Theory of Consumer Choice (1980)," explains various deviations from expected utility theory. It underpins the significance of bounded rationality in economic behaviour. His work is based on the idea that people's choices can often be predicted by psychological principles and they don't necessarily align with rationality.

Thaler is also credited for introducing the concept of "mental accounting," a psychological phenomenon, according to which people categorize and evaluate financial outcomes in non-linear and often irrational ways. For example, individuals might treat money differently based on its source (e.g., a gift versus earned income) or its intended use. This concept, highlighted in his paper "Mental Accounting Matters" (1999) challenges the conventional economic notion of interchangeability, emphasizing that not all dollars are treated as equal in the minds of consumers. Thaler's work on "nudge" theory, which he carried out in collaboration with Cass Sunstein, has become influential in policymaking in different spheres worldwide. In their book "Nudge: Improving Decisions About Health, Wealth, and Happiness" (2008) they propose that based on understanding how people think, it is possible to design such choice architecture that would make it easier for people to choose what is best

for them, their families, and society. By introducing small changes in the form of nudges, policymakers can guide individuals towards better decisions without restricting their freedom of choice.

Behavioural approach affected not only economics, but also finance. **Robert J. Shiller** (1946) is known for his insights in behavioural finance. He has explained the role of psychological factors in financial decision-making, and challenged traditional economic theories that assume perfectly rational investors. Shiller's pioneering work on asset prices elaborated in his book "Irrational Exuberance" (2000), where he explored the psychological drivers behind speculative bubbles in stock and real estate markets. Shiller provided a detailed examination of the history and dynamics of market bubbles, arguing that they are fuelled by human psychology rather than rational economic behaviour.

In the book "Animal Spirits" (2009) co-authored with **George Akerlof**, they study the role of non-economic motives and irrational behaviours in economic decision-making. They discuss how various psychological factors, including confidence, fairness, and corruption, can significantly impact economic outcomes. Robert Shiller was awarded the Nobel in Economic Sciences in Memory of Alfred Nobel in 2013, which he jointly shared with Eugene Fama and Lars Peter Hansen.

George Akerlof (1940-) is credited for the "Market for Lemons" paper in 1970, which tackled the issue of asymmetric information in markets. In this foundational work, Akerlof explained how markets can fail or be adversely affected when sellers have more information about product quality than buyers. Using the used car market as a metaphor, he demonstrated that when buyers cannot distinguish between high-quality and low-quality products (referred to as "lemons"), this can lead to a decrease in the overall quality of goods in the market and even to market collapse.

However, beyond this concept, Akerlof studied also the influence of social norms and identity on economic decision-making. He examined, how individuals' decisions can be influenced by their perceived social category, and how this perception affects their interaction with others from different social groups. In "Identity Economics," (Akerlof, Kranton, 2000) he pioneered the exploration of how one's sense of self and belonging to a group can significantly influence economic choices. By introducing identity into the analysis of economic behaviour, Akerlof challenged traditional economic models and expanded the boundaries of behavioural economics.

Matthew Rabin (1963-) contributed to behavioural economics with the study of intricacies of human decision-making. Rabin's work, particularly on procrastination and self-control, has shed light on the internal conflicts that individuals face when making decisions. He explored how present biases can lead to inconsistent choices over time, emphasizing the non-standard time preferences observed in human behaviour (O'Donoghue, Rabin, 1999). Rabin also articulated the profound interplay between psychological factors and economic models, documenting the necessity to integrate psychological realism into traditional economic theories (Rabin, 1998). These explorations have been instrumental in enriching the understanding of behavioural patterns in economics.

Other behavioural economists, who contributed to the development of concepts to be studied include **David Laibson**, whose work related to the hyperbolic discounting (1997), explains why people often choose smaller but sooner rewards over larger but later ones, even if the latter is objectively better for them. Ernst Fehr is known for his work on the role of fairness in economic decision-making (2000), Fehr has investigated topics such as altruistic punishment and the importance of social norms in economic behaviours.

The contributions to behavioural economics have not only challenged traditional economic perspectives but have also offered insights into the complexities of human decision-making. Their explorations have demonstrated that human choices often deviate from what neoclassical economics would predict and this is due to many psychological factors and inherent biases. As the field continues to evolve, the contributions of these scholars serve as foundational pillars, shedding light on the multifaceted nature of human economic behaviours and the psychological factors that drive them.

Table 1.2 Milestones of the Development of Behavioural Economics

Year	Milestone
1955	Herbert Simon introduces the concept of "bounded rationality".
1974	Tversky and Kahneman publish their seminal paper on heuristics and biases.
1979	Tversky and Kahneman introduce Prospect Theory
1985	Richard Thaler's paper on mental accounting.
1992	Thaler publishes "The Winner's Curse" discussing anomalies in economic decisions.
Early 2000s	Behavioural economics becomes integrated into public policy with "nudging".
Ongoing	Continued research and application of behavioural insights in various fields.

Source: authors

1.4. Applications of behavioural economics in real life settings

Behavioural economics provides a profound lens through which human decision-making is understood, highlighting how individuals may sometimes make choices that are not in line with their economic self-interest. This academic field has broadened its influence beyond public policy to significantly impact sectors like marketing, healthcare, and finance.

Governments and public institutions have embraced nudge theory to subtly influence individual decisions in ways that maintain freedom of choice. For example, positioning nutritious foods strategically in cafeterias can lead to healthier eating habits in schools. Such nudge techniques demonstrate that behavioural insights can foster positive change in public behaviour without the need for strict regulations.

In **marketing**, the application of behavioural economics enables brands to design messages that resonate with consumers by tapping into cognitive biases, thereby making products more appealing and shaping effective pricing strategies. A nuanced understanding of these biases allows for the creation of targeted marketing campaigns that can enhance customer engagement and loyalty.

To address common **financial biases**, such as the inclination to overspend or neglect retirement savings, educational programs have been initiated. Recognizing these tendencies have led to the development of targeted interventions to counteract them. Presenting financial information through a behavioural economics lens can nudge individuals towards sounder financial decisions.

The **healthcare sector** also benefits from behavioural economic insights. Anti-smoking campaigns that focus on the negative health effects of smoking, utilizing the concept of loss aversion, have proven more effective than those emphasizing quitting benefits. Designing interventions that cater to our desire for immediate rewards can encourage long-term health maintenance.

In the realm of **sustainable development,** behavioural economics offers a transformative approach by understanding the complexities of human behaviour. Policymakers can leverage principles such as loss aversion and status-quo bias to create interventions that encourage energy conservation, sustainable consumption, and environment-friendly actions. The use of behavioural insights to promote societal change without impinging on individual freedom is a valuable tool in progressing towards sustainable development goals.

1.5. Critique and Evolution of Behavioural Economics

Behavioural economics emerged as a revolutionary field, bridging the gap between psychology and traditional economics by emphasizing the psychological foundations of economic decisions. However, despite its transformative insights, behavioural economics has not been immune to criticism and has undergone significant evolution in response to it.

One of the primary critiques is centred on its **reliance on "anomalies" or deviations** from neoclassical economic theory. Critics argue that these anomalies are merely exceptions rather than the rule and using them as foundational constructs may lead to an overly complicated understanding

of human behaviour (Rabin, 2002). Moreover, some suggest that behavioural economics tends to focus on isolated behavioural tendencies, overlooking the broader, systemic factors at play in economic decisions (Guala, 2005).

Another critique relates to the field's practical applications, particularly **the concept of "nudging."** While nudging can undoubtedly guide individuals towards better decisions, critics argue it can sometimes border on paternalism, infringing on personal autonomy (Hausman & Welch, 2010). There's also a concern that relying too heavily on nudges might oversimplify complex problems, and not address the root cause.

One of the central critiques of behavioural economics pertains to **the durability and longevity of behavioural interventions.** While nudges, such as changing default options or using social proof, have shown efficacy in the short term, there are concerns about their long-term impact. Critics argue that while nudges might prompt immediate behavioural changes, they might not necessarily instil lasting habits or shifts in underlying beliefs (Benartzi et al., 2017). For instance, a nudge that encourages employees to save more for retirement by automatically enrolling them in a savings plan might increase initial participation rates, but if the underlying beliefs about saving are not altered, these individuals might opt out or reduce their contributions in the future.

Behavioural economics has been also criticized for its **heavy reliance on laboratory experiments,** often carried out with university students as subjects. Critics point out that the behaviours observed in controlled environments might not necessarily extrapolate to real-world settings or be representative of broader populations. This limitation potentially challenges the external validity of many behavioural findings (Levitt & List, 2007).

The use of behavioural insights to influence decisions, especially in public policy, has raised ethical concerns. Critics argue that by subtly guiding individuals' choices without their explicit awareness, **nudges can border at the edge of manipulation**, and compromise the principle of autonomy. While nudges aim to promote welfare-enhancing choices, there has been the discussion about who is to decide what is "welfare-enhancing" (Bovens, 2009).

Some critics suggest that behavioural economics **might oversimplify the vast complexity of human decision-making.** They argue that human behaviour is influenced by many factors, including cultural, historical, and societal contexts, which might not be entirely captured by behavioural models. In response to these critique, proponents of behavioural economics emphasize the field's continuous evolution. The focus has shifted towards understanding the mechanisms underlying behavioural interventions to ensure their long-term efficacy. There's also a push for more field experiments and collaborations with diverse populations to ensure broader generalizability. Ethical considerations are now central in the design of behavioural interventions, with an emphasis on transparency and respect for individual autonomy.

Behavioural economics has evolved adaptively. The field has grown more structured in its approach, increasingly recognizing the interplay between individual behaviours and systemic factors. Many researchers now advocate for a combination of nudges with more traditional economic interventions, like taxes or subsidies, to achieve desired outcomes (Thaler & Sunstein, 2008). Additionally, there has been a push towards ensuring that behavioural economics' applications respect individual autonomy and emphasize an informed choice.

Furthermore, the evolution of behavioural economics has witnessed further interaction with other academic disciplines, reinforcing its interdisciplinary nature. For instance, behavioural economics has increasingly intersected with neuroeconomics, a field that studies the brain's role in the decision-making (Glimcher & Rustichini, 2004). This convergence has enriched behavioural economics' understanding of human behaviour, offering a more holistic view that encompasses both psychological and neurological dimensions. Similarly, collaborations with such fields as anthropology and sociology have expanded behavioural economics' cultural and societal context, ensuring a more comprehensive understanding of economic behaviour across diverse settings (Henrich et al., 2010).

1.6. Key Principles of Behavioural Economics

In the status quo of economic thought, behavioural economics stands out as a compelling framework that intersects human psychology with economics principles. While neoclassical economic paradigm has poised humans as perfectly rational agents, focusing on enhancing their personal utility, real-world observations and rigorous experimental studies present a more in-depth picture. This divergence from traditional thought has led to the development of foundational principles that provide a more accurate portrait of human behaviour. Central to this redefined perspective are three cornerstone concepts: Bounded Rationality, Bounded Self-interest, and Bounded Willpower. These do not represent academic terms only, but reflect subtle intricacies and paradoxes observed in human behaviour. They challenge long-standing assumptions, provide a fresh lens to understand often unpredictable economic choices that people make. The understanding of these principles allows us to gain a profound understanding of the interplay between cognition, emotions, and societal influences in economic decisions and actions.

1.6.1. Bounded Rationality

Herbert A. Simon as a proponent of the idea of bounded rationality challenged the economic paradigm that asserted that humans act as perfectly rational decision-makers. Simon's notion pointed out that decision-making by individuals is often constrained by factors such as limited access to information, cognitive restrictions, and time pressures.

- **Incomplete Information**: While conventional economic theories tend to assume that individuals possess and can flawlessly process all existing information, but empirical data reveal that this is not the case. Acquiring exhaustive and accurate information frequently requires resources, time, or might be inherently unfeasible. Consequently, decisions are often based on partial or even information, which is easily available
- **Cognitive Constraints**: Regardless of the information availability and abundance, the human capacity to analyse and comprehend information is inherently restricted. If people are faced with information overwhelm and intricate data, particularly under time pressure, they may face cognitive constraints, which will negatively affect their decisions.
- **The Principle of Satisficing**: These limitations can lead to individuals adopting a 'satisficing' approach to decision-making. Instead of engaging in an exhaustive search for the most optimal solution, individuals tend to settle for options that suffice or achieve a specific acceptability criterion.

As researchers studied more in-depth the specifics of human decision-making, the new approaches and toolkits were developed.

Gerd Gigerenzer and his colleagues expanded on the notion of bounded rationality by introducing the idea of the "**adaptive toolbox**", i.e., a set of heuristics, or rules of thumb that individuals use to make decisions quickly and efficiently. These heuristics are not necessarily suboptimal, because they can often lead to better outcomes in certain environments because they allow for faster decision-making.

Further research has also illuminated the **interplay between emotions and rational decision-making**. Emotions have been recognized as factors that can either enhance or detract from the quality of decisions, but this depends on the context.

The recognition of bounded rationality has implications for market dynamics and policymaking and points out that markets do not always gravitate towards the equilibrium as suggested by the neoclassical model. The research has recognised that the effects of bounded rationality can lead to better predictions and understanding of market anomalies.

The principle of bounded rationality has been instrumental also for explaining deviations from neoclassical economic paradigm when explaining market behaviour and is manifested in market anomalies, including bubbles and sudden crashes, which can be explained by bounded rationality. Empirical research, such as the studies by Tversky and Kahneman on decision-making heuristics and inherent biases, further supports Simon's bounded rationality proposition.

Accepting the bounded rationality proposition allows to provide a more in-depth and realistic understanding of human decision-making processes in economic contexts, positioning it closer to actual human behaviour than theoretical models.

1.6.2. Bounded Self-interest

Historically, neoclassical economic theories presented humans as rational agents whose primary motivator was self-interest. Decisions were assumed to be driven predominantly by personal gains, either monetary, or in terms of utility maximization. However, as behavioural economics focuses on a deeper understanding of human decision-making and the concept that emerged as a counterpoint to the idea of absolute self-interest is the notion of "bounded self-interest".

Bounded self-interest challenges the notion that humans act purely out of the self-motivated gains. It points out that individual actions are influenced not only by their personal benefits, but also by considerations of fairness, ethics, and reciprocity. It recognizes that even though humans are motivated by self-interest, this motivation is often "bounded" by other preferences.

One of the key pillars of bounded self-interest is **the principle of fairness**. Experiments in behavioural economics, especially those involving game theory such as the ultimatum game, have demonstrated that individuals are often willing to sacrifice personal gains to punish what they perceive as unfair behaviours. Similarly, acts of altruism, where individuals help others even at a personal cost, can be perceived as a manifestation of bounded self-interest.

Humans are inherently social beings, and their actions are influenced by **societal norms and expectations.** These norms often guide what people consider as "acceptable" behaviour, even though such behaviour does not lead to maximizing personal gains. Moreover, the principle of reciprocity, i.e., returning favours and responding to positive actions with positive behaviour also reflects bounded self-interest. People often act in ways that will benefit others, expecting kindness to be reciprocated in the future.

The concept of bounded self-interest has significant implications for economic decision-making. For instance, companies that promote social responsibility and ethical practices often find customer loyalty not only based on the utility of their products but also on their adherence to values that resonate with their customers.

Several studies have contributed to our understanding of **bounded self-interest**. For instance, Fehr and Schmidt (1999) introduced models of **inequality aversion**, suggesting that individuals derive disutility from inequitable outcomes, even if they stand to benefit from them.

Understanding bounded self-interest allows for a more holistic perspective on human behaviour, and to recognize the multifaceted motivations that drive decisions. It emphasizes the idea that while self-gain remains an important motivator, human decisions are also largely influenced by their sense of community, ethics, and a **desire for balanced reciprocity.**

1.6.3. Bounded willpower

Bounded Willpower represents another important concept in behavioural economics. Traditional economic models tend to believe that individuals act in alignment with their desires and long-term objectives. However, behavioural insights indicate that individuals frequently must address the problem of self-discipline, which often leads them to choices that do not reflect their future aspirations.

Thus, this notion suggests that a **person's capacity for self-restraint** is not infinite. Consequently, they might end up making choices that diverge from their intended objectives or what is in their best interest. Such deficiencies in judgment and self-control can be observed in numerous areas, ranging from monetary decisions to choices concerning health.

A key concept related to bounded willpower is **temporal discounting,** which is the tendency to undervalue future rewards in favour of immediate benefits. For instance, individuals might choose to spend money now rather than save it for the future, or they might opt for unhealthy food because of its immediate gratification despite knowing its long-term health implications. Kahneman's dual-system theory (2011) provides a framework to understand this conflict. System 1 is impulsive and seeks immediate rewards, while System 2 is more deliberative and considers long-term consequences. Bounded willpower arises when System 1 overrides the more rational System 2.

Research has shown that factors such as **fatigue, stress, and cognitive overload** can further deplete an individual's self-control. Baumeister et al. (2007) present the work on "ego depletion", which suggests that willpower functions like a muscle and can be exhausted after extended use. Recognizing the limitations of bounded ill power has led to the exploration of tools and mechanisms that would help individuals to make better decisions. **"Commitment devices"** like fixed-term savings accounts or diet commitments with penalties for non-adherence to the diet provide examples of external structures, which could help to enhance the willpower.

1.7. Heuristics and Biases

Behavioural economics seeks to understand the mechanisms, which lead individuals and groups to specific economic decisions. As explained above it integrates insights from psychology and economics to provide a more holistic view of decision-making processes. In this context, heuristics and biases play a pivotal role. Behavioural economics perceives humans as complex entities, who often deviate from rationality due to various cognitive shortcuts, known as heuristics, which can lead to systematic errors or biases in their decisions.

Thus, **heuristics** represents **mental shortcuts,** or they are also called as "rules of thumb" that individuals employ to simplify complex decision-making processes. Instead of analysing every possible detail, which can be cognitively demanding and time-consuming, heuristics allow people to make swift decisions. However, this speed can sometimes come at the expense of accuracy and quality of the decisions.

Biases arise when heuristics systematically lead to incorrect or irrational decisions. Thus, they are not random errors, but consistent patterns of deviation from a normative behaviour, which can often predictably influence an individual's choices.

The integration of heuristics and biases into economics allows us to understand those real-world behaviours that previously were not possible to explain comprehensively by standard economic theory. These are such questions as why people often overvalue items that they own, or why individuals may feel more pain from a loss than pleasure from an equivalent gain.

These questions can be explained through the study of heuristics and biases. The understanding of these patterns helps us as individuals to make better decisions, but also provides policymakers, businesses, and educators with tools and strategies to design more effective interventions, products, and curriculums that align with human behaviour. Thus, behavioural economics through its emphasis on heuristics and biases, provides a more structured and realistic approach to understanding economic decisions.

1.7.1. Decision-making with applying heuristics

The human cognitive system often employs certain strategies to reduce complex tasks of assessing probabilities and predicting values into simpler judgmental operations. These strategies, termed as heuristics, serve as **cognitive shortcuts** to facilitate swifter decision-making processes. While these heuristics have evolutionary advantages and enable humans to navigate a myriad of daily decisions without extensive cognitive load, they are also prone to systematic deviations, which lead to potential biases and suboptimal judgments. Here we provide an overview the most common heuristics as they have been specified in the literature:

1. Availability Heuristic: A predominant heuristic in the decision-making, the availability heuristic postulates that individuals assess the frequency or probability of an event based on how readily examples or instances come to their mind. Such judgments are often influenced by recent exposures to events especially to emotionally charged events. For instance, heightened media coverage of certain events, like shark attacks, can inadvertently lead individuals to overestimate their prevalence.

2. Representativeness Heuristic: This heuristic involves estimating probabilities based on how closely an event or item resembles a broader group or category to which it might belong. In other words, it's about assessing, how representative the specific event is of the overall group. For instance, stereotypes, even if statistically unfounded, might still influence our judgments, e.g., if someone is

described as thoughtful and reserved, people might assume that they are in a job typically labelled as "for introverts," regardless of the actual probability of an individual to be in such a job.

3. Anchoring and Adjustment Heuristic: Within this cognitive framework, initial values or anchors heavily influence subsequent judgments. Individuals, when presented with an anchor, tend to inadequately adjust away from it, which results in potential biases. E.g., an individual's estimate of the length of the Mississippi River might be distorted by the introduction of an arbitrary initial value.

4. Simulation Heuristic: Rooted in the ease of mental simulation, this heuristic suggests that individuals evaluate the probability of outcomes based on the simplicity with which they can envision or simulate scenarios. This often manifests in sentiments of regret or relief, contingent on the ease of imagining alternative outcomes. E.g., after missing a flight by 5 minutes, a person would have more regrets of missing the flight than if missed the flight by a longer time-period.

5. Recognition Heuristic: Under this heuristic, recognition serves as a primary determinant of decision-making. Recognized entities are often perceived as superior or more valuable, leading individuals to potentially overlook more pertinent but unrecognized alternatives. E.g., when deciding which cities to visit, people usually choose better known places, because they are more familiar to them.

6. Framing Effect: Is intrinsically linked to the presentation of information. The framing effect points out that individuals' decisions can be systematically altered based on the framing of choices. For instance, positive framing ("95% fat-free") might be perceived more favourably by people than negative one ("5% fat").

These heuristics enhance our understanding of the underpinnings of human decision-making, it is important to acknowledge their dual role. On one hand, they can expedite decisions in complex environments, but their inherent susceptibility to biases requires careful scrutiny, especially in critical decision-making scenarios.

1.7.2. Behavioural biases

Behavioural biases represent consistent deviations from logical judgment, causing individuals to make decisions that may not always be rational. These deviations often stem from the mind's strategies to streamline information processing. Recognizing these tendencies is crucial, as they can influence numerous decisions in such fields as finance, health, and interpersonal relations.

The following account provides an overview of the most common behavioural biases:

1. **Confirmation Bias** refers to the tendency to search for, interpret, and remember information in a way that confirms pre-existing beliefs of an individual. E.g., of a person believes that investing in technology stocks is the most lucrative option, when reading financial news, he would primarily notice articles that praise technology stocks and overlooks those that highlight potential risks of investing into such stocks.

2. **Hindsight Bias** is related to seeing events as if they have been predictable after they have already occurred. E.g., after a stock market downturn, a person may comment that they knew that this was going to happen, even though they did not make any such prediction beforehand.

3. **Anchoring Bias** is related to the situation, when rely on the first piece of information they receive (i.e., the "anchor"), when making decisions. E.g., after seeing that a shirt was originally priced at $100 and now it is on sale for $50, they can perceive it as a bargain, even if the shirt's true value is closer to $40.

4. **Overconfidence Bias** represents the tendency for individuals to overestimate their own abilities or the accuracy of their beliefs and predictions. E.g., an individual can believe that their predictions about future stock market trends are correct 90% of the time, even though the actual track record shows a success rate of only 60%.

5. **Availability Heuristic** points out that people tend to overestimate the importance and probability of information that is readily available to them due to recent exposure. E.g., after seeing multiple news reports about airplane accidents, they may fear flying, even though statistically airline transport is one of the safest modes of travel.

6. **Endowment Effect** recognizes that people often assign more value to things merely because they own them. E.g., after buying a concert ticket for $50, a person may refuse to sell it for $70, because believes that the experience is worth more now that he owns the ticket.

7**. Loss Aversion** points out that losses tend to have a more significant emotional impact on individuals than gains of an equivalent value. E.g., a person feels more upset about losing $20 from their wallet than would feel happy about finding a $20 bill on the street.

8**. Status Quo Bias** recognizes that individuals prefer things to stay the same by doing nothing or maintaining their current or previous decision. E.g., despite the new evidence may suggest that a different approach may be more beneficial, an investor may continue to use the same investment strategy because it is what he has always done.

9. **Framing Effect** points out that decisions are influenced by the way the information is presented. E.g., patients are more likely to opt for a medical procedure when told it has a 90% survival rate than when told it has a 10% mortality rate, even though both framings convey the same information.

10. **Recency Bias** involves placing more importance on recent events when evaluating something. E.g., after a week of rainy days, people may predict that it will rain again tomorrow, even though the weather forecast indicates the weather change.

These biases illustrate how people may deviate in their decision-making from rationality and emphasizes the importance that they were aware of them to make better choices.

1.8. System 1 and System 2: A Dual-Process Theory

Dual-process theories have been influential in shedding light on the mechanisms underlying human cognition. Central to this discussion is the distinction between System 1 and System 2 thinking, a framework, which was popularized by Daniel Kahneman in his seminal book "Thinking, Fast and Slow" (2011).

System 1, often termed **the "fast" system**, operates automatically, quickly, and with little conscious effort. It is responsible for immediate reactions and split-second decisions. For instance, when one reads the expression "2+2", the answer "4" almost instantly comes to mind. This example illustrates the automaticity of the System 1. Similarly, driving on a familiar route is often done without much conscious thinking, relying on ingrained habits and learned responses.

In contrast, System 2, **the "slow" system**, is deliberate, analytical, and effortful. It is activated during activities that require more in-depth processing, such as solving a complex mathematical problem or making a critical life decision. An example of System 2 thinking would be evaluating the pros and cons before making a significant purchase.

While System 1 is efficient in processing vast amounts of information quickly, it is also susceptible to biases and errors. For instance, the availability heuristic, where individuals assess the frequency of an event based on its ease of recall, is rooted in System 1 (Tversky & Kahneman, 1973). E.g., after seeing airplane accidents frequently reported in the news, a person may overestimate the likelihood of plane crashes, despite the fact that air travel is statistically safe.

Even though more logical, System 2, has also its limitations. It requires more cognitive resources and is more demanding on time and effort. Consequently, people often default to System 1 to conserve mental energy, only using System 2 approach, when it is absolutely necessary.

The interplay between these two systems plays a critical role in shaping human decisions and behaviours. It is crucial to recognise, when each system is at work, and their inherent strengths and weaknesses, to make informed decisions in everyday life and in academic or professional settings. Thus, the distinction between System 1 and System 2 provides a valuable framework for understanding human cognition. If people are aware of the characteristics and limitations of each system, they should be able better navigate the complexities of the world.

SUMMARY

This chapter provided a critical examination of the underpinnings of behavioural economics, explaining in depth its significant deviation from classical and neoclassical economic theories that view humans as purely rational agents. The evolution of the discipline highlights the integration of psychological insights into economic paradigms. The acknowledgment of human cognitive limitations and the multifaceted motivations that influence the decision-making are at the core of the behavioural approach. We introduced the concept of bounded rationality, asserting that humans often operate within cognitive limitations, which makes them susceptible to biases and heuristics. Behavioural economics also challenges the traditional notion of economic actors being solely driven by self-interest, sheds light on the broader considerations of fairness, reciprocity, and societal values that play an important role in our economic decisions. The intricacies of decision-making processes are explained using Kahneman and Tversky's dual-process theory, which differentiates between intuitive, automatic cognition and deliberate, analytical thought processes. This chapter should serve as an introduction to the upcoming chapters, which will apply key insights presented here in more specific settings.

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CHAPTER 2: EXPECTED UTILITY THEORY AND PROSPECT THEORY

It believes that economics is a suffered meal for many people when they are studying at university. Again, it is a torture to understand the differences between microeconomics and macroeconomics. Some of them had to sit and rotate the graph to find the intersection point until he got a headache. By the time he made it through, he was battered. Again, it still came through like a pizza that had been cut into the minimum line for eight pieces. Many people may still be unsure about what **exactly 'behavioural economics'** is. Including some people who read it and became interested in this idea. You may still not know what to do next. Today we invite everyone to get to know **behavioural economics** in a concise manner via the **expected utility theory (EUT**) (Von Neumann & Morgenstern, 1944). Economics is **'Managing limited resources to get the most benefit'** and when going into a little more detail it will be found that this knowledge can be roughly divided into two types: **'Mainstream Economics' and 'Heterodox Economics'** assumes that humans are economic animals (homo economicus) with sufficient economic cause and effect to choose what to do or not to do and can manage to use limited resources to maximum efficiency. **'Behavioural economics'** is a part of the second stream of economics that has a different focus from the traditional educational approach. This concept is therefore a combination of knowledge of psychology and principles of economics. It is based on the belief that humans do not make all rational a**nd optimal decisions in the way that mainstream economics thinks.** But there are other things. That comes from personal beliefs and social influences that come into play in making many decisions, such as bias, emotion, and overconfidence or bandwagon effects (Tversky & Kahneman, 1979).

2.1. Introduction of Expected Utility Theory

2.1.1. Definition

Expectation Theory which psychologists in the intellectualist group believe that human beings are animals that use their intelligence or thoughts to decide whether will behave in a certain way to lead to the goal that will satisfy one's own needs. Therefore, the following assumptions were born.

1. **Human behaviour is deterministic** by the sum of his own inner drives and forces from the environment.
2. **Each human being has needs in the different wishes and goals.**
3. A **person decides to perform a behaviour by choosing from several behaviours.** This includes the expectation of the value of the results that will be obtained after the behaviour has been performed.

Therefore, the expectations are both values in the positive and negative ways. A person influences the outcome of a particular action. They are thoughts, beliefs, desires, hopes or person's feelings about something, such as a person, action, or event, etc. So, it is thinking ahead by aiming for what is possible to happen as he thought. However, a person's expectations will depend on needs and according to the experience of each person (Tversky & Kahneman, 1979; Von Neumann & Morgenstern, 1944).

2.1.2. Historical Background

Behavioural economics has a history saying that it is about microeconomics and related to psychology. Since Adam Smith has used psychological explanations to explain individual behaviour and Jeremy Bentham wrote about utility using **psychological aspects** to explain it. However, in later eras, economists 'extracted' the psychological aspect from education. It is a group of Neo-Classical Economics by seeing that humans are **'Economic animals'** like the scientific name is called homo economicus. The idea that human is this economic animal. It is placed on a straightforward base. If one is thirty years old or older and used to study economics, he will find that there is no teaching about

'Economic History'. It hardly seems that "Economics" itself has evolved continuously. Along the way economics has some concepts that can be used. Some cannot use. But the teaching of economics in the past was taught as if it were economics. **'Humans are economic animals'** is a universal truth. Everything was thus reduced to a dull form. For example, when talking about demand, supply, and equilibrium price. One uses simple equations and graphs. It is as if everything is logical, like living in an ideal society. The concept of humans as economic animals is about 'holding back' the perfection of the two sides at the end of the rope. On one side is the consumer. The other side is the producer. **Consumers want maximum benefits** which means including the benefits of that product or service. If it is cheap or free, that is even better. The producer side wants nothing but **maximum profits** causing these two sides to play tug of war with each other all the time. The price is a mechanism to pull back and forth. All of which is done as if humans on both sides are fully rational creatures. That is, everything is done with Perfect Rationality. Therefore, this economic model is called the **"Rational Actor Model**", meaning that everyone is an 'actor' who has a reason. But in the 20th century, many economists began to see the complexity of humans, because things rarely followed the models that such economists predicted. Because humans are not that rational. Simple, blunt explanations that, in their ideal state, cannot be used in practice.

Economists began to see that economics alone was not enough to explain the increasingly complex social phenomena of the post-World War II period. So, he began to turn to explanations that required the help of **psychology**. And in fact, this includes other sciences as well, such as political science or sociology. One must admit that early psychology, there are no characteristics yet. How much of it is 'empirical science'. That is, using the Scientific Discipline? Therefore, **expected utility theory** has proposed by Von Neuman and Morgenstern (1947). It is an economic concept used to explain Individual decision-making under conditions of risk and uncertainty. A **rational decision maker** will prioritize the expected value of each path. Pick and choose the alternative that gives the expected utility. **Expected Utility Theory** became a main of neoclassical economics and decision theory, relating to many disciplines such as **finance, psychology, and philosophy**. The theory integrates subjective preferences and rational decision-making into a mathematical model (Von Neumann & Morgenstern, 1944). The fundamental knowledge was that individuals, blended with complete information, act as rational agents striving to maximize their expected utility when faced with uncertain outcomes. Critics have questioned the assumptions of perfect rationality and consistent decision-making, arguing that they do not align with observed **human behaviour** (Allais, 1953). These criticises are developed to the alternative theory, especially in **the behavioural economics concept**. A more realistic of decision-making under uncertainty led to the introduction of Prospect Theory by psychologists whose names are Daniel Kahneman and Amos Tversky in 1979. Prospect Theory, building on the root by Expected Utility Theory, acknowledged the influence of psychological factors, such as loss aversion, and provided a more descriptive account of how individuals make decisions (Kahneman & Tversky, 1979).

2.1.3. The Fundamental Concepts of EUT as A Decision – Making Model

Utility is the satisfaction that a person receives from consumption. A particular type of product or service at a particular time. How much or how little the utility of the product or service will depend on the amount of consumer demand is often different. Types of utility characteristics provide by

1) Total Utility (TU) includes all combined utilities that is obtained from consuming each unit of any good or service.

2) Marginal Utility (MU) refers to the amount of utility or satisfaction that the consumer receives when consuming more goods or services showing in the Figure 2.1.

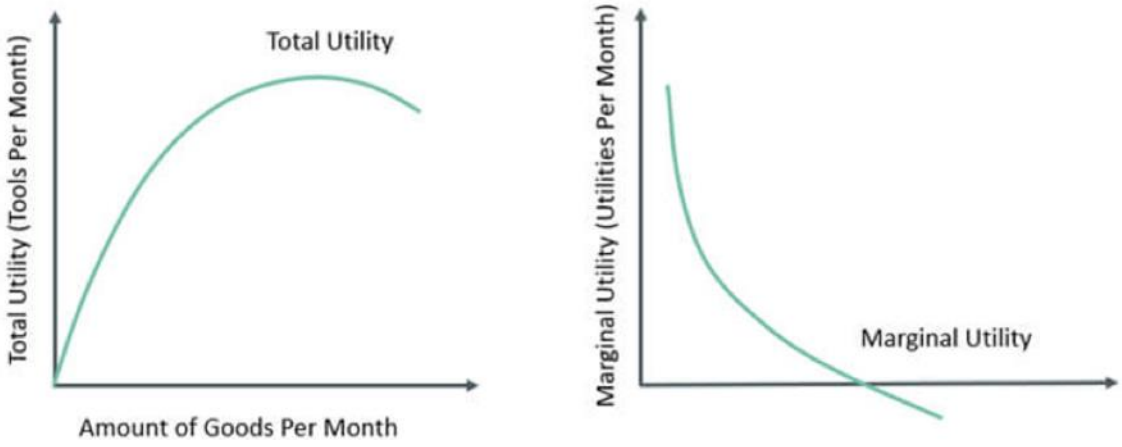

Figure 2.1 Marginal Utility and Total Utility (Thakur, 2023)

The Figure 2.1, it shows that total utility declines when **marginal utility** becomes negative. It means individual or business faces resource constraints, and optimizing total utility involves allocating these resources to produce the goods and services where the marginal utility of each is equivalent. In financial terms, such as to make business decisions, executives often find that there are alternatives to making decisions. There may be many, and each decision may cause different results.

However, the decision maker may consider the probability of those events occurring and make decisions, possibly considering the results. It expresses that individual's personal beliefs or perception about the likelihood of different outcomes occurring. This is called "Subjective Probability". The assessments contribute to the calculation of EU as Figure 2.2.

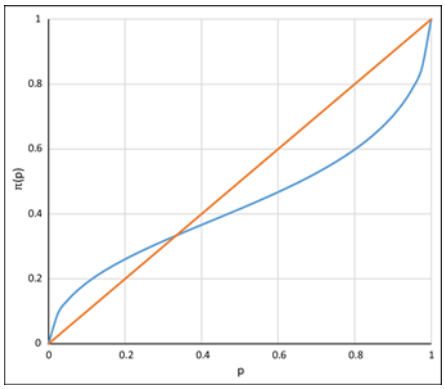

Figure 2.2 Subjective Probability (Biggs & Pettijohn, 2019)

The only thing that matters is especially the financial results. The thing that will be used to decide which option should be chosen may come from calculating the expected value of financial results, known as "Expected Monetary Value (EMV)", this EMV value can be calculated from the average of financial results. Weighted by probability, for example, if option A will make a profit for the company of 5 trillion dollar with a probability of 50% or it may cause the company to lose 2 trillion dollars. With a probability of 50% or it may cause the company to lose 2 trillion dollars. With a probability of 50%, the EMV of option A will be equal to 0.5 x 5 + 0.5 x (-2) = 1.5 trillion dollars, while option B will make a profit for the company 4 trillion dollars with probability 60% or may cause the company to lose 5 trillion dollars with a probability of 40% in this case. Option B will have an EMV value of 0.6 x 4 + 0.4 x. (-5) = 0.4 trillion dollars, so in this case If using the EMV value as the deciding factor, then one should choose option A. However, in making business decisions, many times the decision maker does not focus only on the EMV value alone, but also considers various things, especially risk.

For example, if there is a choice of action decide as follows. The numbers in the Table 2.1 below are the returns that will be received. The unit is dollars.

Table 2.1 The returns from a choice of action decide

		Future Events	
Choices	Event 1	Event 2	EMV
A	200,000	- 40,000	200,000 * 0.5 + (- 40,000) * 0.5 = 80,000
B	100,000	50,000	100,000 * 0.5 + 50,000 * 0.5 = 75,000
Probability	0.5	0.5	

From the above example, although alternative A has a higher EMV than Alternative B, it is believed that there are many people who choose Alternative B. Instead of choosing option A on the grounds that option B has only possible gains, it has a lower risk than option A, which even though it can be gained. But there is also a chance of loss.

In this case, EMV may not always be the deciding factor in utility theory. Utility Theory, therefore, has adjusting the value of this payoff is within the utility value which has a value between 0 – 1. A utility value equal to 0 being where the decision maker receives the lowest utility and a utility value equal to 1 is the value at which the decision maker receives the highest utility. The process of converting returns to utility values is as follows.

1. The utility value with the highest return is set to be equal to 1 from the case study that can be used as an example. Write the utility value of the return of 200,000 dollars as follows: U (200,000) = 1

2. The utility value of the return with the lowest value will be set to be equal to 0 from the case study that is used as an example. Write the utility value of return – 40,000 dollars as follows: U (-40,000) = 0

3. For return values that are between the largest and smallest values, such as from the example return of 100,000 dollars is for the decision maker to answer the following questions.

If there are two alternatives, which option will the decision maker choose between:

•Alternative 1 will receive 100,000 dollars

•Alternative 2 has a probability equal to p of receiving 200,000 dollars and 1-p at must pay 40,000 dollars.

This p value will be the probability that the value is between 0 - 1. For example, if the value p = 0.5, the question will be as follows:

If there are 2 alternatives, the decision maker will choose the alternative whichever between

•Option 1 will receive 100,000 dollars.

•Option 2 has a probability of 50% of getting 200,000 dollars and 50% of having to pay 40,000 dollars.

If the answer is an alternative 1, then adjust the p value from 0.5 to increase. At the same time, if the answer is alternative 2, adjust the p value to decrease until one gets a p value that makes the alternative 1 and 2 are equally interesting alternatives, assuming p = 0.8 will make the choice 1 and 2 are equally interesting as follows.

•Option 1 will receive 100,000 dollars.

•Option 2 has an 80% probability of winning 200,000 dollars and 20% of losing 40,000 dollars.

Therefore, the utility value of 100,000 dollars can be calculated as follows.
U (100,000) = 0.8 x U (200,000) + 0.2 x U (-40,000) = 0.8 x 1 + 0.2 x 0 = 0.8

It will be noticed that in that case, the decision maker wants the average return (Expected Value) in option 2 to be equal to 0.8 x 200,000 + 0.2 x -40,000 = 156,000 dollars, which is more than the alternative 1, which has a return value of 100,000 dollars, up to 56,000 dollars, which one calls this difference is Risk-Premium. It is the return that the decision maker is willing to sacrifice to the risk is lower meaning that accept 100,000 dollars with no risk, which is equivalent to receiving 156,000 dollars with increased risk.

Similarly, if the same method is used for the remaining values, such as the return value of 50,000 dollars, it may be possible to find the utility value. It is equal to 0.6. If one tries to use these values to create a diagram between returns and utility values, it will be as shown in Figure 2.3 as follows:

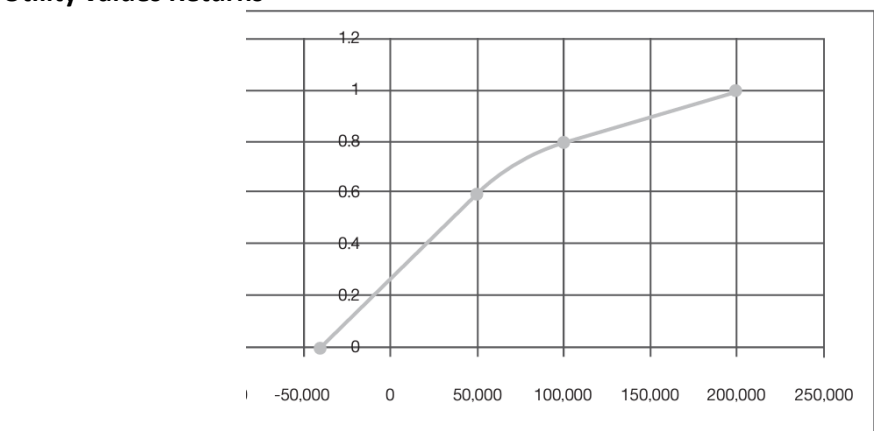

Figure 2.3 Relationship between returns and utility values

The curve showing the relationship between **returns and utility values** is characterized by an **inverted curve**. This shows that decision makers require much higher payoffs to increase utility. **Because he wanted to Compensate for the risks incurred**. Therefore, it can be concluded that this decision maker clearly has the characteristic of being afraid of risk called risk aversion. Risk aversion is characterized by an unwillingness or readiness to accept what is considered risk.

The main objective of venture capital is to reduce uncertainty. In trading, it may turn into an investment. 'safer' assets such as bonds and safe assets such as gold**. The EUT often assumes risk aversion, reflecting the idea that individuals are willing to sacrifice potential gains to avoid the negative impact of losses** shown in figure 2.4.

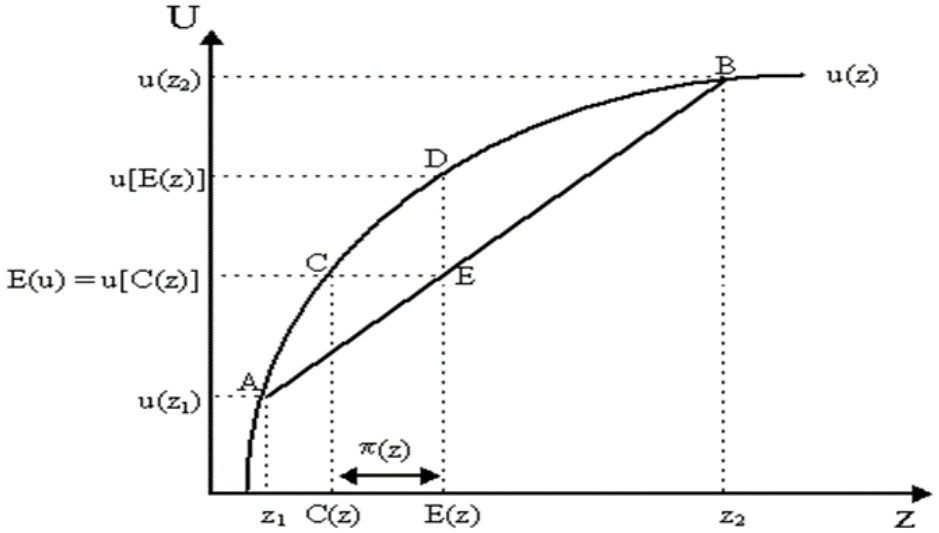

Figure 2.4 Risk Aversion (Ross, 1976, 1981)

If he feels indifferent with risks, also known as risk neutral, should this graph line be a straight line or if you are a risk taker? Seeking this line graph has a supine curve.

3. When adjusting the Payoff value, let it be the utility value. When finished, use that value to calculate the value of Expected Utility as follows:

Table 2.2 The expected utility value from a choice of action decide

		Future Events	
Choices	Event 1	Event 2	Expected Utility Value (EUV)
A	1	0	1 * 0.5 + 0 * 0.5 = 0.5
B	0.8	0.6	0.8 * 0.5 + 0.6 * 0.5 = 0.7
Probability	0.5	0.5	

In this case the decision maker will choose alternative B which, although it has a lower EMV than alternative A, has a higher average utility than alternative A. Because the individual makes choices that maximize the EU by considering both probabilities and values associated with the different outcomes. Therefore, to enhance the decision-making skills, one should apply by implementing the rational decision-making process as shown in Figure 2.5.

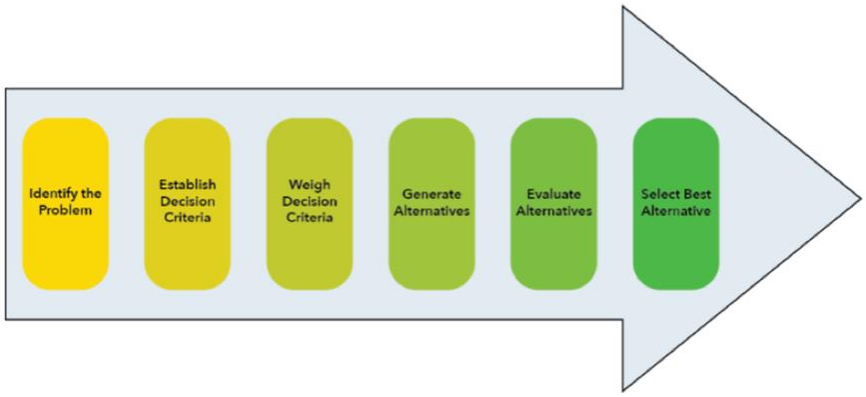

Figure 2.5 The Rational Decision – Making Process

Decisions using this **utility theory** tend to produce decision results that are more in line with the decision maker's feelings. It is based solely on financial returns and can be used to explain the results of decisions more clearly than other methods. However, the difficulty of using this utility theory is in estimating the probabilities in the steps 3 which sometimes the decision maker may be confused or unable to clearly tell but using utility theory can still be helpful towards business decisions that include analysis from various perspectives beyond just financial returns.

So that **Expected utility theory** proposed by Von Neuman and Morgenstern (1947) is an economic concept used to explain Individual **decision-making under conditions of risk and uncertainty**, but one can modify combining with the business perspective because a rational decision maker will prioritize the expected value of each path by picking and choosing the alternative that gives the expected utility.

2.2 Exploration of the key Assumptions underlying EUT

Utility means satisfaction that a person has received a response from consumption or a service to respond to consumer satisfaction along with the assumptions that satisfaction can be expressed as a number. Therefore, **utility theory is called the unit method counting as the Cardinal Approach.** The basic assumptions of the theory are as follows.

This theory assumes **satisfaction that consumption received from the consumption of services** can be calculated as a unit. The **utility** of a product can be measured in units that can be counted called **"cardinal utility".** That is, when a consumer receives a product to satisfy their needs, the consumer can determine number or amount of satisfaction. The amount received from goods is released into countable units called utils. For example, consumers can measure the satisfaction with

the utility received from consuming mango = 15 utils and utility received from consuming avocado = 45 utils so that the utility of consuming avocado is greater than consuming mango for 3 times. Moreover, utility can also be measured in monetary units, which are the amount of money a consumer is willing to pay to purchase an additional unit of a good.

Constant **marginal utility of money**, this is because if the unit of money is used as the standard for measuring utility, then additional utility of the value of money must remain constant. If the additional **utility of money** changes when the income of the consumer changes, then the standard of measurement is flexible, so this is not suitable for being a measure. Suppose **Marginal Utility** decreases or diminishing, that is, if consumers demand more units of goods and services. The benefits are given by the value of the remaining units. It will gradually decrease. This law is called **"Law of Diminishing Marginal Utility".** The law of diminishing marginal utility means that **when a consumer consumes any kind of value continuously, its marginal utility increases**. However, when it is too much for consumer's satisfaction, each unit of utility will decrease. By specifying that other variables related to the item remain constant.

Satisfaction with the amount of consumption received from consuming each type of product is not constant.

Consumers are people with reason or having the rationality aiming to seek utility highest in product consumption with financial constraints. Because the consumers want to seek maximum satisfaction. Total utility (TU) is the sum of the utilities that the consumer receives from consumption of each type of product. The total utility of a group of goods depends on the number of items on each type of product. It will have an independent nature. The satisfaction received from consuming a product depends on the quantity consumed without depending on the amount of consumption of other products. The quality of the product can be added additionally.

For example, if there are n kinds of goods and consumers consume quantities of $X_1, X_2, \ldots, X_n$, so the

$U = U_1 (X_1) + U_2 (X_2) + \ldots + U_n (X_n)$

where

U = total utility received from consuming goods $X_1, X_2, \ldots, X_n$

$U_i (X_i)$ = total utility of goods i depends on quantity of goods i which i = $X_1, X_2, \ldots, X_n$

Each consumer has knowledge. This is completely related to the information used in decision making on spending.

2.3. Use of EUT in Various Contexts

2.3.1. Finance

Financial Literacy defined by the Organization for Economic Co-operation and Development (OECD) is awareness, knowledge and understanding, skills, attitude and behaviour in a manner that results in **people making good financial decisions and ultimately** (Atkinson & Messy, 2012). Consideration of a person's level of risk tolerance to explain their acceptance of new environment that will occur in the future. Daniel Kahneman said, **"People hate losses more than they enjoy gains"** when he or she is looking on investment. This happens because investors cling to acquired assets. When investors are faced with a situation where the price of their investment assets decreases. It will cause investors to be in the sense of regret aversion. It means he does not want to incur losses from investing in assets. This idea is in a result of wrong investment decisions and develop himself to be in loss aversion behaviour. This behaviour is inconsistent with the principles of being rational expectation (Lee, Shleifer & Thaler, 1991).

According to traditional financial assumptions, the behaviour will lead to a behaviour called **misbehaving,** causing the port to collapse because it is at its own peril. For the bigger view, in the case of the management policy to implement a free trade policy whether any person will accept it or not. It will depend on the level of risk tolerance and the person too. **Satisfaction** with the management policy on the free trade policy, the level of risk acceptance is evaluated based on utility theory that analyzes between a **person's utility and the returns in money received**. The expected utility framework underlies the rationale for investors demanding higher returns for bearing additional

systematic risk. This risk-return trade-off, CAPM, reflects the main principles of EUT. Arbitrage Pricing Theory (APT) is another application of EUT in finance because the APT provides a more flexible framework for understanding asset pricing and risk (Ross, 1976). Acceptance levels are divided into three categories based on utility functions. Those are **Utility Theory and Risk-Averse Individual, Utility Theory and Risk-Neutral Individual, Utility Theory and Risk-Loving Individual** (Haugen, 1997).

Therefore, the "Expected Utility Theory (EUT)" has proven to be a magnificent tool in the field of finance. From portfolio management to asset pricing models and risk management, EUT provides a framework for understanding and analysing decision-making in the complex and uncertain world of finance. Its applications continue to evolve as financial markets and instruments become more sophisticated, reaffirming EUT's enduring significance in the study and practice of finance.

2.3.2. Insurance

Human economic activities such as consumption, production or investment, people often face the problem of deciding on alternatives to meet their needs and receive the most return. Sometimes, they may have to encounter **environmental factors** that are risks or uncertainties which occur. It will make decisions based on the information received different. Consumer behaviour and risks can be divided into 3 types. Those are **Risk-Averse, Risk-Loving, Risk-Neutral**. From this theory of consumer behaviour and risk, it has been used to explain the selection of the types of voluntary car insurance. **Consumers will have the behaviour of choosing to use car insurance in volunteer and accept the results according to the risks their faces.**

However, if consumers have risk-averse behaviour, he or she will voluntary car insurance that provides the most protection to receive the most utility. However, if disaster occurs, consumers will receive compensation or receiving returns from the coverage of such voluntary car insurance varies based on the type of voluntary car insurance that the consumer has selected. From pricing policies and designing insurance products to managing catastrophic risks and understanding behavioural aspects of insurance choices, **EUT contributes significantly to the functioning and evolution of the insurance sector.**

2.3.3. Risk Management

It is the process of searching for factors and carrying out activities controlled to reduce the causes and chances of damage to the organization by the executives. So that the level and size of the risks that will occur in the future is at a level acceptable to the organization. Moreover, it can be controlled and inspected systematically. In theoretically, for example, exposure to similar income fluctuations would weaken share on the **incentive risk**. But the opposite was found: **Voluntary risk-sharing was highest when subjects faced similar income fluctuations.** Different households and professionals have different sources of income; thus, the income is uncertain and different. The income of a daily worker is more uncertain than that of a regular worker. Farmers' income depends on both the quantity and price of their products be produced. They are often affected by many factors that cannot be controlled, such as natural disasters, epidemics, and market conditions. Although households can reduce expenditure uncertainty by purchasing health or accident insurance, but there are not many options for reducing income risk. In some communities, professionals have had to resort to voluntary risk sharing, which is free of contracts and obligations but aids those affected in the form of giving money, things, products, or labor from those who are not affected or are less affected. In theory, such voluntary risk sharing would not be possible. If those currently aiding do not believe that they will receive assistance when they need it in the future. Then, this is an important factor for successful voluntary risk sharing. Therefore, it consists of personal behaviour and environment. The behavioural factor arises from trust between those involved (Jindapon, Sujarittanonta, Viriyavipart, 2022; Charness & Cenicot, 2009). So that the "Expected Utility Theory (EUT)" is a powerful tool in the field of risk management. It provides a systematic approach to decision-making under uncertainty, allowing organizations to assess risks in various domains, including finance, project management, operations, insurance, and supply chain management.

2.4. The criticisms and limitations of EUT

Every consumer has limited money or income. Therefore, there must be **'Choice Decision',** which is before deciding which path to take. As a consumer, one must consider that "Is that choice bring you the most satisfaction?" Because every time a choice is made, it means that the money or limited resources that consumers have will decrease. Therefore, consumers must choose what will bring them maximum satisfaction. By this satisfaction in economics, it is called **'Utility".** As for theories used to explain consumer behaviour based on satisfaction or utility, there are 2 main theories:

1) Utility Theory is a theory assumes that consumer satisfaction can be measured in units. The unit called Utility is considered **Cardinal Theory.** Utility theory is based on the principle of psychology states that humans act according to their own preferences. Therefore, the purchase of goods and services arises from the satisfaction that will be obtained from the purchase of such goods. However, the same amount of the same product may provide different utility. Both in the case of different times or different consumers. Therefore, even satisfaction can be measured, but there are still differences between individuals. Consideration of satisfaction, it is necessary to study any consumer. The consumer will decide to buy more or less of a particular product. which depends mainly on the utility or satisfaction that he will receive.

2) Equal Satisfaction Line Theory or Indifference Curve Theory, it is a theory assumes that consumer satisfaction cannot be measured. It can only be said that satisfaction is more or less. It is considered an **Oridinal Theory**, which although the latter theory agrees that the important factor used to explain consumer behaviour is satisfaction. But there are arguments against the first theory's approach that satisfaction can be expressed in 'sequence', but it is impossible to express 'how much'. Equal satisfaction curve theory, the lines used to explain this theory are called Indifference Curve: IC, which is a line that shows the relative proportions of two different types of products but provide equal satisfaction to consumers.

Expected Utility Theory (EUT) assumes that **preferences are transitive and satisfy other rationality axioms**. Transitivity is a crucial assumption underlying Expected Utility Theory (EUT) and is a fundamental concept in decision theory (Von Neumann & Morgenstern, 1944). However, there is empirical evidence suggesting that individuals may violate these axioms, particularly in situations involving complex choices and uncertain outcomes. These violations challenge the normative nature of EUT, highlighting the descriptive limitations of the theory.

2.5. Introduction to Prospect theory

2.5.1. Definition

From the concept of **Behavioural Economics,** which is a new type of economics study that applies the concepts of behavioural science and psychology combined with "Economic" concepts. To point out that human decisions regarding production, consumption, investment, and other matters, it does not follow the assumption of economic theory that humans are always rational. But humans make decisions based on emotions, feelings and experience involved. Prospect theory is the work of Nobel Prize-winning studies Kahneman and Tversky, Department of Economics in 2002. By expectation theory, which is the analysis of decision making under risk and uncertainty. It will lead to an explanation of human decisions that do not follow the principles of rationality. For this study the main findings about behaviours that may impede saving and investing are as follows:

1. **Fear of loss (Loss Aversion) is the opinion that human feelings when losing benefits and feelings when gaining benefits are different.**
2. **Influence of Basic Options and Inertia** (The Power of Default and Inertia) is a detailed and quite complex choice pattern, such as the pattern of choosing life insurance, buying, and selling houses and cars or mobile phone packages with many options. Generally, most people choose the default option from the many available options. As for the influence of this basic choice, it may cause inertia behaviour, i.e., behaviour of people that do not want to exert effort, for example, when a company requires employees to be members of a mutual fund provide a provident fund since starting work which is Default. If an employee

wishes to cancel their membership in the fund, they must do so. You do not have to cancel or resign from the company. Establishing this basic option helps ensure employees have savings.

Therefore, the **"Prospect Theory"** has become a cornerstone in behavioural economics, providing a more realistic and nuanced model of decision-making under uncertainty.

2.5.2. Origins

The originator of this idea is Edward Tolman, but Victor Vroom published and created the theory. Vroom gives his views on four assumptions that are the source of motivation for work, that is, **1) Expecting that when the behaviour has been shown, will it be able to do that thing or not**? Having knowledge to what extent is the ability and facilities to display behaviour sufficient to proceed? And have a role where you can show how well you can do it? 2) **How well do you expect to do the job?** 3) **Do you expect that when you do that work you will get the desired results?** 4) **Interpreting the results of actions, if he sees that his actions have value, he will want to do them**. But if it is worthless, he does not care. Therefore, it can be concluded that when people are motivated to do anything, they have expectations accordingly. If something is lacking, then motivation will also be lacking. When looking at the condition, the theory focuses on development, with Vroom emphasizing that humans should know themselves and know the limits and abilities. Therefore, Vroom Expectation Theory or Expectation Theory is sometimes called VET. Theory has been formulated as follows.

Motivation = Value of results x Expectations x Relationship between action with results

1) **The value of the results,** each person will depend on their wishes or needs. If one wants a lot, one will have a positive value, but he will not feel happy or unhappy. This means it will have a value of zero and if he does not like it or not? It will have a negative value.
2) **Expectation is the probability** that an action will have a chance of having an effect. How much are the results at the first level? If people believe that if one works hard, he will be able to achieve high productivity. Of course, the expectation is equal to one. On the contrary If one believes that even if he tries to work hard no matter how much, it is impossible to produce high volumes of work at all. The expectation will be equal to zero.
3) **The relationship between actions and results** explains that each person's motivation will depend on the results received when the action is completed according to goal, so it can be said that Is that part of the motivation a person will have? It depends on the relationship between actions and results.

All human beings have always expected. Expectation is like a driving force to create desire, which is necessary in human life. Each person has different expectations in each time or situation, especially in conditions where the environment has changed.

2.5.3. The Development of Prospect Theory as An Alternative to EUT

The mainstream economics, there is a common on human assumption that humans will carry out economic activities with reason called "**Economic Rationality**" without bias to choose the best option. Therefore, in deciding economic problems, humans will be in the way they receive the benefits and **maximum satisfaction from a limited budget.** In **behavioural economics**, there is an assumption that **"Homo Economicus**" is a human being who can process thoughts efficiently and can make reasonable decisions with maximum satisfaction in mind. **Homo Economicus** will have the following qualities: Unbounded rationality, being able to perceive information and process it without limits and being able to make reasonable decisions without bias. Unbounded willpower, having unlimited self-control. Unbounded selfishness, thinking. Think only of his own highest satisfaction with emotionless. Heuristics or rule of thumb means studying conscience or using common sense, which is the first thought that pops into the brain without thinking or suddenly think about it and allowing you to decide in a limited time. But the decision may not be reasonable.

In **Prospect Theory,** it is said that most people tend to want more certainty than there is risk that is called "**Certainty effect".** The most people make decisions based on the value of the **"gain" or "loss"** relative to a reference point. The perspective of such changes may be compared to the current state or things that are different from expectations. What makes people happy or unhappy is "change." The behaviour of most people will avoid risk called **Risk Aversion**. On the other hand, some groups of people have the behaviour Risk Loving when making decisions about losses called **Reflection Effect.**

2.6. Key concepts of Prospect Theory

2.6.1. Reference Dependence

Reference dependence is a foundational concept in Prospect Theory, a ground-breaking framework developed by psychologists Daniel Kahneman and Amos Tversky in the late 1970s. This key concept challenges the traditional assumptions of Expected Utility Theory and introduces a novel way of understanding how individuals make decisions under uncertainty. At the heart of **Prospect Theory** is the idea that **individuals do not evaluate outcomes in isolation**. Instead, they assess **gains and losses** relative to a **reference point.** This **reference point** serves as a benchmark against which individuals gauge the desirability of potential outcomes. The introduction of reference dependence was a departure from the utility maximization assumptions of Expected Utility Theory and became a fundamental building block of **Prospect Theory**. The concept of reference dependence is closely tied to the notion of value functions. **In Prospect Theory**, individuals are assumed to have value functions that depict how they subjectively weigh potential outcomes. These value functions are typically represented by **S-shaped curves**, illustrating the **diminishing sensitivity to changes in wealth**. As individuals move away from the **reference point**, the marginal value of gains decreases in the domain of gains, and the marginal value of losses increases in the domain of losses. The reference point can vary based on individual circumstances, personal experiences, and framing effects. For example, in financial **decision-making**, the reference point may be influenced by an individual's current financial state, such as gains or losses in an investment portfolio. In health-related decisions, the reference point could be the current state of well-being or health. One of the key consequences of reference dependence is the reflection effect. This effect describes the **asymmetry in the way gains and losses are perceived**. Kahneman and Tversky found that **losses loom larger than equivalent gains**, leading to **risk aversion in the domain of gains and risk-seeking behaviours in the domain of losses.** This asymmetry challenges the traditional economic assumption of risk neutrality and has profound implications for understanding decision-making behaviours.

Reference dependence also plays a crucial role in explaining the phenomenon of loss aversion. **Loss aversion** is the tendency for individuals to strongly prefer avoiding losses over acquiring equivalent gains. The **reference point** becomes a crucial **anchor,** and deviations from this point are psychologically magnified. Loss aversion is a powerful motivator in decision-making and has implications for various domains, including economics, finance, and public policy. Furthermore, the concept of reference dependence is closely linked to the framing effect, another key aspect of **Prospect Theory.** The way a decision is framed, or presented, can influence the **reference point**, and subsequently impact individuals' choices. Different frames can lead to different reference points, altering the perceived desirability of outcomes. In conclusion, reference dependence is a central and influential concept in Prospect Theory, providing a novel perspective on **decision-making under uncertainty** (Tversky & Kahneman, 1979). By acknowledging the importance of a reference point and its **dynamic nature,** Prospect Theory captures the richness of human decision-making in various contexts. This concept has not only advanced our theoretical understanding of decision theory but also has practical implications for fields ranging from economics to psychology, contributing to a more comprehensive and realistic model of how individuals navigate complex choices in the real world.

2.6.2. Loss Aversion

Loss aversion is a central and influential concept within Prospect Theory, a **ground-breaking framework in behavioural economics** developed by psychologists Daniel Kahneman and Amos Tversky. This concept represents a **departure from traditional economic theories**, providing insights

into **how individuals perceive and respond to gains and losses** in decision-making under uncertainty. At its core, loss aversion refers to the psychological phenomenon where individuals exhibit a stronger emotional response to losses than to equivalent gains. In other words, **the pain or displeasure associated with losing something is typically felt more intensely than the joy or satisfaction derived from gaining the same amount.** This asymmetry in the emotional impact of gains and losses is a key departure from the rational, utility-maximizing behaviour assumed by classical economic models. Kahneman and Tversky's exploration of loss aversion emerged within the broader context of Prospect Theory, where they sought to understand **how people evaluate and choose between risky prospects**. Loss aversion is a crucial component of the theory, and it is intricately connected to the concept of reference dependence. **Reference dependence**, another key concept in Prospect Theory, involves individuals evaluating outcomes relative to a reference point. Loss aversion is particularly pronounced when deviations from this reference point result in losses. The reference point can be influenced by various factors, including an individual's current state, expectations, and framing effects. When people experience losses relative to their reference point, the emotional impact is heightened, influencing subsequent decision-making.

The impact of loss aversion is illustrated through **value functions in Prospect Theory**. Value functions are **S-shaped curves** that depict how individuals subjectively **weigh potential gains and losses.** Loss aversion is reflected in the steeper slope of the curve in the domain of losses compared to the domain of gains. This asymmetry in the curvature of the value function highlights the **greater psychological weight assigned to losses**. The implications of loss aversion extend to various domains, including economics, finance, and decision-making in everyday life. In financial decision-making, for example, investors often demonstrate a reluctance to sell losing investments, hoping for a recovery to avoid realizing a loss. This behaviour is inconsistent with traditional economic notions of rational decision-making and reflects the influence of loss aversion. Moreover, loss aversion has implications for public policy and marketing. Policymakers can leverage an understanding of loss aversion to design **interventions that encourage desirable behaviours by framing choices** in ways that emphasize potential losses. Similarly, marketers can employ strategies that highlight the potential losses associated with not adopting a particular product or service. The concept of loss aversion has been supported by numerous empirical studies and experiments, providing robust evidence for its existence and impact on decision-making. Notably, these findings have contributed to the broader recognition of behavioural economics as a field that integrates psychological insights into economic models. In conclusion, loss aversion stands as a key concept in Prospect Theory, reshaping our understanding of how individuals make decisions under uncertainty. The recognition of the heightened emotional impact of losses has far-reaching implications for economic and psychological research, as well as practical applications in fields such as finance, marketing, and public policy. Understanding and accounting for loss aversion is crucial for constructing more accurate models of decision-making that better align with observed human behaviour in real-world scenarios.

2.6.3. Probability Weighting

Probability weighting is a fundamental concept within Prospect Theory, a ground-breaking framework in behavioural economics developed by Daniel Kahneman and Amos Tversky. This concept challenges the traditional economic assumption that individuals accurately assess and apply probabilities in decision-making under uncertainty. In the context of Prospect Theory, **probability weighting refers to the idea that individuals do not treat probabilities in a linear and objective manner, as assumed by Expected Utility Theory (EUT).** Instead, people **subjectively distort probabilities, assigning different weights to potential outcomes based on their perceived likelihood.** The deviation from the linear probability assessments of Expected Utility Theory (EUT) is reflected in the **S-shaped probability** weighting function proposed by Tversky & Kahneman (1979). According to this function, **individuals tend to overweight low probabilities and underweight high probabilities**. In other words, they are more sensitive to small probabilities and less sensitive to moderate to high probabilities than traditional economic models would predict. This departure from the normative assumptions of EUT has profound implications for decision-making. Probability weighting contributes to the explanation of phenomena such as the **certainty effect and the overweighting of rare events.**

The certainty effect suggests that individuals tend to overweight certain outcomes, even when the objective probabilities are identical. This tendency to favour certainty over uncertainty is a departure from the predictions of traditional economic models. Moreover, the overweighting of rare events implies that individuals assign disproportionately higher subjective probabilities to unlikely events. This phenomenon is often observed in areas such as insurance decisions, where people may be more concerned about rare but catastrophic events, leading to an overemphasis on insuring against such outcomes.

The probability weighting function in Prospect Theory is intimately connected to the broader framework's treatment of gains and losses. In the domain of gains, the probability weighting function is concave, indicating that individuals tend to be risk-averse when facing high probabilities of gains. In contrast, in the domain of losses, the function is convex, signifying a propensity for risk-seeking behaviour when confronted with low probabilities of losses. The concept of probability weighting interacts closely with other key components of Prospect Theory, such as **reference dependence and loss aversion**. Reference points and the emotional impact of gains and losses influence how individuals subjectively assess and weight probabilities. The **S-shaped curves** of the probability weighting function capture the nuanced way in which individuals distort probabilities based on these contextual factors. **The empirical support for probability weighting comes from various experimental studies conducted by Kahneman and Tversky, as well as subsequent researchers in the field of behavioural economics.** These studies consistently demonstrate that individuals exhibit systematic deviations from the probability assessments predicted by traditional economic models. In conclusion, probability weighting is a pivotal concept within Prospect Theory, contributing to a richer and more accurate understanding of how individuals make decisions under uncertainty. By acknowledging the subjective distortion of probabilities and the nonlinear nature of decision weights, Prospect Theory provides a nuanced framework that aligns more closely with observed human behaviour in real-world situations. Probability weighting challenges the traditional assumptions of rational decision-making and underscores the importance of incorporating psychological insights into economic models to enhance their descriptive and predictive power.

2.7. Applications of Prospect Theory: Exploring real – world applications in Economics, Finance, and Policy making

2.7.1. Exploring Real World Applications in Economics:

Understanding behavioural economics from scratch, it should start by studying how people have their thought processes to make decisions. One can divide cognitive systems into two: automatic systems and reflective systems.

Automatic Systems:

It is based on intuition. One makes decisions or do things quickly without thinking. Therefore, this system has characteristics that are difficult to control called uncontrolled without effort emphasizes connection with surroundings fast not conscious that he is thinking and use skills.

Reflective Systems:

It emphasizes analytical thinking. One must be intentional to be able to make the right decision. This system therefore has the characteristics that he can control it, use effort, use inferences, act slowly, be aware of what he is thinking, and follow rules or principles.

The **social norms** are the interaction of people and is characterized by interdependence. There is usually no **immediate exchange**. Or many times one may not care about getting anything in return at all, such as helping an elderly person cross the road. In terms of policy, using social incentives such as helping each other. Praising and acknowledging good deeds rather than economic incentives. It may give better results. Because **social relationships** satisfy the social animal side of humans who want to be part of a society or community**. Policy design** should consider designing a choice that motivates people to make choices the most beneficial to them or society and avoid decisions that are

harmful or have external economic consequences. Remove negative externalities while maintaining freedom of choice libertarian paternalism, which is different from command and control which lacks flexibility to the context and may violate a person's freedom of choice. Because the concept of behavioural economics varies according to the context, situation, and social and cultural factors of each area. The application of the concept is therefore very diverse. Make the application in one area successful may not affect another area. Therefore, policy design should aim to design policies that are low cost. Or is a supplementary measure that may not replace the usual incentive measures.

Example: Solving the cleanliness problem of public restrooms

Schiphol Airport in Amsterdam Netherlands solves the problem of urine smearing outside the toilet bowl by printing housefly patterns into the urinal. To allow the user to have intention or "aim" while urinating. The results show that it can reduce the mess outside the bowl by up to 80 percent. Moreover, if one wants to analyze the worthiness of following this example. The main cost of the project will be the cost of printing the design on the urinal. And the project benefit is the value that can be saved from reducing the number of people and cleaning time. Then it may be compared with the worthiness of other policies, such as making campaign signs.

2.7.2. Exploring Real World Applications in Finance

Understanding investor and capital market behaviour cannot do it perfectly. Due to the behaviour of people who do not be correctly predicted based on scientific principles. Understanding how investors and the capital market behave may allow us to change our behaviour to be consistent with a model of traditional finance to provide better investment results.

Traditional Finance:

General Assumptions,

1) people are risk-averse and focus on their own interests and maximize their own satisfaction.

2) The price of securities in the market is subject to consolidation and reflects the influence of assets. All stock options are gone.

Investors with the above-average behaviour are called rational investors. Markets with the above-average behaviour is called efficient market. Behavioural finance is the efforts to understand and explain the observed behaviour of investment and market and set assumptions to reflect. Financial behaviour is more observable than economic behaviour.

Behavioural Finance Micro:

It is examining the behaviours and tendencies that set people apart. From people in the future,

it is reasonable according to neoclassical economic theory. Two types of behavioural biases affect Investors' financial decisions. Cognitive errors are errors that arise from inaccurate situations, processes, data, or memories. Emotional biases are errors that arise from impatience or logic. Thinking is using emotion over reason.

Behavioural Finance Macro:

It considers the abnormalities in the durable market that cause the durable market to not have poor performance in traditional finance. Foreign markets are affected by behaviour. Such effects will make durable markets different from efficient durable markets.

2.7.3. Exploring Real World Applications in Policy Making:

Policy design, whether big or small, if one wants the policy to be effective and not oppress people until they have no choice. He can apply the behavioural economics to policy design, so it would be a good choice for policy makers.

Example: Reducing accidents from driving faster than the law limits

A solid white line is painted across Lake Shore Drive in Chicago, USA, to reduce accidents caused by driving over the speed limit. This is because the route has several dangerous S-shaped curves in a row. Many drivers are not careful about exceeding the speed limit and often must break through

curves. The solution is in the moments before entering a dangerous curve. Drivers will see speed limit signs. This is followed by a solid white line painted across the road which is intended to provide a visual signal. The special feature of painting solid white lines is that by default, the solid white lines are spread evenly apart. But when in dangerous curves, the solid white lines are spaced closer together. This makes the driver feel as if he is driving faster and the driver's instinct will be to slow down. If one wants to analyze the worthiness of following this example. The main cost of the project will be the cost of painting solid lines and symbols onto the road. And the benefit of the project is the number of accidents that are expected to be reduced. They might estimate how much economic damage a single accident will cause on average. This must include damages that are easily measurable in monetary terms.

2.8. Contrasting Prospect Theory with EUT

Human' decisions are inevitably subject to risk and uncertainty. How is risk different from uncertainty? According to Hardaker, Huirne, Anderson & Lien (2004), **uncertainty occurs when people have incomplete information about what will happen in the future. But risk is the result of uncertainty.** For example, a farmer plans to sell his rice production the next day, expecting it to be sold at a price of not less than 50 baht per kilogram. In this case, farmers face uncertainty in the price which may decrease on the day of sale. Therefore, farmers may face price risk. The main economic theory used to explain farmers' attitudes and decision-making behaviour towards risk is expected utility theory (EUT). Farmers are rational people and try to choose the best within the constraints they face. Therefore, farmers' decisions are generally made under the assumption of risk aversion. For example, in the matter of choosing production technology in the case of environmentally friendly technology, rational farmers should decide to embrace technology. This is because the net returns of green technologies are higher than those that rely on chemicals.

However, it is found that most farmers are still willing to use traditional production technology that relies on chemicals. It is also found that in some situations, such as small outbreaks of disease or insect disease, farmers who accept good production principles and appropriate (Good agricultural practices: GAP) turn to using chemicals with high levels of severity to eliminate insects to avoid loss of production. This incident shows that farmers do not consider the level of net returns they will receive. This behavioural reality conflicts with the axiom of the EUT because EUT cannot explain farmers' behaviour under circumstances of loss. Therefore, researchers have recently turned to using the theory of extinction called “Prospect theory (PT)”, which is a theory that combines psychological concepts with economic theories. The idea of the theory is that people will have risk-avoiding behaviour only when faced with a situation where they will gain and will have risk-loving behaviour or are willing to take risks to avoid losses when faced with a situation of loss (Tanaka, Camerer & Nguyen, 2010).

SUMMARY

If we consider the assumptions about human behaviour in the **Expected Utility Theory** that appear in economics newspapers and articles, including in the models used by most economists for the analysis at both the micro and macro levels, it was found that the **expected utility theory** assumes that **humans are rational with complete thinking and reading**. In addition, in making a rational decision to do something at a certain time or not, expected utility theory also assumes that humans have a thinking process that has a far-sighted view and calculates the possibility in the form of Expected Value to get the most appropriate results. Optimization under various options that are expected to occur in the future and is discounted to the present value. These assumptions have been made. It is used as a basis for economic analysis. In the real world, the ability to recognize information and the ability of human calculation has limitations, resulting in humans being unable to process. To make rational decisions it as assumed by expected utility theory. Seeking maximum expected utility in practice has many limitations because information is limited. As a result, humans do not fully know the various options that will lead to appropriate decisions. According to the concept of economics decision process, what happens in real life does not meet the high standards that economists have set. One makes the same mistakes over and over in a systematic way (Gilbert, 2013). These things would not happen if humans were the ones to make them. This is reasonable as assumed by economic theory.

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CHAPTER 3: NUDGE THEORY AND CHOICE ARCHITECTURE

In behavioural economics, few concepts have generated as much attention and provoked as much debate as Nudge Theory. Propounded by Thaler and Sunstein in their seminal work, "Nudge: Improving Decisions About Health, Wealth, and Happiness" (Thaler & Sunstein, 2008). Nudge Theory suggests that positive reinforcement and indirect suggestions can influence the motives, incentives, and decision-making of groups and individuals, more effectively than direct instruction or enforcement.

Nudge theory has redefined the landscape of behavioural economics and public policy, it provides a targeted approach to influencing decision-making. This chapter delineates the subtle, yet powerful force of nudge theory within the context of choice architecture and explores its applications in different areas. It also points out to its limitations and future perspectives.

3.1 Nudge Theory: Influencing Choice without Restricting Options

This section introduces the concept of Nudge theory, detailing its origin and the main principles. We will explain, how small changes in the design of the environment can significantly influence the choices that people make, without restricting their freedom of choice. Nudge theory states that decision-making environments influence choices in significant ways. It is based on the insight that seemingly insignificant details within these environments can exert a profound impact on decision outcomes, as it was highlighted by Thaler and Sunstein in their seminal work (Thaler & Sunstein, 2008).

Central to this theory is the recognition that humans, while well-intentioned, often fall victim to systematic cognitive biases and decision-making shortcuts, as was documented by Kahneman (2011). Then, these biases can lead to less-than-optimal decisions. I tis important to note that nudge theory does not aim to address these inherent cognitive tendencies, but rather to channel them in beneficial directions, thereby promoting choices that serve individual broader goals and welfare.
The nudge theory is based on the following fundamental principles:

1. **Choice architecture**

Choice architecture represents a multifaceted approach to improving the decision-making. It is based on the understanding how people think and what influences their choices. Based on it, choice architects can design environments that improve people's ability to make decisions that are in their long-term best interests.
Thus, choice architecture is related to structuring the environment in which people make decisions. This concept is rooted in the understanding that the way choices are presented to individuals can heavily influence their decisions. Thaler, Sunstein, and Balz (2010) clarified the importance of good choice architecture, pointing out that if decision-making contexts are arranged thoughtfully, they can help people to navigate towards better choices, while still preserving their freedom of choice.
The essential assumption of choice architecture is that **decision-making contexts are not neutral**. Every context inherently nudges people in one direction, whether it is intentional or not. For instance, the layout of a supermarket also represents a choice architecture; the placement of specific products on shelves at eye level influences the choices that shoppers make, often nudging them towards purchasing more expensive items. This shows that the organization of a store can subtly guide behaviour of customers.

In a well-designed choice architecture, the organization of the decision space is optimized to make it easier to choose beneficial outcomes. For example, if a form **requires individuals to opt out** of a beneficial programme instead of opting into it, the default choice, i.e., the path of least resistance, becomes the participation in the program, which can lead to its increased enrolment rates. This

approach leverages the status quo bias, which has been well documented. According to it individuals tend to stick with the default options, if they are given a choice. Effective choice architecture also involves **simplifying complex decisions**. When people are faced with overly complicated choices, they can become overwhelmed, a phenomenon known as choice overload. By breaking down complex decisions into simpler, easier to process components, a choice architect can help individuals to better understand their options and the potential outcomes of their decisions.

Another aspect of choice architecture is feedback. By designing an environment where individuals receive **immediate feedback on their choices**, it can empower them to make better decisions in the future. For example, providing real-time energy consumption data can nudge individuals to reduce the energy usage, thus, promoting energy conservation. The **structure and presentation of choices** represents also a part of choice architecture. The use of clear and simple language, graphical elements, and intuitive design can have positive influence on the decision-making. For instance, a retirement savings plan might be more appealing if the long-term benefits are communicated in a clear and compelling way and this way nudge individuals to think beyond their immediate financial situation. In the choice architecture, it is also crucial to anticipate and plan for **common errors**. By understanding how and why people make mistakes, choice architects can design environments that guide individuals back on track. For instance, if people commonly forget to save documents in a computer program, a save prompt would serve as a nudge to compensate for this oversight.

Of course, **the ethical aspects of choice architecture** must be carefully considered. While nudging can lead to better individual and societal outcomes, it also raises questions about its negative impact on the autonomy of individual decisions and the threat of their manipulation. Thus, the choice architecture should be ethical, i.e., respect the decision-maker's values and allow for informed, uncoerced decisions. It also should provide transparency on such issues as how choices are organized and ensure that nudges are aligned with the best interests of individuals, who are being nudged.

2. Libertarian paternalism

The framework of libertarian paternalism embodies a strategic approach to policymaking, which aims to preserve individual autonomy while subtly guiding choices for improved personal and societal outcomes.

At first, the 'libertarian', with its connotations of unrestricted choice, against 'paternalism', suggestive of a guiding hand, might appear to be mutually exclusive. However, the synthesis of these ideas forms a cohesive ideology where autonomous decision-making is valued but gently steered towards options, which are likely to enhance welfare. The rationale for this approach is grounded in behavioural economics, which has put into the spotlight the existence of non-rational decision-making driven by cognitive biases (Kahneman, 2011). Acknowledging these inherent biases, libertarian paternalism proposes interventions that nudge individuals towards more favourable behaviours without taking away their choice. Thus, libertarian paternalism is to represent a balanced approach that seeks to improve outcomes through well-considered policy design that acknowledges human cognitive limitations. It offers a tool for policymakers who aim to enhance social welfare while respecting individual freedom of choice.

Libertarian paternalism represents a distinctive approach within behavioural economics that combines **respect for individual choice with a nudge towards improved decision-making**. As Thaler and Sunstein (2008) express in their book the core of nudge theory involves designing interventions that can positively influence behaviour without forbidding the choice of any options.

In their earlier theoretical work, Sunstein and Thaler (2003) argue that this approach is not inherently contradictory. In their view, it is possible to encourage better choices while fully preserving individual autonomy. Underlying these discussions is the recognition of cognitive biases and decision-making heuristics, as detailed by Kahneman in "Thinking, Fast and Slow" (2011). These psychological patterns often lead people to make choices that may not serve their long-term interests. If understanding these biases, policy designers can create nudges that help people make better choices naturally, without feeling coerced.

Practical applications and case studies of this theory in action are described by Halpern (2015), who highlights, how subtle changes in the way options are presented can significantly influence the decisions that people make and support the efficacy of libertarian paternalism in real-world settings. Camerer et al. (2003) advocate for the need of such policies that would safeguard individuals from poor decisions while minimizing the impact on those who do not need such safeguards. This notion is aligned with the idea of libertarian paternalism by suggesting that interventions should assist those who are most vulnerable to decision-making errors, but at the same time, having a negligible effect on others.

This methodology initiated ethical debates. Advocates defend the moral integrity of this approach, arguing that it can guide individuals towards better outcomes while respecting individual freedoms. On the other hand, the opponents contend that any paternalistic strategy, no matter how well-intentioned, carries the potential for manipulation and could undermine personal freedom and accountability. A critical challenge in the application of libertarian paternalism is **ensuring the alignment of nudges with the true interests of affected individuals.** This requires a comprehensive understanding of human behaviour and an ethical commitment to honesty and accountability. It also requires evidence-backed policymaking to be able to predict the impacts of such nudges reliably. The heterogeneity of population further complicates this approach and strengthens the necessity of a thoughtful design of policies that accommodate diverse preferences and circumstances. In this regard, the availability of opt-out options and of the customization of choices is key, since it would permit individuals to deviate from default selections without significant difficulty.

3. Default options

The concept of defaults is an essential aspect of decision architecture. It highlights, how **pre-selected options** can significantly shape individual choices. This phenomenon rests on the notion that when a default choice is presented, it often carries an implicit recommendation, and people are prone to adopt it due to a combination of inertia and trust in the expertise of the author of the choice (Johnson & Goldstein, 2003). Default options are focused on leveraging the psychological principle of the status quo bias, where individuals have a propensity to stick with current conditions or pre-selected options rather than making an active choice to change (Samuelson & Zeckhauser, 1988). This bias can have considerable implications, especially when the decision involves complex information or if the outcomes are uncertain. In such situations, default options serve as a heuristic, or a mental shortcut, which allow individuals to make a choice with less effort.

Madrian and Shea (2001) demonstrated the effects of default options in their study on retirement savings plans. They found that automatically enrolling employees in a retirement savings plan, with the option to opt out, substantially increased the participation rates compared to requiring employees to opt in. This is because the default option of being enrolled set a new status quo, which employees were more likely to accept. McKenzie et al. (2006) argue that defaults can sometimes function as a form of passive endorsement, suggesting that the default option is the recommended or wise choice. When individuals are uncertain, they may perceive the default as the 'safe' option, presuming that experts, who have designed them have selected the most beneficial or popular choice. However, the ethical aspects of defaults require careful consideration. Thaler and Sunstein (2008) suggest that defaults should be designed to enhance welfare and that they must be constructed with the individuals' best interests in mind, ensuring that the default option is likely to improve their welfare, as mistakes or inaction should not lead to adverse outcomes.

Despite their effectiveness, the application of default options is not without controversy. **Critics usually argue that they infringe on individual autonomy by nudging individuals toward a particular choice.** Nevertheless, Smith et al. (2013) note that provided that the default option aligns with the individuals' likely preferences and well-being, and that opting out is designed as a straightforward process, the ethical concerns should be mitigated. The key is the transparency and ease to reverse the default for those who wish to make a different choice.

Thus, default options represent a powerful tool in the decision architecture. When used thoughtfully, they have the potential to significantly improve individual and collective outcomes by simplifying decision-making processes and guiding individuals towards beneficial behaviours. The

literature indicates that the use of defaults must be done with care to ensure their ethical use, their use can be a valuable component in public policy making as well as private organizational strategies.

4. Feedback

The concept of feedback in decision-making is considered to be instrumental in shaping human behaviour. Feedback mechanisms provide individuals with **information about the consequences** of their actions, which in turn can lead to modification of their future behaviour. Feedback can serve as a potent nudge when it is designed and implemented effectively. It can provide a kind of mirror to individuals, reflect the impact of their actions and prompt them to make adjustments. Dolan et al. (2010) highlight the significance of feedback as an influential tool for encouraging behavioural change. This is a perspective that has been increasingly integrated into policy design and corporate strategies.

In behavioural economics, feedback loops play a key role in nudging individuals towards more desirable outcomes. It assumes that timely, clear, and relevant feedback can correct misconceptions and reinforce positive behaviour. For instance, when people receive immediate information on the amount of energy that they consume, they can adjust their habits towards higher energy efficiency (Allcott & Mullainathan, 2010).

The impact of feedback is amplified when it becomes **personalized.** Fogg (2009) discusses the role of technology in providing personalized feedback, which allows individuals to understand the direct implications of their actions. Personalized feedback can be employed in various domains, e.g., in health care, where patients receive feedback on their own health, to finance, where consumers can track their spending and saving behaviour through personal finance applications.

However, feedback efficacy is also dependent on its **delivery method.** According to Gino and Schweitzer (2011), feedback is most influential when it is immediate, as delays can diminish the association between the action and the result. E.g., in education, Hattie and Timperley (2007) demonstrated that immediate feedback to students could significantly enhance their learning and improve their performance.

The frequency of feedback also plays a crucial role. Research by Frey and Oberholzer-Gee (1997) suggests that repeated feedback can create a loop that consistently informs and shapes behaviour over time. This can be observed in customer loyalty programs, where continual feedback about rewards can motivate people to return to the store/chain and thus, affect the consumer behaviour.

However, the design of feedback systems must consider **the potential for the information overload.** Too much feedback, or feedback that is not actionable, can overwhelm individuals and have the opposite effect, i.e., lead to disengagement. Thaler and Sunstein (2008) propose the use of a simple, clear feedback that is aligned with the goals of individuals and is provided at a time, when it can be most useful. It is also important to frame the feedback appropriately to encourage the desired behaviour. Studies by Tversky and Kahneman (1981) on framing effect demonstrate that people respond differently to feedback based on how it is presented. For example, loss aversion can be leveraged by framing feedback in terms of potential losses rather than gains.

In the digital age, the potential for the use of the feedback has increased exponentially through the use of big data and analytics. Companies like Google and Amazon utilize vast amounts of data to provide feedback to users that can guide their purchasing decisions and online behaviour (Mayer-Schönberger & Cukier, 2013).

5. Expect error

The principle has been pointed out to by Thaler and Sunstein (2008). It points out that **humans are prone to making errors** due to various cognitive biases and heuristics that affect the decision-making. Acknowledging and planning for these potential errors allows us to create nudges that would soften the impact of mistakes and errors and guide individuals towards better outcomes.

In the field of psychology and behavioural economics, human errors are a well-documented phenomenon. Tversky and Kahneman (1974) extensively discussed how heuristics and biases lead to systematic errors in judgment. These **predictable errors must be anticipated,** when we design nudges. For example, the status quo bias, i.e., the tendency to accept current conditions as a default, can lead

to inaction. If defaults are set beneficially, choice architects can mitigate negative impact of this bias to ensure that even if individuals do not make an active choice, the default is in their best interest.

Thus, the concept of "choice architecture" is central to reflecting the human tendency towards errors. It relates to presenting choices to individuals with the aim of making it easier for them to choose what is best for them, without removing their freedom to choose. Thaler and Sunstein (2008) argue that good choice architecture can reduce the negative impacts of errors. For example, automatic enrolment with an option to opt-out in a retirement savings plan ensures participation from those who might otherwise delay enrolment due to procrastination or lack of knowledge.

Also, the design of **technological user interfaces** provides practical examples of expecting an error. For instance, spell check functions in word processors and form validation on websites represent preventive measures to identify mistakes before they have larger consequences. Similarly, financial services use nudges such as automatic bill payments or overdraft protection to anticipate and prevent costly errors.

The principle of expecting error also implies that the system **design should be forgiving and allow for easy correction of mistakes**. For instance, "undo" options in software applications or the ability to easily amend online orders within a certain timeframe can mitigate the negative consequences of an error. It is also important that feedback is provided to individuals so that they can learn from their mistakes (Kahneman, 2011).

However, the design with the expectation of an error requires an **understanding of the conditions under which errors are most likely to occur.** The research by Reason (1990) on human errors has shown that system designs should account for the complex interplay of individual, situational, and environmental factors that contribute to mistakes. Anticipating error in choice architecture is not just about avoiding harm; it also encompasses facilitating better decision-making. For example, in healthcare settings, checklists are used to anticipate common errors during surgery. This standardisation of complex procedures through these checklist nudges healthcare professionals towards best practices, minimizing the likelihood of error.

The principle of expecting error is key in the construction of nudges within the choice architecture. Anticipating potential mistakes and designing systems that are forgiving and corrective allows to gently steer individuals towards better decisions while maintaining their autonomy. Such designs recognize the imperfection of human decision-making and strive to create an environment, where those imperfections lead to minimal harm and maximum benefit.

6. Structuring complex choices

The decision-making contexts can often be overwhelming. When faced with complex decisions, individuals may struggle to process all the relevant information effectively, which can lead to suboptimal choices. Beshears et al. (2013) note that structuring and simplifying complex choices can significantly reduce cognitive load and help individuals in making better decisions. **Cognitive load theory**, as proposed by Sweller (1988), states that the human cognitive system has a limited capacity for processing information. This limitation can become a critical barrier, when individuals are faced with choices that involve evaluating a multitude of options and consequences. Thus, complex decision-making situations can lead to **cognitive overload**, where the decision-maker's ability to process information is overridden by the demands of the task. If individuals reach this state, they may resort to using simplifying heuristics or making arbitrary choices.

The use of nudges that **structure complex choices into simpler, easier forms** help to reduce the cognitive strain for individuals, which is associated with the decision-making. For example, dividing complex choices into smaller, more manageable sets of options allows individuals to focus on a limited number of alternatives at a time and facilitate comparison and choice. This can be observed, e.g., in health insurance plans, where presenting options in a structured and informative format can help consumers to make more informed choices.

Also, the design of choice architecture can effectively **use defaults to structure complex choices**. Pre-selecting options that are likely to benefit a wide range of individuals, such as automatically enrolling employees in a diversified retirement fund, the decision-maker does not have

to evaluate every possible option. Defaults can serve as a form of recommendation and carry an implicit endorsement, which can be especially valuable in complex decision situations.

Simplification can also involve the **presentation of information in a more comprehensible manner.** The use of plain language, clear visual aids, and comparative tables can transform complex information into more straightforward formats. The Behavioural Insights Team's work on simplifying government forms represents an example of this approach, which allowed reducing errors and improving compliance (Hallsworth et al., 2017).

The **timing of information presentation** represents another aspect of structuring complex choices. Gradual disclosure of information allows for a phased approach to the decision-making, where initial choices can be made with a subset of information, and more detailed data can be introduced at the later stage. This sequential revelation of information can prevent the feeling of overwhelm that often accompanies complex decisions. **Grouping the options into categories** based on shared attributes allows individuals to easier navigate complex decisions, since categorization allows them to collectively process information about groups of choices, rather than as isolated pieces of data.

Structuring complex choices represents a powerful tool in the nudge toolkit. It provides a means to facilitate better decision-making by reducing cognitive load. Using simplification, defaults, clear information presentation, and strategic information disclosure, nudges can transform decision-making landscapes from complex to easier to manage, enhance individual autonomy and improve decision-making outcomes.

3.2 Designing and Implementing Nudges

The implementation of nudge strategies is a delicate process focused on subtly influencing the choice architecture without impeding the freedom of choice. The foundational effort behind nudge implementation is to **reduce the decisional burden on individuals, thereby facilitating choices that align with their long-term welfare and societal benefits** (Thaler & Sunstein, 2008). This is rooted in the understanding of human behaviour as susceptible to cognitive biases and heuristics, which often divert from rational decisions (Kahneman, 2011). Nudges are to serve as a counterbalance aimed to subtly improve the decisions and refocus the cognitive apparatus of individuals toward choices that individuals would make under optimal conditions.

Based on the theoretical ground laid out in Section 3.1 this section aims to progress towards key issues linked to practical nudge implementation. This requires an empirical approach to ensure the most effective means of structuring choices. Such empirical approach is needed for developing effective nudges, ensuring that theoretical principles are effectively translated into pragmatic actions (Halpern, 2015). Moreover, the deployment of nudges must be carried out with transparency and accountability, ensuring that they enhance rather than diminish autonomy. It requires a delicate balance between guiding choices and respecting the individual's freedom of choice. Thus, the design of each nudge must be conscientious and creative, fostering decision environments where individual freedoms are respected to mitigate negative impacts of their biases and cognitive distortions.

3.1.1. The Mechanics of Choice Architecture

The mechanics of choice architecture intertwined with the libertarian paternalism represent the **organization of choices aligned with respect for individual freedom**. At the core is the effort to enrich decision-making processes while avoiding any limitations on personal autonomy. As stated above, choice architecture is instrumental in nudging behaviour and by arranging the context in which choices are presented, choice architects can significantly influence the decisions individuals make. For instance, in presenting healthier food options at eye level in a cafeteria, people may be more inclined to select them over less healthy alternatives positioned less prominently (Thaler & Sunstein, 2008). Such an arrangement does not restrict the choices of individuals but subtly steers them toward better decisions.

Libertarian paternalism requires guiding without commands, suggesting without demands. This approach acknowledges that individuals often make suboptimal choices due to cognitive biases and limited information. Thus, nudging is conceived as a gentle guide to help individuals navigate

complex decisions, at the same time ensuring that the freedom to choose is left intact. The **ethical considerations** in designing choice architecture are manifold. Ethical choice requires the provision of opt-out opportunities, ensuring that nudges are not coercive. Furthermore, the motives behind the nudges must be scrutinized to protect against manipulative practices that would prioritize institutional goals over individual welfare.

The nudge design requires careful **calibration between influencing choices and honouring individual autonomy.** This balance can be achieved by focusing on nudges that have significant impact but are modest in intervention. For example, setting up automatic enrolment for employee retirement savings plans with an opt-out feature respects individual freedom while promoting beneficial financial behaviours (Madrian & Shea, 2001). The design must reflect the effort to employ minimal amount of influence necessary to aid decision-making without overpowering the individual's sense of choice.

The design of such nudges requires a deep understanding of human psychology, an appreciation of individual freedom, and a commitment to ethical standards. Such design is needed that is aligned with demands of diverse population, includes appropriate adaptability and can reflect varied contexts within which the individuals operate. Thus, such nudges should not be about creating least resistance but a landscape of informed and free choice.

Implementing nudges in practical settings requires a **understanding of the environments in which decisions are made**, as well as the behaviours they intend to influence. In practice, the default settings, feedback mechanisms, and anticipation of errors must be carefully crafted and integrated into systems that individuals interact with daily. When applying default settings, choice architects must carefully analyse the context to establish defaults that are likely to align with the majority's interests. For instance, in the healthcare sector, organ donation rates improve when registration as a donor is the default option, yet practitioners must ensure such defaults are transparent and easily reversible to maintain autonomy (Johnson & Goldstein, 2003). Implementation also involves monitoring and adjusting defaults based on population behaviour over time to ensure they remain optimally set over the different time period.

As stated above, feedback mechanisms are made operational through **technologies that track and present information to users in accessible formats.** For example, in utility conservation programs, practitioners must design interfaces that not only display usage but also compare it with relevant benchmarks, such as the average neighbourhood consumption, to create social norms that nudge individuals toward reduced usage (Schultz et al., 2007). The effectiveness of these systems depends on their ability to provide feedback that is understandable and relevant to the recipient.

To anticipate errors, the designers of nudges must **engage in a process of identifying where and why individuals commonly make mistakes.** This involves using such techniques as user testing and error tracking. E.g., financial services can reduce errors by simplifying forms and using pre-filled information where appropriate, along with clear instructions to prevent common mistakes (Bertrand et al., 2010). Also, decision aids such as calculators for pensions or mortgages can help individuals to make more accurate forecasts and decisions. Practical implementation of these nudge components also necessitates a feedback loop, where the impact of nudges is assessed, and in the next phase, strategies are refined accordingly. In this regard, data analytics plays a crucial role since it provides insights into user engagement and the effectiveness of different nudge strategies.

The challenge of **simplifying complexity** in decision-making environments is key for the successful implementation of nudge strategies. As indicated above, complex choices can lead to decision fatigue, which can impede effective decision-making. Thus, reducing cognitive load through simplification is essential for facilitating better choices.

One of the techniques to simplify complexity is **to employ heuristic-based decision aids**. Heuristics are simple, efficient rules, tested by evolutionary processes or learned, which have been proposed to explain how people make decisions, come to judgments, and solve problems when faced with complex problems or incomplete information. These aids can assist individuals to narrow down the most relevant factors to consider, thereby reducing the effort needed to arrive at a decision (Gigerenzer & Gaissmaier, 2011).

Breaking down complex choices into smaller, more manageable segments can also help individuals better understand the options that are available to them. This method is particularly

effective when combined with just-in-time information delivery, where information is provided as the individual encounters each choice, rather than overwhelming individuals with the details up front (Thaler & Sunstein, 2008).

Nudge implementation must be accompanied with **effective communication**. This can be ensured by using such tools as the decision trees or flowcharts that can guide individuals through a decision-making process and visually map the consequences of different options (Payne, Bettman, & Johnson, 1993). Such visual aids can substantially enhance understanding, especially when the information is complex or involves statistical data.

Another tool that can contribute to simplification is the **use of analogies and metaphors**, which can make abstract or complicated ideas more relatable and easier to grasp. Comparison of an unfamiliar concept with something well-understood can help bridge the gap between knowledge and action (Kahneman & Tversky, 1979). However, when implementing these strategies, it is critical to test and refine them in real-world settings. This may involve iterative processes such as A/B testing to determine which methods of simplification and communication are most effective for a given population (Dolan et al., 2012).

Incorporating these elements into policy and service design involves a continuous, iterative process that takes into account the complex web of factors affecting human decision-making. As such, the successful application of nudge theory in practice requires collaboration across disciplines, including behavioural science, design, and data analysis, to create interventions that are ethical, effective, and respectful of individual autonomy. The successful implementation of these strategies involves not only the design of the choice architecture but also its continuous evaluation and refinement based on the empirical evidence. The practical application of simplification techniques must be monitored to ensure that they are not oversimplifying to the point of misrepresentation and that they do not lead to the intended behavioural change.

3.1.2. Implementation Challenges and Considerations

The practical implementation of nudge strategies is an intricate process. While nudges are grounded in the intent of steering people towards better choices without restricting their freedom of choice, the pragmatic use of such strategies is prone to several challenges.

When considering the obstacles of implementing nudge strategies, we must consider **unpredictability of human behaviour**. A behavioural intervention might be devised with an expectation of a certain reaction, but the outcome can be very different. Berg and Gigerenzer (2010) argue that human behaviour often defies the predictions of economic models. This unpredictability requires that **nudge strategies underwent the ongoing evaluation**. For instance, when individuals begin to exhibit 'nudge fatigue' (Loewenstein et al., 2015), i.e., the target audience becomes immune to the intended effects of nudges, a proactive strategy is required. This involves not only redesigning the nudge but also potentially alternating it within a portfolio of interventions.

The scalability and adaptability of nudges require a deep **understanding of their context**. Sunstein (2016) emphasizes the need to respect cultural specifics and individual differences in human behaviour. What proves a powerful nudge in one context may not be effective in another contexts. Thus, scalability does not only involve increasing the quantity of nudges but also refining their quality to resonate across different segments of the population. To achieve this, nudges must be conceptualized with modularity in mind, ensuring that their core components are robust enough to be effective universally, but also sufficiently flexible to be tailored to distinct groups without losing their efficiency.

It is also necessary to reflect the legal and ethical landscape. Since nudges touch upon the personal decisions of individuals, they must **respect autonomy and ensure transparency** (Alemanno and Sibony, 2015). Any breach, e.g., in the form of breaking the privacy bounds or coercing behaviour, could invite legal repercussions, and also erode public trust. Thus, a thorough understanding of the legal implications, including compliance with the data protection regulations and consumer rights, is necessary.

In the digital era, technology plays an important role in nudging. Thaler and Sunstein (2008) recognized the **potential for digital platforms to fine-tune nudges to an individual's preferences**, and

thus, enhancing their effectiveness. Big Data, AI, and machine learning provide the possibility for creating personalized nudges, potentially leading to better outcomes. However, Yeung (2017) argues that this personalization raises ethical questions about the extent to which individuals' data can be used to influence their decisions. Thus, finding a balance between utilizing technology for effective nudging and protecting individual privacy is a complex task that requires ethical consideration and robust data governance protocols.

3.1.3. Monitoring, Evaluation, and Continuous Improvement

The successful implementation of nudge strategies requires also the establishment of rigorous metrics and evaluation processes. This requirement ensures not only the effectiveness of the interventions but also their ethical justification, as interventions that cannot be evaluated may also fail to be accountable. The design of these metrics must be intrinsically linked to the desired outcomes, thus, allowing for an empirical assessment that aligns with the underlying behavioural objectives of the nudge.

1) Setting Up Metrics and Evaluation Processes

The formulation and implementation of metrics and evaluation processes for nudge strategies are essential to assess their impact comprehensively. This requires the use of both quantitative and qualitative metrics to identify different effects of nudges.

Quantitative metrics serve are indispensable for capturing the extent of behavioural change. For instance, they might measure the increase in enrolment rates in retirement savings plans following the introduction of a default option. These metrics often take up the form of statistical data, which can be used to draw inferences about the impact of nudges on altering behaviour in the intended direction. Such an analysis may incorporate various statistical tools, including regression models, and time-series analyses to discern trends over time.

Qualitative assessments provide a deep understanding of the impact of nudges that quantitative methods are not able to capture. This includes exploring how individuals perceive nudges and whether these interventions are aligned with their personal values and beliefs. For instance, interviews or focus groups may be used to obtain insights into how individuals perceive the presence of a default option and whether it is seen as an empowerment or an attack on their autonomy. These assessments are critical, since the ethicality of nudges is largely dependent on these perceptions.

Thus, integrating both quantitative and qualitative metrics, researchers and policymakers can provide a more holistic view of the effectiveness of nudges and provide a robust framework for evaluating nudge strategies. It allows not only to measure the direct impact of the nudge in quantitative terms but also ensures that the nudge aligns with the qualitative aspects of human experience, respecting their individual autonomy and fostering welfare. Such an approach allows to reflect the multi-dimensional nature of human decision-making and the diverse aspects of the policy impacts.

2) Long-term Strategies for Monitoring the Impact of Nudges

The lasting impact of nudge strategies is key for understanding their effectiveness and ensuring their alignment with long-term policy objectives. To be able to understand if there is such a lasting impact, comprehensive long-term monitoring strategies are needed.

In this effort, a primary tool **are periodic surveys**. They can be systematically administered to capture the temporal dynamics of how nudges affect behaviour. The surveys should be designed to go beyond immediate reactions, and examine, how attitudes, knowledge, and behaviours evolve or stabilize over time. E.g., repeated cross-sectional surveys allow to compare different population samples at various points in time, identify the change. On the other hand, panel surveys would track the same individuals across time, offering a more structured view of the impact of nudge on behaviour.

Longitudinal studies are necessary to identify causal relationships and observe the life cycle of impact of the nudge. Such studies could involve collecting data from the same subjects at multiple time points, thereby enabling researchers to observe the changes in their behaviour directly attributable to the nudge, and to identify patterns of adaptation or resistance among the population (Halpern, 2015).

The implementation of rigorous statistical techniques such as cohort analysis and time-series analysis can further enhance the reliability of longitudinal studies.

Control groups should be used to isolate the effect of nudge from external variables. Comparing groups exposed to the nudge with those that are not, researchers can control for other factors and identify with larger certainty if observed changes are due to the nudge itself (Shadish, Cook, & Campbell, 2002). Randomized controlled trials (RCTs) considered as the gold standard in experimental research design, are considered particularly effective in this respect, as they mitigate selection bias and allow to establish causal relationships.

The advancements in technology and digital analytics opened new paths for continuous and real-time monitoring of behavioural patterns. Smith et al. (2018) highlight how digital platforms can be leveraged to **collect large datasets**, which, when analysed, can uncover trends and nuances in behavioural change that may not be evident in smaller studies. The integration of machine learning algorithms can further enhance the predictive power of these analyses and facilitate the proactive adjustment of nudge strategies based on emerging patterns.

The ethical and socially acceptable application of these data-driven approaches requires that governance frameworks ensure the data privacy and security, addressing potential concerns related to surveillance and data misuse (Yeung, 2017).

3) Adaptive Management of Nudge Strategies

Adaptive management as a framework is an important part of the process of refining nudge strategies. It requires an approach that is responsive and flexible, that sees nudges as testable propositions subject to their empirical validation and adjustment. Sunstein (2011) put forward this approach emphasizing the need for rigorous testing and refinement of effective behavioural interventions.

In practice, adaptive management involves a cyclical process of designing nudges, implementing them, monitoring outcomes, and then using the insights gained to inform subsequent iterations of the nudge. This cycle is characterized by several stages:

- **Design and Hypothesis Formation**: At the onset, nudges are designed based on hypotheses about human behaviour that are derived from behavioural economics theory, psychological insights, and contextual understanding. The hypotheses assumes the ways in which a nudge might alter behaviour in a desired direction.
- **Implementation and Experimentation**: The nudge is then operationalized within a real-world setting, often through pilot programs or controlled experiments. This phase is crucial for collecting initial data on the nudge's performance and observing its interaction with diverse variables in real world/lab environment.
- **Monitoring and Data Collection**: Continuous and rigorous monitoring is essential to gather a robust dataset that reflects the nudge's impact. This requires the establishment of clear metrics, as discussed above, which can be quantitative (e.g., changes in enrolment rates, or reduction in energy consumption) or qualitative (e.g., satisfaction levels, perceived autonomy).
- **Analysis and Learning**: Data collected during the monitoring phase is subjected to thorough analysis to determine the effectiveness of the nudge. Learning from this analysis is multidimensional, it encompasses not only the assessment of whether the nudge worked, but also understanding how and why it worked or failed to work.
- **Feedback and Adjustment**: Insights from the analysis provide inputs for the modification of the nudge. Adjustments may range from fine-tuning to more significant changes, depending on the evidence. This phase benefits from feedback not only from data analytics but also from stakeholder engagement, ensuring that the perspectives of those affected by the nudge are incorporated into its refining and further design.
- **Re-implementation**: The refined nudge is implemented, and the cycle starts again, embedding a process of perpetual learning and enhancement.

The adaptive management approach is grounded in pragmatism, it recognizes complex and fluid nature of human behaviour and societal dynamics. It reflects that the context in which nudges

are applied is perpetually shifting, as it is influenced by cultural, economic, technological, and policy changes. Therefore, it is key for nudge strategies to be re-evaluated regularly against this change.

The scientific rigor inherent in adaptive management process is to safeguard against the stagnation of nudge strategies. It promotes a culture of continual learning, where nudges are subject to validation and revalidation against new emerging behavioural patterns and societal trends. Adaptive management also addresses the ethical imperative to monitor the long-term consequences of nudges, to ensure that they do not result in harm or diminish autonomy.

The integration of these elements, i.e., rigorous metrics, long-term monitoring, and adaptive management, creates a robust framework for the continuous improvement of nudge strategies. It ensures that nudges do not become static interventions but dynamic tools that evolve based on empirical evidence and societal feedback, ultimately leading to more ethical and effective behavioural public policies.

3.3 Nudges in Public Policy

Nudge theory has carved out a significant niche in public policy, demonstrating its relevance and effectiveness across a spectrum of domains. In **healthcare** nudges are used to boost preventive care attendance; **tax compliance** has been enhanced through simplified communication and process adjustments. **Energy conservation** efforts have benefited from social comparison feedback, and **environmental initiatives** have used strategic placement and messaging to encourage recycling. **Financial behaviour,** particularly savings for retirement, have been positively influenced by default enrolment schemes. In **education**, timely reminders have nudged students towards completing essential steps in their academic journey. **Nutritional choices** have been affected by the strategic presentation of food options, and **public transportation** has become more appealing through user-friendly information systems. **Charitable giving** has experienced the increase through integration into everyday transactions, and **public safety** has been strengthened by embedding nudges within operational protocols. These areas emphasize the versatility of nudges as a tool for policymakers, harnessing the power of subtle cues to foster more beneficial individual and collective actions. In the subsequent text, we will focus on selected policy areas, where nudging was shown to be efficient and discuss the related nudge design and relevant empirical experience.

3.1.4. Public Finance

Suggestions for improving public finance, especially increasing the **efficiency of tax systems** based on a behavioural approach, typically rely on small and cost-effective changes. For example, increasing the extent of tax audits is commonly considered an effective way to increase tax collection. It is assumed that people pay taxes to avoid penalties, with penalties and other punishments being perceived as the primary means of ensuring compliance with tax laws. However, it appears that the behaviour of taxpayers is significantly influenced by behavioural factors, which can include, for example, social norms, a sense of fairness, as well as simplicity and easy understanding of tax systems. Experiments aimed at improving compliance with tax laws, which referenced social norms and emphasized that the majority of taxpayers pay taxes on time, increased the number of those who paid taxes on time. This may be explained by the fact that if people do not know what to do, they look at how others in similar situations behave, especially those with whom they identify. If they have information that these people have paid their taxes, they tend to do the same.

The British Behavioural Insights Team (BIT) tested how **social norms** could be used to encourage non-payers to pay taxes. The reminders sent to those, who did not pay the tax, were supplemented with the text pointing to social norms. In some reminders, it was emphasized that the vast majority of people in the vicinity of the subject paid their taxes on time, although the geographic area was not precisely named. In an alternative formulation, the reminder text emphasized that most similar debtors have already paid the tax. Some non-payers received letters that combined both pieces of information. The results showed that the more specific was the text of the reminder, the higher was the likelihood that the non-payer would pay the tax. If the text combined both emphasized pieces of information, it led to an increase in tax payment by the subjects by 5 percent. Thus, in the fiscal year

2012/13, the sending of reminders pointing to social norms brought additional tax revenues of 210 million GBP in the UK (Harpen, 2015).

Another way to increase the effectiveness of communication with citizens, applicable also in tax collection, is **the personalization of messages**. In an experiment aimed at non-payers of the road tax, BIT found that sending reminders supplemented with a photograph of the vehicle for which the road tax had not been paid increased the tax collection by 9 percent. If people receive a personalized letter from a public institution, the costs and benefits associated with the action to which the letter refers seem more realistic to them. For example, if a subject who has not paid the tax on time receives a personalized letter describing the possible consequences of non-compliance with tax regulations, the recipient may feel that public institutions have precise and detailed information about their actions, and the indicated consequences will be considered highly realistic.

In Ireland, between 2014-2015, an experiment was conducted to determine how various formulations of reminders based on their personalization and **simplification** would influence the behaviour of non-payers of taxes. It focused on tax subjects who did not file their tax returns on time and were delayed in paying corporate tax. Some companies were sent a generally formulated letter. Another group of companies received a reminder stating that based on information from a third party, it was verified that the company was still operational. Compared to the generally formulated text, this modification alone led to a 17 percent increase in the filing of tax returns by latecomers. Another group of companies received a reminder with a simplified text, shorter and containing only key information. Replacing complex legal formulations with clear and simple language, i.e., **simplifying** the text led to a 3 percent increase in the number of filed tax returns in Ireland in 2015, which represents about 2.8 million Euros in additional tax revenue (Purcell, 2016).Written communication from public institutions to citizens is thus more effective if it is written in simple language, clearly communicates the essence of the message from the beginning and is highly personalized. It also shows that even a small obstacle, for example, the need to make an additional click on a website, can significantly influence people's actions. Therefore, even a simple and inexpensive intervention associated with simplifying access to documents and directing clients directly to the page where the necessary form opens can have substantial impact.

In an experiment conducted by BIT, simply removing one extra step to access tax forms increased the completion of tax returns by non-payers from 19 to 23 percent. The **timing** of the intervention also proved to be very important. It was found that people tend to cheat less if they have to confirm the accuracy of the information with their signature at the beginning rather than at the end of the form. This is explained by the fact that a handwritten signature temporarily activates a person's sense of duty, even if they are not aware of it. Therefore, if the accuracy of the information is confirmed with a signature before starting to fill in the tax return, it can be expected that it will be completed more responsibly and truthfully. It is also recommended that interventions aimed at reinforcing desirable behaviour should be carried out sooner, before individuals and companies have time to get accustomed to undesirable ways of acting. In the case of tax collection, it is then suggested that tax authorities focus on providing advisory services, when preparing tax returns and paying taxes, especially to newly established entities. As experience shows, if companies pay taxes in the first years of their existence, they tend to behave in the same way also later. However, if entities get used to paying taxes late or not at all, they will tend to do so repeatedly.

3.1.5. Health Care

In the **healthcare domain**, the behavioural approach has potentially many applications. E.g., it has contributed to increased usage of **preventive healthcare services**. Although preventive examinations are generally covered by health insurance, a significant portion of the population does not participate. Serious diseases are then not detected early, which leads to increased mortality and healthcare costs.

In an effort to increase attendance of preventive check-ups, the UK utilized a voucher system. Providing a voucher worth 5 GBP to those who attended a preventive examination increased the number of preventive exams by 21 percent. At first glance, it may seem inappropriate for insurers to pay people to use preventive healthcare services. However, early detection of diseases not only

increases patients' chances of recovery but also reduces the costs associated with treating diseases that are identified late. Therefore, the use of this method of nudging can both save lives and also reduce healthcare costs for health insurers.

For instance, sending **automated appointment reminders** or alerts for vaccinations has been shown to significantly boost attendance rates. These reminders often incorporate elements of behavioural insights, such as emphasizing the benefits of timely health checks or framing messages in a manner that taps into an individual's innate desire to avoid illness. By simplifying the process of engaging with healthcare services—such as streamlining appointment scheduling or offering small incentives for attendance—healthcare providers have successfully nudged individuals to take proactive steps in managing their health.

Healthcare systems have utilized the concept of default options **to nudge individuals towards healthier choices.** E.g., the design of cafeteria layouts where healthier food options are made more prominent and accessible, thus subtly encouraging better dietary choices. Such interventions take advantage of **the human tendency to go with the 'path of least resistance,**' thereby making the healthier option the easier choice. On a policy level, public health campaigns have used nudges to promote behaviours like not smoking, with messages crafted to trigger emotional responses that can lead to positive behavioural change. These nudges affect people on the periphery of conscious awareness, subtly guiding their choices without restricting freedom towards better health outcomes.

3.1.6. Social Security Systems

Another well-known example of applying behavioural insights in the policy design is the change to the **private pension saving system** in the UK. The shift from a system where each individual had to opt-in, to automatic enrolment with an option to opt-out if a person does not want to participate in private pension insurance, led to a substantial increase in participation. As a result of this change, frictional costs were reduced, as people no longer needed to take any additional steps to join the pension savings system. Meanwhile, financial education or the provision of tax incentives for those with private pension insurance, which tend to be far more costly, had a much smaller impact on increasing savers' participation in the system.

The behavioural approach offers several explanations for why people do not give sufficient attention to securing an adequate income in retirement and provides tested solutions that can encourage people to save more and better for retirement. One explanation is based on so-called **exponential or hyperbolic discounting**. According to it, people tend to discount rewards that they receive in the future. Moreover, the model of hyperbolic discounting also suggests that discount rates are not time-consistent, and the discounting rate increases with the time horizon in which individuals expect to receive the benefit. People are not interested in saving for retirement since saving is currently associated with costs and will only benefit them in a distant and uncertain future. At the same time, people find it more acceptable to commit to a larger amount of savings for retirement in the future only and are not ready to sacrifice part of their current disposable income. Therefore, they may be more willing to decide to save more for retirement in a future period than immediately. This can be leveraged in designing pension savings models aimed at encouraging future retirees to grow their savings over time.

The problem of insufficient retirement savings is also explained by inertia or so-called status quo bias, which is associated with **procrastination** (Samuelson, Zeckhauser, 1988). People do not make important decisions even if they can significantly affect their future, if there are positive, even if often very small, costs associated with making those decisions. Empirical studies (e.g., Samuelson and Zeckhauser, 1988) have confirmed inertia in actions regarding pension savings. They have shown that people have the tendency not to change the portfolio into which they invest their savings, even if the profitability of available alternatives, means that they are potentially missing out on additional returns. Therefore, it is suggested that in the design of the pension system this problem was addressed by changing the default options. If a default option is properly set and people do not do anything and remain inactive, the default solution will be in place.

Saving behaviour is also influenced by **loss aversion**. It is estimated that people feel the impact of losses about twice as intensely as gains of the same size. They, therefore, suffer from loss aversion

and do not want to give up disposable income, as once they get used to its level, its reduction will be perceived as a loss. This can be a source of aversion to higher pension savings which would be associated with a reduction in their disposable income. In the pension savings system, this problem can be addressed by interlinking the growth of savings to the wage growth. The saver will then not perceive the growth of savings as a loss of disposable income and will be more willing to save more for retirement.

It turns out that people will save more if the savings system has built in **automatic features.** A good pension savings system is therefore based on automatically enrolment. It is also beneficial if it is set up so that people's contributions to the system grow if their incomes increase, or if the real value of their monetary assets decreases due to inflation. This can be achieved by setting up automatic increases in contributions at set time intervals, or by ensuring that a certain percentage of their salary is always saved. Thus, if their salary increases, then their savings will increase as well. The timing of the period in which people need to make change in their pension savings system. For example, people are more inclined to commit to higher savings in January than in other months. This can be explained by the adoption of New Year's resolutions and the effort to fulfil them.

Experience shows (Madrian and Shea, 2001) that if people are **automatically enrolled** in the pension savings system, the vast majority will stay in it later. If, however, they have to decide to join the system themselves, only about one-fifth of them will take this step. An example of successful utilization of changing default choices to increase participation of savers in private retirement saving in the UK (Halpern, 2015) is the transition from a system in which everyone had to sign up themselves (so-called opt-in), to a system of automatic enrolment and the need to opt-out if a person does not want to have a private pension insurance (so-called opt-out).

The **design of investment options** in retirement savings is also important. A large number of investment options increases the frictional costs associated with deciding where to invest and thus, discourages savers from actively investing their savings. On the other hand, **well and understandably set investment choices** facilitate savers' decisions about where to invest their savings and thus, create conditions for growth of their retirement savings. Recognizing the importance of the design of available investment choices, in the USA some retirement investment companies have moved away from the traditional division of investment funds by their risk level (conservative, moderately risky, and risky) and defined the profile of individual funds so that their structure was adapted to the age of pension savers. Such funds follow the life cycle investment models and as the retirement date approaches, their riskiness decreases. The emergence of such funds simplified the decision-making of pension savers related to which funds to invest into and led to an increased participation in the retirement saving system. This effect was significant especially for people who had no experience with investing in the financial market, people with lower incomes, and women (Thaler and Benartzi, 2004).

It is also recommended that when preparing and implementing nudges, **the human interest in games and fun** should be used. For example, proposals have emerged to use this human characteristic to reduce the number of tax returns submitted at the last minute and to eliminate the associated additional costs (arising, for example, due to the need to extend the opening hours of tax offices and post offices) by setting up a lottery, which would include entities that submit tax returns ahead of time. Prizes could be paid for with fines collected from taxpayers who did not submit their tax return on time.

Although the results of the changes made need to be further verified, the positive experience so far shows that taking into account the conclusions of the behavioural approach in the preparation and implementation of public measures can increase their effectiveness in a cost-effective way. However, at each stage of this process, it is necessary to keep in mind the objectives that the change aims to achieve and to try to understand how the new or changed measure will be perceived by those who will implement it, as well as by those it is aimed at.

SUMMARY

In Chapter 3, we explored the Nudge Theory, reflecting on its foundational role in shaping choice architecture while respecting individual autonomy. The chapter delineated the subtle yet powerful ways in which minor tweaks in the environment could significantly alter behaviour. We pointed out to key principles to be respected in the design of behavioural nudges and discussed the implementation of nudges, with particular attention paid to the efficiency of personalized communication and the simplification of complex information. It was shown that personalized and tailored messages resonate more deeply with individuals, and significantly influence their compliance and actions. The strategic timing of these interventions is also crucial, as is the establishment of default settings that could passively guide behaviour. This was exemplified by the example of the shift in pension savings behaviour in the UK, where the transition to automatic enrolment substantially increased participation rates in the pension saving programs.

The chapter also points out to the need for the adaptive management of nudge strategies, emphasizing the necessity for a cyclical process of evaluation, monitoring, and refinement. This approach is exemplified by the importance of ethical deployment and the potential pitfalls, such as nudge fatigue. The effectiveness of nudging as a policy tool rests on its adaptability and responsiveness to the dynamic interplay of societal, economic, and behavioural factors, thus, it must be ensured that such strategies remain relevant and morally sound in their application.

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CHAPTER 4: HEURISTICS AND BEHAVIOURAL BIASES

4.1. Introduction to Heuristics

The role of heuristics in decision-making processes has received substantial attention in behavioural economics. The work of Tversky and Kahneman, particularly their paper "Judgment under Uncertainty: Heuristics and Biases" (1974), set the basis for understanding how individuals rely on heuristic principles to make judgments and decisions. These principles, or, in other words, **cognitive shortcuts**, on one hand, facilitate quicker decision-making by simplifying complex problems. On the other hand, they can also introduce biases that systematically deviate from rationality.

Thus, heuristics serve as cognitive shortcuts that streamline decision-making, enable rapid responses with minimal mental exertion, which is essential in time-sensitive or low information situations. They are not static but evolve as the brain learns from experience to identify patterns that affect heuristic development suited to individual environments and historical outcomes.

The evolutionary roots of heuristics suggest that they arose as survival mechanisms, aiding our ancestors to make swift decisions in the conditions of uncertainty. Various heuristics have been identified, including well-known ones like availability, representativeness, and anchoring, and others driven by emotions (affect heuristic), familiarity, or perceived rarity (scarcity heuristic).

The applicability and success of heuristics are context-sensitive, with certain heuristics being effective in specific situations while potentially leading to errors in others. This error potential is especially pronounced in unfamiliar contexts where the heuristic may not be applicable.

Heuristics have broad relevance beyond psychology, they influence such fields as economics, where they shed light on market behaviour, and artificial intelligence, where they guide decision-making algorithms. In educational spheres, the understanding of heuristics can help to refine pedagogical strategies and align teaching with the natural information-processing styles of students. In the following sub-chapter we will discuss most common heuristics, then, we discuss related behavioural biases and finally look at the critique and development of research and practice linked to this area of behavioural economics.

4.1.1. The availability heuristic

The availability heuristic represents a mental shortcut that relies on immediate examples that come to mind of people when they consider a decision, which can lead to a biased judgment regarding the likelihood of alternative outcomes. This cognitive process is significantly influenced by the recency, frequency, and emotional impact of events or information, which come to mind of an individual. When an individual can easily recall or imagine an event, they are more likely to overestimate its likelihood or prevalence.

Schwarz and his colleagues (1991), provided empirical evidence supporting the availability heuristic. They found that participants judged events that they could easily recall, such as diseases, to be more frequent than those that they could not. This work illustrated how the ease of retrieval of instances from memory could distort an individual's perception of reality and lead to a misjudgment of actual probabilities.

In the availability heuristic, the vividness of an event also plays a crucial role. Vivid or emotionally charged events can be recalled more easily and thus, are perceived as more common. This aspect is particularly evident in the context of media coverage. Sensationalized reporting of rare but dramatic events, such as terrorist attacks or plane crashes, can create a heightened sense of risk and fear in the public of being attacked by terrorists, or being a victim of a plane crash when flying. This overestimation of probability due to the availability heuristic can overpower statistics and leading to what Cass Sunstein (2003) referred to as **probability neglect.** In such cases, individuals focus on the dramatic outcomes of an event rather than the actual statistical probability of its occurrence.

Probability neglect can have significant implications for public policy and legal decisions. When policymakers are influenced by the availability heuristic, they may allocate resources or introduce legislation based on misperceived risks, potentially neglecting areas that statistically would deserve more attention. For instance, extensive media coverage of a few tragic incidents involving child kidnapping may lead to a public pressure to introduce stricter laws, despite the statistical evidence that points to a decline of such crimes.

The availability heuristic can also affect personal decision-making in various domains, e.g., health-related behaviour, or financial planning. If individuals overestimate the likelihood of health issues that they have heard about frequently in the news or within their social circles, they may introduce unnecessary lifestyle changes or demand medical tests that are not required given their actual risk level. When deciding on their financial investment, investors may overvalue stocks based on recent news or tips from acquaintances, and disregard long-term trends or broader economic indicators.

Thus, even though the availability heuristic simplifies decision-making by relying on immediate examples that readily come to one's mind, it also introduces biases by overemphasizing the frequency and probability of events based on their ease of recall and emotional impact. Understanding the mechanics of this heuristic is essential for mitigating its effects and promote more rational decision-making in individual and public domains, and to ensure that policies and personal choices are affected by reality rather than perceptions.

4.1.2. The representativeness heuristic

The representativeness heuristic is a fundamental concept in the psychology of judgment and decision-making. As initially described k by Tversky and Kahneman (1974), this cognitive shortcut is where individuals make judgments based on how much one instance resembles another. Their research highlighted the human tendency to rely on the apparent similarity between objects or scenarios, often at the expense of statistical evidence, leading to various systematic errors in judgment.

Kahneman and Tversky (1973) examined how people make predictions and judgments based on the representativeness heuristic and often disregard critical background statistical information, which has become known as **the base rate fallacy**. Bar-Hillel (1980) extended this notion by demonstrating how people frequently fail to account for the actual frequency of events in their probability judgments, and thus, they fail victim to the base rate fallacy.

The representativeness heuristic also contributes to what Tversky and Kahneman (1983) identified as **the conjunction fallacy**, which means a logical fallacy that occurs, when people assume that specific conditions are more probable than a single general one. This was illustrated in the Linda problem.

BOX 1. Linda Problem

The Linda problem is a classic example used by Tversky and Kahneman to illustrate the conjunction fallacy. The problem presents participants with a description of a woman named Linda, who is characterized by a series of personality attributes that suggest she is outspoken, bright, and concerned with issues of discrimination and social justice. After reading the description, participants are asked to rate the likelihood of several possible scenarios about Linda's present occupation or activities. The critical items among these scenarios are two statements: one that Linda is a bank teller, and another that Linda is a bank teller and is active in the feminist movement.

Statistically, the probability of two events occurring together (in "conjunction") is always less than or equal to the probability of either event occurring on its own. This is because the conjunction of two events can only happen, when both events happen, making it a subset of the occurrence of each individual event. Therefore, the probability of Linda being both a bank teller and a feminist should be lower than the probability of her just being a bank teller, as being a bank teller does not exclude any other activities or characteristics Linda might have.

However, in their experiments, Tversky and Kahneman found that a majority of participants rated the conjunctive statement (bank teller and active in the feminist movement) as more likely than the single statement (bank teller). This error arose because Linda's description matches the stereotype of a feminist more closely than that of a bank teller. As a result, participants judged the probability of a scenario not by statistical reasoning, but by the representativeness or similarity of the description to their stereotypes.

The "Linda problem" shows how individuals often rely on heuristic judgment, even when it contradicts logical reasoning. This reliance on narrative and stereotypes and not on the logic is pervasive and can lead to significant errors in judgment across various real-world situations. The problem is a powerful demonstration of the tension between intuitive and rational thinking, and it has been widely cited in the literature on cognitive psychology and decision-making to emphasize the need for statistical literacy and critical thinking in everyday reasoning.

Source: Tversky, A., & Kahneman, D. (1983). Extensional versus intuitive reasoning: The conjunction fallacy in probability judgment. *Psychological Review*, 90(4), 293-315.

Gilovich, Griffin, and Kahneman's (2002) provide an extensive review of the relevant literature, and further insights into the impact and intricacies of representativeness heuristics. Kahneman (2011) provides a relevance of the role of heuristics in the dual-process theory of mind, namely in fast, automatic, intuitive decisions.

In real life scenarios the representativeness heuristic can have important implications across a variety of fields. In the financial sector, the representativeness heuristic can significantly influence investors' decisions. They may evaluate a company's future performance based on how closely it resembles other successful companies, and ignore crucial financial data such as cash flow, debt levels, and market trends. Also, this heuristic can lead to overvalued "star" stocks and undervalued "dog" stocks, as investors chase after stocks that have recently performed well, assuming that their past success is indicative of their future returns. Thaler and Sunstein (2009) pointed out that such biases can distort stock prices and create inefficiencies in the market, as the true value of the companies is not reflected in their stock prices.

In healthcare, the consequences of relying on the representativeness heuristic can significantly affect healthcare outcomes. Physicians may diagnose based on a patient's symptoms that appear representative of a common illness and potentially overlooking a rarer, more serious condition that doesn't fit the common perceptions. Croskerry (2003) stresses the importance of recognizing these cognitive shortcuts and implementing strategies, such as checklists and decision support systems, to avoid diagnostic errors. If more objective data and evidence-based guidelines are integrated into the diagnostic process, healthcare providers can improve the accuracy of their diagnoses and patient outcomes.

Both examples illustrate the need for awareness and mitigation of cognitive biases like the representativeness heuristic. In finance, this may involve a more disciplined investment approach that considers a range of financial indicators and market analyses. In healthcare, continuing education on cognitive biases and the use of structured diagnostic protocols can help practitioners avoid common pitfalls in clinical diagnoses.

Thus, the application of strategies to mitigate the effects of the representativeness heuristic is crucial. Educational efforts that enhance statistical thinking and understanding of probabilistic reasoning can help counter some of the heuristic's influence. Decision aids and algorithms can reduce reliance on stereotypes by incorporating objective data into the diagnostic process.

4.1.3. Anchoring

The concept of anchoring, identified by Tversky and Kahneman (1974) describes the cognitive bias where individuals too much rely on the first piece of information they encountered (i.e., the "anchor"), when making the decision. Once an initial anchor is set, all subsequent judgments are made by adjusting to that anchor, and there is a significant bias in place towards interpreting other information around it. The classical illustration of this heuristic involved participants spinning a wheel

of fortune marked with numbers 0 to 100. Even though the number was randomly generated, it influenced the participants' subsequent answers to unrelated questions, such as estimating the percentage of African nations present in the UN.

This heuristic has profound implications, especially in economic decision-making and negotiation contexts. E.g., initial price offers in a negotiation have a tendency to "anchor" the bargaining process, affecting the range of counteroffers and final agreed price, regardless of the inherent value of the good or service. However, anchoring is not only limited to negotiations, it can also affect market dynamics. E.g., the price of a stock in the initial public offering (IPO) can anchor investors' perceptions of the company value and affect its subsequent trading and even long-term market valuation.

The concept of **arbitrary coherence** (Ariely, Loewenstein, and Prelec, 2003) extends the idea of anchoring. Their research suggests that once an initial price is established in a consumer's mind, it can shape not only the current value they place on that item, but also future transactions, despite the fact that the initial price is arbitrarily set. This has significant consequences for pricing strategies used in marketing and can provide information about how companies price new products that they introduce to the market.

Further studies have revealed that anchoring effects persist even when the anchor should be considered irrelevant by the decision-maker. E.g., in legal judgments, suggested sentencing durations can act as anchors and affect the final judgment even when the numbers are presented by an interested party, such as the prosecution or defence. Englich, Mussweiler, and Strack (2006) have shown that experienced legal professionals were susceptible to anchoring effects from legally irrelevant suggestions.

The implications of anchoring can also be seen in everyday decision-making, such as consumers' purchasing behaviour. Regardless, if they evaluate the reasonable nature of a sale price or decide on how much to pay for a used car, the initial presented price serves as a mental benchmark against which all other values are compared. This heuristic may also influence how individuals assess their happiness with the salary offers for different job positions, when their initial expectations anchor their satisfaction levels.

Understanding anchoring should serve as a powerful reminder of the need for critical evaluation in the decision-making. In financial education, it puts emphases on the importance of teaching students to recognize and adjust for potential anchors and encourage them to seek objective valuation methods. In professional training of negotiators, judges, or healthcare professionals the understanding of anchoring should be also included, since it can improve the rationality and fairness of the decisions. Thus, anchoring is not only a concept of academic interest, but it represents a practical cognitive bias which has broad impact on personal and professional judgments.

4.1.4. Other forms of heuristics

- **The affect heuristic**

The affect heuristic is based on the premise that our emotions associated with certain stimuli can significantly impact our perception of the risks and benefits involved in a decision (Slovic et al., 2007). This mechanism is deeply rooted in human evolutionary past, where rapid emotional responses could mean the difference between survival and life. In contemporary contexts, however, this can lead to distortions in judgment, particularly when the emotional response is not aligned with statistical reality. On one hand, this heuristic enables swift decision-making drawing from emotional responses, while, at the same time, it poses the risk of jeopardizing rational analysis.

In the sphere of finance, the affect heuristic can manifest itself in the form of investor sentiment, where positive emotions towards a market or a particular stock can lead to an underestimation of risks, potentially lead to inflating market bubbles or to poor investment choices (Loewenstein et al., 2001). Negative emotions may result in an exaggerated perception of risk leading to undue market sell-offs or aversion to otherwise sound investments.

The interplay between emotions and cognition has also significant implications for public health policy. For instance, campaigns designed to discourage smoking by generating negative

emotions towards the habit aim to shift risk assessment among smokers and highlight severe health risks over the short-term gratification of nicotine (Alhakami & Slovic, 1994).

Thus, the affect heuristic demonstrates that our emotions play an important role in shaping our perceptions and decisions, often bypassing more analytical and deliberative thought processes. As such, understanding and accounting for the affect heuristic is critical in different domains, such as individual decision-making, or the formulation of public policies.

- **The simulation heuristic**

The simulation heuristic, which was conceptualized by Kahneman and Tversky (1982), points out that individuals determine the likelihood of an event based on the ease with which they can visualize or simulate it in their minds. This heuristic is intricately connected to the vividness and emotional impact of potential outcomes, and it heavily influences individuals' perception of probability and risk (Taylor & Schneider, 1989).

For instance, the widespread media coverage of aviation disasters, despite their statistical rarity, can amplify public fear of flying. The videos and detailed accounts make it easier for individuals to construct mental simulations of such events, thereby disproportionately inflating their subjective assessment of the risk involved in air travel (Combs & Slovic, 1979). This phenomenon can lead to an avoidance of flying, which is not proportionate to the actual low probability of aviation incidents.

But the simulation heuristic is not only limited to negative outcomes, it also extends to positive scenarios, such as people overestimating their chances of winning the lottery after hearing about lottery winners. The vivid personal narratives of winners can make the possibility of winning more imaginable and seemingly more attainable (Gregory, Lichtenstein, & Slovic, 1993).

The simulation heuristic also has critical implications for legal judgments. The ease with which a jury can simulate the sequence of events leading to a crime can impact the actual verdict. The more coherent and detailed the narrative presented, the more likely they are to consider it probable, thus, it can affect both the determination of guilt and the severity of sentencing (Kerr, 1983).

The simulation heuristic emphasizes the impact of ease of mental imagination and narrative coherence on the perceived likelihood of events. This heuristic can skew risk assessment and decision-making, through the divergence between subjective judgments and objective probabilities.

- **The status quo heuristic**

The status quo heuristic underlines an inherent cognitive preference of humans for the current state of affairs, with individuals exhibiting an inclination towards maintaining existing conditions or decisions. This heuristic is based on the cognitive conservatism, where change is often sacrificed in favour of a familiar and well-trodden path. Such attitude is deeply ingrained in human nature and often operates subconsciously, steering individuals away from potential risks associated with change, even when such change could lead to improved outcomes (Samuelson & Zeckhauser, 1988).

Samuelson and Zeckhauser's work on the status quo bias, which is linked to the status quo heuristic, illuminates the resistance to change by demonstrating the disproportionate weight attributed to the current state when making choices. This heuristic is further amplified by the phenomenon of **loss aversion**, articulated by Kahneman and Tversky (1979), where the displeasure of losses is valued more than the pleasure of equivalent gains. Thus, individuals are more inclined to avoid losses rather than pursue equal gains, which often results in their irrational commitment to the status quo.

The implications of the status quo heuristic are vast. It affects decisions in such domains as finance, where investors may stick with a suboptimal portfolio out of an aversion to potential losses from altering their investments (Kahneman, Knetsch, & Thaler, 1991). Similarly, in politics, voters may support incumbent candidates or policies that they are familiar with, regardless of the merits of alternative options, out of a desire to avoid the uncertainties entailed by change (Hartman & Weber, 2009).

This heuristic also presents challenges in health care decision-making. Patients often opt for treatments that maintain the status quo, such as choosing not to undergo surgery, even when

alternative interventions have higher success rates, because the potential losses (e.g., surgical risks) are more salient than potential gains (i.e., improved health) (Ritov & Baron, 1992).

Understanding the status quo heuristic and its accompanying biases is essential for devising strategies that encourage more rational decision-making. Such strategies might include presenting information in a manner that balances the perceived risks of change with its potential benefits or structuring choices in a way that highlights the opportunity costs of inaction.

Thaler (2015) discussed how heuristics influence consumer behaviour and market outcomes, often leading to decisions that deviate from the 'rational agent' model. The integration of heuristics into behavioural economics and psychology has initiated a rich dialogue on the nature of human rationality. Gilovich, Griffin, and Kahneman (2002) provide a comprehensive examination of heuristics and biases, which presents a variety of perspectives on the adaptive nature of heuristics and the conditions under which they lead to errors. This body of work suggests that while heuristics are indispensable for managing the complexity of the environment, they can also be the Achilles' heel of human cognition when they lead to persistent and systematic errors. The exploration of heuristics is critical for understanding human cognitive processes. The initial findings of Tversky and Kahneman have been expanded upon by many researchers and establish a specific view of how heuristics shape our perceptions and decisions. It became clear that heuristics represent essential tools that the human mind employs in their effort to navigate more and more complex world.

4.2. Understanding Biases

The terms "bias" and "heuristic" are related concepts in psychology but they refer to different aspects of our cognitive processes. A **heuristic** is a mental shortcut that allows people to solve problems and make judgments quickly and efficiently. These rule-of-thumb strategies shorten decision-making time and allow people to function without constantly stopping to think about their next course of action. Heuristics are useful in many situations, but they can also lead to errors in judgment.

On the other hand, **a bias** is a systematic deviation from rationality or good judgment. It is an inclination or prejudice for or against one person or group, especially in a way considered to be unfair. Biases can stem from various sources, including heuristics. When heuristics lead to errors, these errors are known as biases. Thus, heuristics are cognitive shortcuts that our brains use to make complex problem-solving more manageable. These shortcuts are often based on our past experience and can be quite efficient. However, when these heuristics are overapplied or not applied properly, they can lead to biases, i.e., systematic patterns of deviation from norm or rationality in judgment. But biases can also occur due to other factors, not only heuristics, such as emotional, cultural, or informational factors.

In this sub-chapter, we will discuss most common behavioural biases.

- **Escalation of commitment**

Escalation of commitment, commonly known also as the sunk cost fallacy, entails a cognitive bias where decision-makers persist in an endeavour once an investment in resources regardless, if time, money, or effort, has been made. This bias is anchored in the aversive sentiment associated with loss, due to which individuals irrationally continue in a venture to justify past investments, even when facing potential negative outcomes (Arkes & Blumer, 1985).

This phenomenon also reflects an inherent reluctance to admit flawed judgment or failure, even though this leads to a continued allocation of resources in a possibly unproductive endeavour. The bias is underpinned by **self-justification theory**, which postulates that individuals are motivated to justify their previous choices, even if detrimental to present or future objectives (Staw, 1976). It is further reinforced by the notion of **commitment consistency**, where individuals have a psychological desire to appear consistent in their commitments, irrespective of the changing circumstances (Cialdini, 2009).

In business and management, the escalation of commitment can result in increased investment in failing projects, influenced by a desire not to write off past investments as losses. This is often seen in corporate settings where managers persist with strategies long after they have proven

to be suboptimal, since they are driven by a desire to avoid the stigma of failure (McCarthy, Schoorman, & Cooper, 1993).

The sunk cost fallacy is also pertinent in personal decision-making. Individuals may continue to invest in relationships, careers, or educational paths based on past emotional or financial investments, despite clear indicators that the chosen path may not lead to the anticipated outcomes (Garland & Newport, 1991).

To counter the bias, it is crucial to foster decision-making processes that emphasize rational overviews of current situations and disregard irretrievable past costs. Decision-makers should adopt a forward-looking perspective and assess alternatives based on future benefits and costs rather than past investments.

- **The framing effect**

The framing effect is a cognitive bias that illustrates the impact of presentation and context on the decision-making. This bias is not a mental shortcut like a heuristic, but rather a bias that affects the way options are perceived, based on whether they are framed in terms of potential losses or gains. Tversky and Kahneman (1981) point out that individuals tend to exhibit risk-averse behaviour when a decision is framed positively but are more willing to take risks when a decision is framed negatively, despite the equivalence in the underlying outcomes. This phenomenon is grounded in the asymmetry between the psychological impact of losses and gains. Kahneman and Tversky found that losses have a more substantial emotional impact on individuals than an equivalent amount of gains, which is known as loss aversion. For instance, individuals are more likely to opt for surgery if its success rate is framed as "90% chance of survival" rather than a "10% chance of death," despite the outcomes being statistically identical (Kahneman, 2011).

The framing effect is a potent force in shaping human behaviour and can be observed across various sectors. In marketing, product attributes can be framed to emphasize either the benefits of use or the consequences of non-use. For instance, a sunscreen lotion may be marketed by emphasizing the protection it offers against skin cancer (gain-frame) or by highlighting the risk of not using it and consequently suffering from skin damage (loss-frame). The meat labelled as "75% lean" tends to be more appealing than meat described as "25% fat," despite both phrases describing the same product. This is because the former framing emphasizes the positive aspect of the product (Levin, Schneider, & Gaeth, 1998).

Public health campaigns also leverage framing to influence public behaviour. A campaign to promote vaccinations might frame the message by focusing on the high success rate of the vaccine in preventing illness (gain-frame) or by underlining the risk of contracting the disease without the vaccine (loss-frame). The manner in which the information is framed can significantly affect individuals' willingness to receive vaccinations. A study by Rothman and Salovey (1997) showed that people were more likely to engage in preventive behaviour, like using sunscreen, when the benefits were emphasized (gain-framed) rather than the negative consequences of not using it (loss-framed).

In the financial sector, the framing effect can alter investment behaviours. For example, a financial advisor might present an investment option by stressing the potential for profit (gain-frame), leading to a risk-averse choice. Alternatively, the advisor could frame the option around the potential loss that could occur by not investing (loss-frame), which might compel an investor to take on a riskier investment to avoid the perceived loss. Also, it was shown that when options are presented in a gain-frame, investors tend to be risk-averse, but if they are formulated in a loss-frame the same investors can behave in the risk-seeking investments (Levin et al., 1985).

These examples illustrate how the framing effect can drive decision-making processes, often subconsciously. The implications of this bias underscore the importance of critically assessing how information is presented, as the frame can sometimes overshadow the content in influencing decision outcomes.

- **Hindsight bias**

Hindsight bias, often colloquially known as the "I knew it all along" effect, reflects a cognitive distortion when individuals believe after an event has occurred that they accurately predicted the

outcome, despite having no basis for this prediction. This bias not only alters personal recollection of judgment and decision-making but also has profound implications for learning, memory, and the judicial process (Fischhoff, 1975).

The bias is particularly harmful in that it can lead to an increased confidence in one's predictive abilities. When past events are viewed through the lens of hindsight bias, individuals tend to oversimplify the causes and effects, disregard the true randomness or complexity that may have been involved (Hawkins & Hastie, 1990). This can foster overconfidence in personal judgment and decision-making capabilities and potentially inhibit critical learning processes and the accurate evaluation of decisions (Roese & Vohs, 2012).

Hindsight bias has been consistently demonstrated across various domains, such as financial forecasting, where market analysts retrospectively claim predictability of market downturns or booms, often ignoring the unforeseeable factors that may have led to these outcomes (Biais & Weber, 2009). Healthcare professionals might believe that they "knew" the diagnosis of a patient despite only arriving at it after several tests, which can lead to confirmation bias in future diagnoses (Harley, 2007).

To counteract the hindsight bias, it is essential to implement strategies that emphasize process over outcomes, such as maintaining decision diaries, promoting awareness of the bias, and fostering environments that encourage the exploration of all possible outcomes of a decision (Hoch & Loewenstein, 1989).

- **Base-rate neglect**

Base-rate neglect is a cognitive bias that occurs when individuals disregard or give insufficient weight to the base-rate information, which is the general information on the prevalence of an event or characteristic within a particular population, and instead focus on specific information. This bias represents a deviation from rational reasoning, where both base-rate statistical data and specific case information should be integrated to form accurate judgments (Bar-Hillel, 1980).

The classic example provided by Tversky and Kahneman (1973) in their work on the availability heuristic and other biases, illustrates this phenomenon through the "cab problem," where individuals favoured less reliable specific information (an eyewitness account) over the more informative base-rate data (the proportion of cabs of each colour). In the legal field, base-rate neglect is evident when judges make decisions based on the salient details of the case presented in court while they neglect statistical information about the crime rate or the base-rate likelihood of certain behaviour within the context of the crime (Koehler, 1996). In medicine, this bias can impact diagnostic accuracy. Physicians may focus on the results of a diagnostic test or the details of a patient's state without considering the base-rate prevalence of the condition, which can lead to overestimation or underestimation of the likelihood of a disease (Kahneman et al., 1982). The implications of base-rate neglect in financial decision-making are also significant. Investors might concentrate on the recent performance of a stock or the most recent news about a company and ignore the long-term performance data or the overall economic indicators, which can lead to suboptimal investment decisions (De Bondt & Thaler, 1995).

The base-rate neglect can be addressed by education on statistical thinking and decision-making under uncertainty. Decision-makers need to understand the importance of being mindful of base rates and actively integrate this information into their decision-making processes. This can be facilitated e.g., by presenting statistical data in a more accessible format, or by using decision aids that emphasize the relevance of base rates in the decision-making process.

- **Recency effect**

The recency effect is a cognitive bias that describes the tendency to give disproportionate weight to the most recent information when making judgments or decisions. This bias is a part of the broader psychological theory of memory that states that recent events are more easily recalled and thus can be more influential than earlier events (Murdock, 1962).

The recency effect can significantly impact investment decisions. Investors may place unjustified emphasis on a company's latest quarterly report and overlook long-term historical performance and trend data. This can lead to rushed decisions, such as the buying or selling of stocks based on short-term fluctuations rather than sustained financial health of a company (Seasholes & Wu,

2007). Thus, the recency effect can induce volatility in the market, as investors would react to the latest news without a comprehensive analysis of comprehensive performance metrics.

In human resource management performance appraisal can be also affected by this bias. Managers may evaluate an employee's performance based on their most recent accomplishments or failures, rather than considering the entire review period. This can lead to evaluations that do not accurately reflect the employee's overall contribution (Bernstein et al., 1987).

In education, where students' most recent coursework or participation can predominantly influence instructors' overall assessment of their performance, and potentially overshadow earlier academic achievements or difficulties of students (Roediger III & Karpicke, 2006).

A deliberate effort to synthesize both new and old information is required to mitigate the recency effect. Decision-makers should adopt systematic approaches that integrate comprehensive data analysis over time. Such practices can counterbalance the cognitive bias towards recent information and ensure more balanced and informed decisions.

- **Optimism bias**

Optimism bias is a cognitive bias that lead individuals to believe that they are less susceptible to negative outcomes than others, and consequently, they can underestimate the likelihood of experiencing adverse events. This bias can result in a skewed perception of risk and an overestimation of one's own abilities or having a control over events. This has been documented across a range of domains from health to finance (Weinstein, 1980).

The optimism bias has been documented in health psychology, where individuals often underestimate their risk of illness or believe that their health is better than of an average person, which influences their health behaviour and attitudes towards preventive measures (Sharot, 2011). This can result in inadequate preparedness for potential health issues and a lack of adherence to medical advice. In financial contexts, optimism bias can lead to overconfidence in investment decisions. Investors may believe they are less likely to suffer market losses than others, which can result in higher levels of risk-taking and neglecting portfolio diversification principles (Barber & Odean, 2001). The financial crisis revealed the collective impact of optimism bias, where the belief in ever-rising housing prices contributed to the growth and eventual burst of the real estate bubble. The **planning fallacy**, a phenomenon, which is closely related to the optimism bias, describes the tendency of individuals to underestimate the time, costs, and risks of their future actions and overestimate their benefits, which can be observed in personal projects and public policy planning (Kahneman & Tversky, 1979). The optimism bias can be addressed by implementing strategies that promote more realistic assessments of risks and outcomes. Educating individuals about statistical information, encouraging consideration of worst-case scenarios, and fostering decision-making processes that involve objective risk assessments can contribute to counterbalancing this bias.

- **Conservatism bias**

Conservatism bias is a cognitive bias where individuals tend to insufficiently revise their prior beliefs when they face new evidence, which leads them to cling to initial opinions or forecasts despite the fact that new information suggests the need for a change in their view. This bias is characterized by an underweighting of new information and results in a gradual and overly cautious updating of one’s beliefs. It was first identified and described by Edwards (1968).

This tendency for conservatism can lead to a lag in the assimilation of new information into one's belief system and individuals may often require overwhelming evidence to significantly alter their preconceived opinions. Conservatism bias has been examined extensively in finance, where it contributes to slow reaction times to new financial data and results in stock prices that do not instantly reflect new market information (De Bondt & Thaler, 1990).

Conservatism bias can be partially attributed to anchoring, where initial information serves as a reference point, and subsequent information is assimilated less vigorously (Tversky & Kahneman, 1974). This bias is also linked to confirmation bias, when individuals favour information that confirms their existing beliefs and undervalue the evidence that contradicts them (Nickerson, 1998).

The implications of conservatism bias extend to such areas as clinical decision-making, where physicians may not sufficiently adjust their diagnosis when they are presented with new patient information (Arkes, 1981). It is also manifested in political beliefs and ideologies, where voters may not adjust their positions even when they are faced with evidence about their preferred candidates or policies (Lord, Ross, & Lepper, 1979).

Conservatism bias can be mitigated using deliberate strategies such as encouraging individuals to consider alternative hypotheses, ensuring that diverse viewpoints are considered, or promoting metacognitive strategies that involve reflecting on one's thought processes and decision-making criteria.

- **Zero-risk bias**

Zero-risk bias is a cognitive anomaly where individuals display a preference for completely eradicating a risk over options that reduce a greater aggregate risk. This preference for absolute risk elimination, despite the availability of statistically superior risk reduction alternatives, serves as a manifestation of the human desire for certainty and control (Baron, 2023).

The bias can be observed in societal risk management, where policies may be directed towards eliminating minor risks entirely while neglecting more substantial but less salient risks. For instance, the allocation of substantial resources to prevent rare diseases may be favoured over more cost-effective health interventions that address prevalent health issues but do not eliminate them completely (Viscusi, 1998).

Zero-risk bias can also be observed in individual decision-making scenarios. Consumers often opt for products that claim to remove a specific risk entirely, such as "100% organic" or "completely free of trans fats," even if the overall health benefit is marginal compared to other more balanced dietary changes (Kahneman & Tversky, 1979).

The bias is rooted in psychological heuristics that favour simplicity and absolutes. The elimination of a risk is intuitively more satisfying than reducing it, even if the reduction was statistically more significant (Sunstein, 2002). The attractiveness of "zero" is strong, often overpowering rational assessment of outcomes and leading to decisions that, while providing the comfort of certainty, are not optimal from a risk-benefit analysis perspective.

Zero-risk bias can be addressed by enhancing risk literacy and cultivating an understanding of statistical thinking. Decision-makers, individuals, and policymakers, should consider the broader context of risk management and evaluate risk reduction strategies based on their overall impact rather than the intuitive appeal of "zero risk."

- **Information processing biases**

Information processing biases significantly influence how we perceive and interact with the world around us, often skewing our judgment and decision-making. The following biases fall into this group of biases:

Confirmation bias, which affects our ability to objectively evaluate arguments and evidence. It is an important issue in which people attribute undue weight to information that confirms their existing beliefs and undervalue information that challenges them. This bias can lead to a polarized view where one's beliefs become increasingly extreme and more resistant to change, contributing to the formation of isolated communities of like-minded individuals in social and political spheres. (Nickerson, 1998).

Availability cascade plays a critical role in shaping public opinion and can often lead to misinformed consensus or amplify societal fears. The process starts with a claim that gains attention, which is then repeated across various media, and leads individuals to accept it as true only because they have heard it frequently. This can distort public perception and policy, especially in the face of risks that are sensationalized, which leads to disproportionate responses to those risks (Kuran & Sunstein, 1999).

Negativity bias suggests that individuals are more likely to focus on negative details rather than positive ones. This bias is particularly influential in such areas such as consumption of news media, where negative news is more likely to be reported and remembered than positive news, potentially

influencing voters' behaviour and public policy based on a misperception of the prevalence of negative events (Rozin & Royzman, 2001).

Projection bias results in individuals making future plans based on current preferences, potentially leading to choices that do not align with their future needs or desires. This cognitive distortion can significantly impact long-term decision-making, like financial planning for retirement, where individuals may underestimate their future financial needs based on their current situation. It can also influence consumer behaviour, lead to immediate gratification purchases that may not provide long-term satisfaction. This bias suggests that without considering, how their preferences might change over time, people may commit to decisions that later seem not to be suitable or irrelevant to their changed circumstances (Loewenstein, O'Donoghue, & Rabin, 2003).

These biases emphasize the necessity for individuals to critically assess how they gather, process, and act upon information. Developing awareness and strategies to counter these biases, such as seeking out diverse viewpoints, thinking critically, and considering the long-term implications of decisions, which could help mitigate their effects and lead to better outcomes.

- **Self-perception biases**

Self-perception biases shape self-concept of individuals and influence their interactions with the world and often lead to distorted assessments of their abilities, possessions, successes, and the degree of control they exert over events.

The **Dunning-Kruger effect** points out the phenomenon, where individuals with limited knowledge or competences in a domain tend to overestimate their own abilities. On the other hand, individuals with substantial expertise may underestimate their competences, assuming that the tasks, which are easy for them are also easy for others. This cognitive bias highlights the metacognitive inability of people to recognize their lack of abilities and lead to inflated self-assessments (Kruger & Dunning, 1999).

The **Endowment effect** reflects the propensity to assign more value to objects as soon as they own them. This is not only a matter of possession, but it is related to a deeper psychological link between ownership and identity. The effect suggests that the act of owning an item increases its value to the individual, which can lead to irrational decision-making, such as demanding a higher price to sell a possession than one is willing to pay to acquire it (Kahneman, Knetsch, & Thaler, 1990).

The **Self-serving bias** reflects the tendency to credit oneself for successes while attributing failures to external circumstances. This bias serves to protect self-esteem of an individual but can distort one's perception of reality and imped their learning and growth. It is a bias that hinders critical self-reflection and acceptance of responsibility, thereby potentially bringing personal development to the standstill (Miller & Ross, 1975).

The **Illusion of control** is the tendency to believe that a person can influence outcomes over which they objectively have no control. This bias can be observed in various contexts, e.g., gamblers can believe that they can influence the outcome of the game or investors who believe that they can predict market movements. Such overconfidence in control over events can lead to riskier behaviour and decision-making that does not align with the actual level of influence (Langer, 1975).

Each of these biases can lead to suboptimal decision-making and behaviour. Acknowledging their existence, seeking objective feedback, emphasizing statistical literacy, and adopting strategies to foster self-awareness and realistic self-assessment can help to mitigate these biases.

Behavioural biases point out to the intricacies of human psychology. These inherent mental tendencies, demonstrate the cognitive shortcuts and imperfections in human reasoning. Recognition and understanding of these biases go far beyond their academic study, since it is fundamental for personal development and enhancing decision-making effectiveness. As people become more aware of these psychological patterns, they gain the opportunity to refine their thought processes and foster better decision-making.

4.3. Critical Evaluation and Debates

4.3.1. The Dual-Edged Sword of Heuristics

Heuristic reasoning plays a critical role in facilitating rapid decision-making. The application of heuristics brings advantages especially in situations where the speed is a priority, and the exhaustive processing of information is not feasible. However, these heuristic processes are not without their trade-offs, especially when used in situations, which require complex and specific analysis (Simon, 1955).

The key trade-off is between the quickness of the decision-making and the thoroughness required for decisions in complex situations. While heuristics can streamline the cognitive process, the reliance on them can lead to oversimplifications. In such contexts such as strategic planning or high-level policy decisions, this tendency towards oversimplification may result neglecting critical variables, which may lead to the decisions that lack comprehensive consideration (Kahneman & Tversky, 1972).

The constraints of heuristics are most evident in complex decision-making, where multiple variables and potential outcomes must be considered. Relying predominantly on heuristics may lead to the exclusion of relevant information, potentially leading to systematic biases and errors in judgment (Tversky & Kahneman, 1973).

Criticism of an overreliance on heuristics suggests that it may inhibit the development of advanced decision-making skills, perpetuate a cycle of suboptimal decision-making and reinforce biases that systematically influence rational reasoning (Gigerenzer & Brighton, 2009). Also, the reliability of decisions made through heuristics may diminish when the decision-making context changes. Heuristics that are effective in one environment may not be suitable in another one, which can lead to inaccuracies in judgment when these cognitive shortcuts are not adapted to the new context (Gigerenzer & Brighton, 2009).

Despite this critique, it is important to recognize the conditional effectiveness of heuristics. Their utility is context dependent. It is important to identify when and how to apply them is vital. Education and professional training should provide individuals with the skills to be able to determine, when the use of heuristic is appropriate, and foster their abilities to navigate between intuitive and analytical thinking as needed. Even though heuristics are a fundamental part of the cognitive toolkit, their application has limitations, especially in complex decision-making contexts. Future educational initiatives should focus on enhancing the capacity of individuals to evaluate, when their use is appropriate.

4.3.2. Critique of cognitive biases in economic behaviour

The critique of cognitive biases in economic behaviour is focused on the challenge that they pose to the traditional rational-agent model. Cognitive biases introduce systematic deviations from the assumptions of full rationality and bring into question the predictive accuracy of classical economic theories. The limitations of cognitive biases are not only in their existence but also in the ambiguity regarding their magnitude and impact across different economic contexts.

Their critics argue that while biases are identifiable in laboratory settings, their influence in the real world might be overstated. The market, as a collective entity, often mitigates individual biases through the law of large numbers and the arbitrage process. Individual irrationalities as such may be neutralized when they are aggregated across the whole market. This argument is based on the belief in market efficiency, where prices reflect all available information and adjust accordingly to new data (Fama, 1970).

However, the counterargument to this critique is found in the empirical evidence of market anomalies and financial crises, which suggest that biases can scale up to affect market outcomes. Behavioural economists point to such instances as the dot-com bubble and the subprime mortgage crisis as examples where collective biases led to systemic failures, which contradicts the notion of market self-correction (Shiller, 2003).

Another criticism of behavioural biases focuses on the challenges of measuring their impact. While the effects of cognitive biases can be significant in controlled experiments, quantifying their impact on actual economic decisions in more complex, real-world settings is very difficult. The

unpredictability of external factors, together with the dynamic interplay of different biases, complicates the task of creating precise economic models that would account for these psychological tendencies (Camerer, 1999).

Furthermore, the normative position of behavioural economics is criticized for its paternalistic implications. When biases are used to justify such interventions as "nudges" to correct presumed irrational behaviour, this raises concerns about autonomy and the role of policymakers in private decision-making. This challenges the principle of sovereignty of consumers, which is a cornerstone of market economies and raises ethical questions about the boundaries of such interventions (Sunstein, 2015).

The application of cognitive biases in policy-making also faces the critique. Critics argue that policy decisions which are based on these biases may lead to such regulations that oversimplify complex behaviour or create unintended consequences that further distort the markets (Berg & Gigerenzer, 2010). As research continues to evolve, it must address these streams of critique to enhance the robustness and applicability of this theory.

4.3.3. Methodological challenges of heuristics and bias research

The methodological underpinnings of research on heuristics and biases within behavioural economics have been subject to intense scrutiny, with critique often centred on the alignment of experimental designs with real-world scenarios. **Laboratory experiments**, which represent a main form of empirical validation of many psychological theories, provide controlled settings that may remove the complexity and dynamics inherent in economic decision-making. This raises concerns about the l validity of such studies, i.e., the question, whether the insights gained from artificial environment can reliably be extrapolated to the diverse and unpredictable real-world situations (Guala, 2005).

Experiments that isolate specific cognitive biases often utilize simplified decision-making scenarios that may not reflect the interplay of factors influencing real economic behaviour. The controlled conditions, which are inherent for such studies may omit variables that are an integral part of the real world situations, such as social influences, long-term consequences, and or presence of competing biases (Levitt & List, 2007). As a result, there is a growing pressure on research that would not only acknowledge the existence of multiple interacting biases but also investigate the cumulative and possibly conflicting impacts that these biases may have on decision-making.

The measurement of biases presents another distinct methodological challenge. Biases as internal psychological constructs are not directly observable and often require indirect measurement through proxies or self-reporting, which are subject to their own biases and limitations. The effort to translate these subjective experiences into quantifiable data introduces potential distortions, thus, what is measured may not fully capture the depth or the specificity of a given bias (Kahneman et al., 1982).

Another layer of complexity to the methodological critique is added by **temporal factors**. The decisions in the economic sphere are frequently spread over time and subject to revision as new information becomes available, personal circumstances change, or the broader economic context shifts. Static experimental models fail to capture this dynamic and thus, they can lead to potential misrepresentations of the decision-making process (Loewenstein & Prelec, 1992).

The interpretation of research findings is further complicated by the **varied decision-making environments across different populations**. A heuristic that has highly influence in one cultural or socioeconomic context may be mitigated or absent in another one. This raises questions about the **cultural and economic universality of cognitive biases** and necessitates a more structured approach that encompasses cross-cultural studies (Henrich et al., 2010).

The challenge for future research is to address these critiques through innovative methodologies that would more accurately reflect the complexity of economic behaviour. This includes the development of longitudinal studies that can track decision-making over time, field experiments that would capture behaviour in naturalistic settings, and cross-cultural research that would assesses the generality of findings across diverse groups.

4.3.4. Heuristics and cognitive biases - prospective pathways

The study of heuristics and cognitive biases is integral to behavioural economics research, since it allows to deepen the understanding of human decision-making. The integration of technological

advancements, particularly in the field of data analytics and artificial intelligence, represents one of such areas. These new technologies hold the potential to systematically analyse large datasets to identify patterns in the decision-making that were previously not detectable, and to understand how digital environments influence the ways in which cognitive biases manifest themselves (Lazer et al., 2009).

In the area of public policy, the application of behavioural insights has been increasingly recognized for its potential to design interventions that guide collective decision-making toward optimal social outcomes. This involves not only understanding the cognitive biases but also designing interventions that are sensitive to these biases, so as individual behaviour could be effectively aligned with broader social goals (Thaler & Sunstein, 2009).

Neuroeconomics represents a frontier field and merges the neural and behavioural sciences to understand the brain mechanisms, which underly economic decision-making. The study of how brain processes affect the use of heuristics, and the emergence of biases provides a layer of understanding of related biology that could transform economic models from purely behavioural to biologically-based predictions (Glimcher & Rustichini, 2004).

Cultural variations in the application of heuristics and biases also require closer examination. As global economic interconnectivity grows, it becomes increasingly important to identify, how cultural contexts shape economic behaviour. Such knowledge is crucial for the development of global economic policies that are based on cultural factors and specifics and sensitive to diverse decision-making frameworks (Henrich et al., 2010).

Methodologically, the field is moving towards **longitudinal and field studies** that aim to capture the dynamism of economic decision-making over time and within natural contexts. These approaches seek to trace the influence of heuristics and biases across a life span or through economic cycles and bring insights into the persistence and evolution of these cognitive patterns (List, 2011).

As research into heuristics and cognitive biases progresses, the implications for policy formulation become more pronounced. The insights gained from this research will not only enhance related theoretical frameworks but also generate relevant information for the design of more effective, evidence-based policy interventions.

SUMMARY

The chapter examined the key role heuristics play in decision-making. It builds upon the pioneering work of Tversky and Kahneman. Heuristics represent cognitive shortcuts that help people make faster choices by simplifying intricate situations. However, these shortcuts can sometimes lead to biases that cause deviations from rational decision-making. The chapter explained well-known heuristics and biases such as the availability, representativeness, and anchoring biases. We point out that while heuristics contribute to effective decision-making, their context-dependent nature may result in errors, particularly if the decisions concern unfamiliar scenarios.

The chapter also emphasizes heuristics and behavioral biases are relevant not only in psychology but also in management, economics, public policy, management, and other areas. Their understanding provides insights into market behavior and knowledge of the decision-making systems. The knowledge of heuristics is also helpful in understanding problems of sustainable development and related decisions in private and public domains. The chapter also discusses the related research in behavioral economics and emphasizes the need to refine decision-making frameworks to reduce biases and improve judgment.

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CHAPTER 5: INTERTEMPORAL CHOICE

Intertemporal choices, central to decision-making, involve balancing **costs and benefits across different time frames.** These decisions are relevant for various sectors, including government, business, and personal life. Examples range from resource allocation for infrastructure to strategic business choices and individual decisions like buying a car or planning a vacation. Decisions that related to **different time periods** have been studied in economics since the time of Adam Smith. Later theorists argued that two approaches are associated with intertemporal choice. The first approach focused on the fact that people differ in terms of the discomfort they experience when delaying gratification. The second approach drew attention to the fact that variations in time preference occur because people have different abilities to predict the future. Samuelson, who introduced the **Discounted Utility Model (DUM)** in 1937, can be considered an important pioneer in this field. The model assumes that each individual has a **single discount rate** during his lifetime, which he uses to **discount future benefits**, while this does not change throughout his lifetime. However, many studies point to **anomalies** that occur when examining real human decisions. It has been shown that discount rates can change over time and there is even evidence that different products are discounted at different discount rates and different product attributes are discounted differently.

Why do we bother placing the alarm clock on the other side of the room? Well, that's no longer necessary with Clocky (Thaler and Sunstein, 2009)—an alarm clock that jumps off the bedside table and scurries away when we try to snooze it, blaring its alarm. So, why invest in something that adds difficulty to our lives and leads to morning curses when we struggle to turn it off? Clocky is all about **commitment.** When we go to bed, we want to ensure we wake up on time. However, upon waking, our **preferences shift**, and we find ourselves wanting to stay in bed. The person we are in the morning is **different** from our evening self, and this cycle repeats daily. As a result, our evening selves identify the weaknesses of our morning selves and attempt to counteract them by making a commitment that our morning selves cannot avoid. This tendency of preference reversal over time is a widespread phenomenon in various aspects of our lives, where we frequently give in to **temptation and procrastination** while simultaneously trying to implement measures to prevent our future selves from doing the same.

5.1. Time Preferences and Discounting, how individuals value rewards at different points in time

In the realm of **economics** and **behavioural studies**, the concept of **time preference** holds a central position. Time preference, as defined by renowned economists such as Ludwig von Mises (1951), Eugen von Böhm-Bawerk (1889), and John Hicks (1939), refers to the **human tendency to place differing subjective values on present and future consumption or rewards**. This phenomenon plays a essential role in understanding **intertemporal decision-making and resource allocation**.

Intertemporal decision-making often circulates around scenarios in which individuals must choose **between engaging in an activity that occurs an immediate cost and yields a delayed benefit**. One class of decisions demonstrating this dynamic applies to investment goods, such as the choice to invest in one's education. Conversely, other decisions involve a **benefit in the short term followed by a subsequent cost**, as seen in leisure goods, for instance, watching TV or eating unhealthy snacks. Frequently, these costs entail an **opportunity cost**, where, for instance, saving for retirement necessitates sacrificing immediate consumption for greater future consumption. In many of these situations, the opportunity cost is linked to an activity perceived as undesirable in the near future, such as dieting, starting an exercise regimen, or quitting smoking. Consequently, individuals may frame their choice as a **trade-off between experiencing an immediate benefit** (like the pleasure of junk food, relaxation, or smoking) **and realizing a different benefit** (such as improved health) **in the future**. Given that long-term benefits typically outweigh short-term ones, the fundamental dilemma can be viewed as a choice between **"smaller-sooner" (SS) rewards and "larger-later" (LL) rewards** (Wilkinson and Klaes, 2017)

This dilemma, often referred to as **"temptation,"** depends on the fact that when the **SS reward** lies in the distant **future**, individuals opt to forgo it in favour of the **LL reward**. However, as time progresses and the SS reward draws nearer, its allure increases, leading people to **"yield to temptation"** and reverse their prior decision. When the payoffs involve negative consequences or costs, the SS versus LL trade-off gives rise to a **different self-control problem**, known as **procrastination**. Here, **procrastination** entails unforeseen delays. Consider, for example, commencing a project with a looming deadline. Initiating it earlier incurs a relatively minor cost, but postponing it results in greater costs in terms of heightened effort and stress. In this context, when the **SS cost** remains in the distant future, individuals **favor SS over LL**. However, as time proceeds and the **SS cost** approach, individuals often switch to **preferring LL and postpone commencing the project**. This scenario still embodies elements of **temptation**, as the allure of more pleasurable activities may divert attention from the forthcoming task. It's worth noting that both types of **self-control problems** can be explained by the concept of **hyperbolic discounting** (Wilkinson and Klaes, 2017).

In practice, both field studies and experimental research have consistently demonstrated the **prevalence of such inconsistent time preferences**. Casual observations and personal experiences also underscore the commonplace nature of these situations. For instance, individuals may decide in advance not to indulge in a delicious dessert at a restaurant to protect their future health. However, when the dessert cart rolls by (acknowledging the persuasive power of immediate temptations, especially in upscale restaurants), they often yield **to temptation and indulge.** The timing of payments is much less crucial (discount rates are significantly lower) **when individuals are considering a single payout** at a specific moment compared to when they are **comparing two rewards paid at two different times** or when they are asked to **assign a value to the delay or increase in payment**. In one of the experiments, the experimenter asked two groups of students how much they would pay for a $100 gift certificate at a restaurant of their choice. One group was informed that the certificate was **immediately valid**, while the other group was told they could use it exactly **six months from the date of purchase.** The valuation of this gift certificate by both groups **did not differ significantly**, indicating **negligible discounting**. However, when they were asked **how much they would be willing to pay** (or be paid) to use the gift certificate **six months earlier** (or later), **time suddenly became significant**. The latter group, set to use the gift certificate **later,** was willing to pay $10 for earlier usage, whereas the former, immediate group, demanded $23 for **delayed** usage of the gift certificate. **When a temporal shift of consumption is framed as a delay it has greater significance than when framed in terms of speed-up.** The importance of the delay is **reduced when the consumer is merely requested to express the current value of consumption at the two-time intervals** (Loewenstein,1988).

People may differ in the degree to which they experience predictive utility or are influenced by intuitive factors. The multiple-motive approach is especially significant when we **aim to understand variations within the same individual**. When we observe the actions of a single person across **various aspects of their life**, we often face **a broad spectrum of apparent attitudes towards the future**. For instance, one individual might engage in heavy smoking while carefully analyzing the prospective returns of various retirement plans. Another person may precisely save money, yet not consider energy efficiency when purchasing an air conditioner. Alternatively, someone might invest two decades in building a career, only to jeopardize this long-term commitment for fleeting moments of pleasure. The Discounted Utility Model (DUM) assumes a **uniform discount rate that applies to all consumption choices**, making it challenging to account for such intra-individual disparities. In contrast, the multiple-motive approach offers a framework through which we can interpret these differences more effectively, attributing them to more specific, stable, and legitimate factors. These factors may include **the extent to which individuals display skepticism toward promises, derive anticipatory pleasure from their choices, are influenced by intuitive impulses, or possess accurate foresight regarding their future well-being** (Frederick, Loewenstein and O'donoghue ,2002).

During a period of military downsizing, Warner and Pleeter (2001) investigated the decision-making processes of American military personnel. Faced with the option of a one-time payment, a lump-sum payment, or regular payments, over 60,000 military employees had to make a **choice based on their current salary and years of service**. For instance, an E-5 with nine years of service could choose between $22,283 today or $3,714 each year for eight years. Despite the **prevailing interest rate** being

only 7% at the time, the **immediate payment was equivalent to a lump-sum payment discounted** at a rate of 17.5%. Surprisingly**, more than half of all military officers and over 90% of enlisted personnel opted for the lump-sum payment.** The **significant demographic disparities in discount rates** were observed, aligning with theoretical predictions and recent experimental findings. Notably, higher discount rates were identified within military ranks, particularly among enlisted individuals. A distinct pattern emerged as well: discount rates exhibited an inverse relationship with the magnitude of lump-sum payments. This suggested **that individuals applied lower discount rates to larger sums. The estimates closely resembled the discount rates observed in the rapidly expanding market for acquiring deferred income streams.**

In exploring the intersection of laboratory and real-world experiments, Harrison, Lau, and Williams (2002) utilized survey questions featuring **actual monetary incentives** to recognize **individual discount rates.** Their experiments were conducted throughout Denmark on behalf of the Danish government, utilizing a nationally representative sample of 268 individuals aged between 19 and 75 years. The authors used a simple foundational question commonly employed to discover individual discount rates: **"Do you prefer to receive $100 today or $100 + X tomorrow, where X is some positive amount?"** If a subject prefers $100 today, we can infer that the individual's discount rate is higher than X% per day; conversely, if they choose $100 + X tomorrow, we can deduce that the discount rate is equal to or lower than X% per day. The authors employed time horizons of 6 months, 12 months, 24 months, and 36 months. Results show that **it is feasible to extract discount rates from individuals in real-life situations with concrete economic consequences**, and these **discount rates fall within a theoretically reasonable range**. Authors also observe **disparities in discount rates** among certain sociodemographic segments of the Danish population, indicating that **intertemporal welfare assessments for these specific household groups should consider these distinctions**. However, the elicited discount **rates remain consistent across different time horizons**, extending up to one year. This consistency aligns with **the application of constant discount rates for specific household types over timeframes.**

Examining the linkage between **short-term time preferences and long-term investment decisions**, Eckel, Johnson, and Montmarquette (2005) conducted a study utilizing experimental data gathered from a sample of working poor individuals in Canada. Each participant faced a series of decisions involving **trade-offs between immediate and future sums of money**, including both **short and long-time horizons**, with stakes reaching up to $600. Time preferences were stimulated in the experiment by offering subjects **a choice of payments that occurred in the future on different days**. The time horizon for future payments ranged from 2 to 28 days, with earlier payments being shifted by 1 day, 1 or 2 weeks. The value of most questions started at approximately 72 Canadian dollars, with a few questions having values around 26 Canadian dollars. The distribution of annual discount rates derived from the presented questions was irregular, with values of 10%, 50%, 200%, and 380%. The short-term discount rate averaged 289% annually, which aligns with the literature on discount rates. Their findings reveal that **short-term preference choices are effective predictors of long-term investment decisions.** These short-term questions are not only **more cost-effective** to administer but also result in **higher estimated discount rates.** Importantly, they **do not identify any evidence suggesting that present-biased preference measures obtained from short-term time preference decisions indicate bias in long-term investment choices.** Furthermore, their analysis demonstrates that individuals **display heterogeneity in the discount rates derived from short-term time preference decisions compared to those from long-term time preference decisions.**

Exploring the impact of **significant life events on intertemporal decision-making** among young adults, Liu and Aaker (2007) conducted experiments that specifically delved into the effects of experiencing the death of a close person due to cancer. Their findings indicate that such an experience, which imparts information related to time, leads to **choices that prioritize long-term future outcomes over immediate interests**. This effect seems to be driven by an **enhanced awareness and tangibility of one's future life trajectory**, redirecting attention away from the present and towards the **long-term perspective.** In a separate study, Tanaka, Camerer, and Nguyen (2010) conducted experiments in Vietnamese villages to investigate the **relationship between income, demographic factors, and individuals' risk and time preferences.** Their findings indicate that **mean village income is associated**

with these preferences. People living in **impoverished villages** do not necessarily **exhibit fear of income variability**; instead, **they display aversion to losses.** When they introduced instrumental variables related to income, they found a **significant correlation between mean village income and risk aversion,** reflecting the **concavity of the utility function**. In the time discounting experiment, they observed that **mean village income is correlated with lower discount rates**. This suggests that individuals in **wealthier villages tend to be not only less risk-averse but also more patient.**

According to Wilkinson and Klaes (2017) individuals can have **three different prior probability distributions** for events with **uncertain time durations or delays**, such as waiting for someone to return, based on their past experiences. One possible distribution is Gaussian or normal, like estimating the life of a battery. In this case, the expected remaining life decreases as time passes. Another type of distribution is exponential, where the **expected remaining delay remains constant over time**. In this case, expectations **don't change with time**, and there should be **no switch from LL to SS.** The third type of distribution is associated with a **power function**, often referred to as a **heavy-tailed distribution**. This distribution allows for **more frequent extreme events**, like waiting for an email or an unscheduled bus. In such cases, as time passes, **individuals might expect the delay to increase.** Here, **a shift from LL to SS is predicted** because **the discounted utility of LL decreases over time**, aligning with the DUM's predictions. It's essential to note that **in situations involving a heavy-tailed prior probability distribution**, the **preference shift is not time-inconsistent but is actually anticipated by the DUM**. This is because, with this distribution, the conditional expectation for remaining time continuously updates in Bayesian terms, treating the absence of new information (like the experimenter not returning or a bus not arriving) as new information, leading to a rational shift in preferences.

5.2. Exponential Discounting and Hyperbolic Discounting

5.2.1. Exponential Discounting

In 1937, Samuelson introduced the **Discounted Utility Model (DUM)** in a relatively modestly titled article called **'A note on measurement of utility.'** In this model, he argued that **comparing intertemporal trade-offs necessitated a cardinal measure of utility rather than an ordinal one.** The DUM expanded upon Fisher's analysis of **indifference curves**, which had primarily focused on comparing **two time periods**, by extending it to situations **involving multiple time periods**. However, as mentioned earlier**, the DUM simplified the various psychological factors influencing time preference into a single parameter, the discount rate.**

The essence of this model is best conveyed through **mathematical expressions**. It defines an intertemporal utility function, denoted as $U_t(c_t,...,c_T)$, which represents **the utility at time t associated with a consumption profile** (c_t, c_{t+1}, c_{t+2},...) that begins **in period t and extends to period T.** The DUM incorporates the **fundamental axioms of the standard neoclassical model**, including principles **of completeness, transitivity, and independence**. Furthermore, **the DUM assumes that an individual's intertemporal utility function can be described by a specific functional form**, which is as follows:

$$U_t(c_t, \dots\dots, c_T) = \sum_{k=0}^{T-t} D(k)u(c_{t+k}) \quad \text{where } D(k) = \left(1/1+\rho\right)k \qquad (1)$$

The term $u(c_{t+k})$ can be interpreted as the **person's instantaneous utility function**, meaning their perceived wellbeing in period t + k. The term D(k) refers to the **person's discount function**, meaning the relative weight that the person attaches in time period t to their wellbeing in period t + k. Finally, the term ρ refers to the **person's discount rate, meaning the rate at which they discount expected future utilities** (Wilkinson and Klaes, 2017).

Which option is more appealing: $100 today or $100 tomorrow? How about $1000 today versus $1000 next year? In most cases, individuals **tend to favor receiving their money sooner rather than later**. While there are exceptions to this, as we'll explore in the forthcoming chapter, the typical inclination is **towards immediate access to funds.** This inclination does not imply that a dollar received tomorrow holds any less intrinsic value than a dollar received today. Rather, it indicates that, from

today's perspective, **the utility of a dollar today outweighs the utility of a dollar tomorrow.** Several factors contribute to this preference. Receiving money earlier provides a wider array of opportunities, some of which may have time constraints, while allowing the option to save for future opportunities. Moreover, **obtaining money earlier extends the period for potential savings and interest accumulation.** Regardless of the rationale, when events or benefits in the future are perceived as less valuable from today's standpoint, we refer to this as **"discounting the future."** This phenomenon is broadly known as **time discounting**, and the degree to which one discounts the future is regarded as a matter of **personal preference, often termed as time preference** (Angner, 2020). **Exponential discounting** suggests that **the rate at which individuals are willing to trade consumption between any two time points solely depends on the time gap between those two points**. It is important to note **that exponential discounting does not lead to dynamic inconsistency**. A fundamental characteristic of the assumption of exponential discounting is the **concept of dynamic consistency, where preferences remain constant over time**. In simpler terms, unless new information is introduced, preferences do not change as time progresses. However, it turned out that this assumption is unrealistic for many real decisions of subjects. Alternatives like hyperbolic discounting have more empirical support.

5.2.2. Hyperbolic discounting

Exponential discounting implies that the agent's actions **remain consistent over time**, indicating that **their preferences between two choices do not alter merely due to the passage of time**. If you exhibit time consistency and believe (today) that option *a* is superior to option *b*, then your belief about options *a* and *b* was the same yesterday, and it **will remain consistent** tomorrow.
It can be relatively straightforward to demonstrate that **anyone who applies exponential discounting will exhibit time consistency.** On the other hand, **hyperbolic discounting can explain not only why individuals prioritize their immediate well-being over their future, but also why they alter their intentions regarding this balance between the present and the future.** Consequently, it can elucidate why people may have strong intentions to diet, quit smoking, complete homework, or cease drug use, yet ultimately struggle to follow through with these intentions (Angner, 2020).

The basis of hyperbolic discounting is that people tend to be more impatient in the short run, using a higher discount rate, and become more patient over longer periods of time. This phenomenon is referred to as present bias.

Over time, as **differences between the DUM and empirically observed forms** of discounting became more apparent, new models emerged that aimed **to better align with real-world discounting phenomena**, rather than creating theoretical models that strictly adhere to precise axioms, which are often challenging to find in the real world. **Hyperbolic discounting (HD)** is one such approach used to construct these models, primarily designed to c**apture the phenomenon of time-inconsistent preferences**, which the DUM struggles to address in its basic form. HD is **better suited for situations involving uncertainty, probability, or risk** (for example Epper et al., 2010). The term HD does not **encompass a single functional form**; instead, it **represents a set of functions that share the characteristic of a decreasing discount rate over time.**

The first economist to explore alternatives to the constant discounting framework of the DUM was Strotz (1955), who **did not find any normative justification for the constant discounting approach**. Strotz was also insightful about the **consequences of relaxing the assumption of constant discount rates**, particularly in terms of the emergence of **time-inconsistent preferences.** While he did not propose a specific mathematical formula for an alternative discount function, he did **highlight the idea of diminishing discount rates**. This concept essentially lays the foundation for **hyperbolic discounting**, where individuals tend to **demonstrate greater impatience in the short term, characterized by higher discount rates**, and become **more patient over longer time horizons**. This phenomenon is commonly referred to as **present bias**. To clarify the terminology and facilitate comprehension of the mathematical aspects of various models, it's helpful to distinguish between the terms **discount rate, discount factor, per-period discount factor, and discount function**. In the traditional discounting model

of the DUM, the **discount rate ρ remains constant and corresponds to the interest rate used for discounting future utilities.** The **discount factor** represents the **factor by which each period's utility is adjusted to calculate its present value.** In the context of constant discounting, the discount factor is expressed as $1/(1 + \rho)^t$. The **per-period discount factor,** denoted as 'd,' reflects **the factor by which each discount factor is multiplied to determine the discount factor for the subsequent period**. In the DUM, this value is also constant and equals $1/(1 + \rho)$. The discount function illustrates the **connection between the discount factor and time, revealing the cumulative effect of discounting over a range of time periods.** In the DUM, this discount function can be described as $D(t) = d^t$, commonly known as an exponential discount function. Consequently, if an individual has a utility function $u(x_0, x_1, x_2,\ldots x_0)$, the utilities for periods 0, 1, 2,…t are discounted by factors of 1, d, d^2,… d^t. It's essential to note that in this case, the time variable is treated as discrete, considering only whole numbers (Wilkinson and Klaes, 2017).

The initial hyperbolic discount function, as proposed by Herrnstein (1961), originated from experimental research involving animals and was represented as $D(t) = 1/t$. Herrnstein (1981) subsequently formulated another specific variation of the hyperbolic function, expressed as $D(t) = (1 + \alpha t)^{-1}$.

Phelps and Pollak (1968) employed a modified variant of this function known as a quasi-hyperbolic function:

$$D(t) = \begin{cases} 1 & \text{if } t = 0 \\ ß\delta^t & \text{if } t > 0 \end{cases}$$

Generally, when ß < 1, it implies that **the discount factor between the current period and the next is lower than the discount factor in later periods**. Therefore, it can be interpreted that **ß quantifies the extent of present bias**. In the special case **where ß = 1, the quasi-hyperbolic function simplifies to the exponential function of the DUM**. It's important to note that this model, often referred to as the (ß,δ) model, can also accommodate **Reverse time inconsistency (RTI)**[1] when ß > 1. According to the (ß,δ) model, in contrast to the DUM, the utilities in the periods 0, 1, 2,...,*t* are discounted by 1, ßδ, $ß\delta^2$,..., $ß\delta^t$.

To illustrate **the impact of hyperbolic discounting**, we can use values from the study conducted by Ainslie and Haslam (1992) in a simple example. Let's assume that individuals have a present bias factor (ß) of 0.6 and a per-period discount factor (δ) of 0.9. They are presented with a choice: receiving $100 in six years (the SS reward) or $200 in eight years (the LL reward). Both the payoffs and delivery time periods are fixed.

Now, let's calculate the present values:
Present Value at time 0 for $100 in 6 years: V_0 ($100 in 6 years) = $0.6(0.9)^6(100) = \$31.9$
Present Value at time 0 for $200 in 8 years: V_0 ($200 in 8 years) = $0.6(0.9)^8(200) = \$51.7$

At the current moment, the $200 to be received in eight years is more appealing. However, after six years, the situation changes:

Value at time 6 for $100 received now: V_6 ($100 now) = $100
Value at time 6 for $200 received in two years: V_6 ($200 in two years) = $0.6(0.9)^2(200) = \$97.2$

At this point, **the immediate receipt of $100 becomes more valuable than the $200 to be received in two years, and individuals' preferences reverse**. This example demonstrates a "temptation" scenario.

[1] The term "reverse time inconsistency" was coined by Loewenstein (1987) to depict scenarios in which individuals initially favored the LL reward but subsequently altered their preference in favor of the SS reward, representing a reversal of preferences compared to what is typically observed. Loewenstein suggested that for items associated with "vivid and fleeting" consumption, such as Halloween candles or expensive wines, this phenomenon could be explained by the impact of anticipatory utility. In these cases, individuals choose to postpone consumption to extend the enjoyment of the experience.

We can also observe how the (ß,δ) model applies to a **procrastination scenario** by reversing the situation and converting both payoffs into **negative values**. In this case, the initial payoff is -$100 in six years (the SS), and the second one is -$200 in eight years (the LL). At the current moment, the smaller discounted cost of -$31.9 for the SS is favored over the larger discounted cost of -$51.7 for the LL. However, six years later, individuals will prefer to switch to the LL option, which has a lower discounted cost of -$97.2 compared to the immediate cost of -$100 for the SS.

For a better illustration, the key distinctions between Exponential Discounting and Hyperbolic Discounting are presented in the following table.

Table 5.1 A Comparison of Exponential and Hyperbolic Discounting

Feature	**Exponential Discounting**	**Hyperbolic Discounting**
Consistency over time	Consistent preferences over all time horizons	Inconsistent preferences, changing over time
Rate of Time Preference	Constant rate of time preference	Variable rate of time preference
Impulsivity	Less impulsive behaviour	More impulsive behaviour in the short term
Discounting Rate	Higher discount rate in the long term	Higher discount rate in the short term
Time Consistency	Time-consistent preferences	Time-inconsistent preferences
Present Bias	Absence of present bias	Presence of present bias, especially in the short term

Source: Authors

5.3. Time Inconsistent Preferences

The structure of **discounting** highlights a **conflict between our current preferences and those we will have in the future**, as discussed by Laibson in 1996. This conflict represents one of the definitions of **dynamically inconsistent preferences**. As pointed out by Dragone in 2007, **individuals often demonstrate a high degree of patience when their decisions involve costs or benefits that are distant in time.** However, their **patience diminishes considerably when the choices involve events that are approaching**. For instance, **a short-term delay in receiving a reward leads to a much larger reduction in its perceived value compared to a similar delay in a long-term context.** We've previously explored the circumstances under which time preferences can become inconsistent. **Hyperbolic discounting (HD)** inherently accounts for this possibility, making **inconsistent time preferences not the driving factor for seeking a model that better reflects real-world preference dynamics,** as is the case with exponential discounting (ED). **Exponential discounting (ED)** remains the sole approach to avoid time-inconsistent preferences, in accordance with the model's definition (Loewenstein, Read, Baumeister, 2003).

There are several theoretical possibilities for how agents perceive and deal **with time-inconsistent preferences.** In reality, **time inconsistency becomes evident**. For instance, an overweight individual may start a diet but, as time passes, they must remind themselves daily of the diet's purpose for their future health, which can erode their willpower, eventually leading them to revert to consuming the same amount of food as before the diet. Similar observations have been made through research methods examining human behaviour, such as revealed preferences. Through the study of individuals, it has been found that **people's inadequate ability to save is often caused by the widespread temptation to spend money immediately** (Laibson, 1996). **People know they should save, but they don't want to continually postpone the realization of their desires into the future.** Further real-life examples might include **impulsive purchases.** A similar principle applies to **procrastination**, where an agent, when faced with an urgent task, delays working on it until the very last possible moment, potentially resulting in lower quality when completing the task.

Presented in 1991, Hoch and Loewenstein introduced an economic-psychological model that seeks to integrate **rational and emotional factors influencing consumer self-control**. The authors strive to explain **how consumers maintain self-control** despite having **preferences that vary over time**. They have conceptualized consumer self-control as a battle between two psychological forces: **desire and willpower**. This economic-psychological model of consumer self-control lies at the crossroads of two major currents in consumer behaviour research. One perspective regards decision-making as rational and unemotional, while the other perceives it as instinctual and emotional. As a result, the **desire-willpower framework serves as an ideal platform for exploring the interplay between logical and pleasure-driven motivations**. These two categories of psychological processes are typically studied in separate research areas. Although each perspective effectively explains a wide range of consumer behaviours, neither can independently offer a comprehensive understanding of the entire decision-making process. **Emotional factors are contained in the reference-point model of deprivation and desire, while cognitive aspects are evident in the contemplation and self-control tactics employed by consumers. A shift in either desire or willpower can lead consumers to cross the threshold into making a purchase.**

Loewenstein and Prelec (1993) demonstrate that **when an intertemporal trade-off is presented within the context of two different sequences of outcomes, individuals experience a shift in their psychological perspective, or "frame," which often makes them more forward-looking, leading to a desire to delay the better outcome until the end.** Their research reveals that the **preference for improvement** is contingent on whether a particular decision is perceived by the decision maker as part of a series of outcomes. In other words, **when the decision frame emphasizes the sequential nature of the choice, negative time discounting tends to prevail.** However, when the frame highlights the individual components of the decision, **positive time preference becomes dominant**. Furthermore, they examined the validity of a common assumption found in theoretical treatments of intertemporal choice, which posits that **preferences for sequences of outcomes** are derived from a simple aggregation of preferences for their individual components. Models with separable formulations, such as the discounted utility model, predict that the overall value (i.e., utility) of a sequence is the sum of the values of its individual outcomes. The results they present challenge this prediction. In general, an **individual's evaluation of complex sequences cannot be straightforwardly inferred from their evaluation of individual components**; instead, it responds to certain holistic properties of the sequence. The authors also developed and empirically tested a theoretical model of choice over outcome sequences. This model incorporates two motives that are not typically part of standard discounted utility formulations: a **preference for improvement** and a **desire to evenly distribute consumption over time.** The authors examined their findings through simple questionnaire. In the following text, we will present some examples they used to investigate the mentioned phenomena related to intertemporal choice.

Example 1 - ninety-five undergraduates at Harvard University were presented with the following three questions and were explicitly advised to disregard their individual scheduling constraints, such as preexisting plans, when answering.

1. Which would you prefer if both were free?
A. Dinner at a fancy French restaurant (86% of subjects chose this option)
B. Dinner at a local Greek restaurant (14% of subjects chose this option)

For those who prefer French:
2. Which would you prefer?
C. Dinner at the French restaurant on Friday in 1 month (80% of subjects chose this option)
D. Dinner at the French restaurant on Friday in 2 months (20% of subjects chose this option)

3. Which would you prefer?
E. Dinner at the French restaurant on Friday in 1 month and dinner at the Greek restaurant on Friday in 2 months (43% of subjects chose this option)

F. Dinner at the Greek restaurant on Friday in 1 month and dinner at the French restaurant on Friday in 2 months (57% of subjects chose this option)

Among the 86% of participants who favoured the extravagant French dinner, 80% **expressed a preference for a dinner option with a shorter waiting time** (Option C) **rather than a longer delay** (Option D). Consequently, only 20% chose to postpone the French dinner when it was presented as a standalone option. However, when the French dinner was incorporated into a sequence with the Greek dinner, allowing participants to decide between having Greek and then French or French and then Greek, the majority (57%) favoured deferring the French dinner. Even with individual isolated choices, there was still some inclination to delay the French dinner, as evident from the 20% of participants who selected the option with a longer delay. Nonetheless, this inclination was notably more pronounced when dealing with sequences as opposed to individual choices.

Example 2 - imagine you must schedule two weekend outings to a city where you once lived. You do not plan on visiting the city after these two outings. You must spend one of these weekends with an irritating, abrasive aunt who is a horrendous cook. The other weekend will be spent visiting former work associates whom you like a lot. From the following pairs, please indicate your preference by checking the appropriate line. Suppose one outing will take place this coming weekend, the other the weekend after.

Suppose one outing will take place this coming weekend, the other the weekend after.		
This weekend	**Next weekend**	
A: friends	abrasive aunt	(10% of subjects chose this option)
B: abrasive aunt	friends	(90% of subjects chose this option)

Suppose one outing will take place this coming weekend, the other in 6 months (26 weeks).		
This weekend	**26 weeks from now**	
A: friends	abrasive aunt	(48% of subjects chose this option)
B: abrasive aunt	Friends	(52% of subjects chose this option)

Suppose one outing will take place in 6 months (26 weeks from now), the other the weekend after (27 weeks from now).		
26 weeks from now	**27 weeks from now**	
A: friends	abrasive aunt	(17% of subjects chose this option)
B: abrasive aunt	friends	(83% of subjects chose this option)

In the initial question, the series of outcomes unfolds within a relatively short timeframe (2 weeks), suggesting that **discounting should be relatively weak, and the preference for improving sequences should be strong.** In this case, 90% of participants selected **the improving sequence**. In the second set of choices, the absolute time interval is much longer (26 weeks), which diminishes the cohesion of the sequence. Here, the authors expected discounting to have a more pronounced influence compared to the preference for improvement. Indeed, given the extended absolute delay, only 52% of subjects chose the improving sequence. In the third pair, the sequence interval was once again reduced to 1

week, which should theoretically lead to a stronger preference for the **improving sequences** compared to the second set of options. However, they had an intuitive expectation that the lengthy delay before the start of the sequence might somewhat diminish its integrity. This intuition may explain the slight reduction, relative to the first set of alternatives, in the fraction of participants opting to expedite the unpleasant visit.

The last example refers to the examination of what is called "Preference for Spreading."

Example 3 - subjects were first given a choice between Options A and B, then between Options C and D; they were instructed to ignore scheduling considerations.

Which would you prefer?

This weekend	**Next weekend**	**Two weekends from now**	
A: Fancy French	Eat at home	Eat at home	(16% of subjects chose this option)
B: Eat at home	Fancy French	Eat at home	(84% of subjects chose this option)
C: Fancy French	Eat at home	Fancy lobster	(54% of subjects chose this option)
D: Eat at home	Fancy French	Fancy lobster	(46% of subjects chose this option)

When deciding between Options A and B, most participants **favoured delaying the extravagant dinner until the second weekend, aligning with the common inclination for improvement**. Nevertheless, the introduction of the shared lobster dinner in Options C and D led to a slight shift in preference towards having the French dinner immediately. This pattern violates additive separability.

5.4. Applications of Intertemporal Choice in Policy and Personal Decision Making

5.4.1. Saving, Consumption and Investments

Fisher (1930) views investment as **a means to manage the timing of consumption**, rather than as a final goal. Several research studies indicate that **individuals display a tendency towards prioritizing immediate gratification, and they frequently underestimate the long-term consequences of their choices when making decisions that span across different time periods** (Laibson, 1997, Frederick et al., 2002). These time-inconsistent preferences frequently lead to **self-imposed limitations on future choices and can result in undesirable outcomes.** Within the conventional real options framework, it is presupposed that individuals possess a **constant rate of time preference**. Consequently, real options models commonly assume that rewards are subject to exponential discounting. These preferences are considered time-consistent, as an entrepreneur's inclination for earlier rewards over later ones remains the same, regardless of when this preference is assessed. Nevertheless, nearly all experimental studies on time preferences indicate that **the assumption of time-consistency is unrealistic**.

In essence, an effective social **discount rate** should be capable of capturing how individuals trade current consumption for consumption in subsequent periods. It should also address the **allocation of resources between the private and public sectors**. The first argument is grounded in the notion that individuals, particularly savers, **are willing to exchange current consumption for future consumption if the current sacrifices (or savings) are compensated more than proportionally in the future.** This is because, assuming that consumption increases over time, the marginal utility of future consumption diminishes for individuals. Moreover, many economists have made the assumption **that individuals possess a positive pure rate of time preference, meaning they consistently prefer immediate pleasure over pleasure experienced in the future**. There are at least two psychological aspects that support the assumption of a pure time preference: **one pertains to individuals'**

impatience (or myopia), and the other is associated with individuals' concerns about not being alive in the very distant future.

In accordance with the typical approach in models involving **time-inconsistent decision-making**, these challenges are envisioned as the result of an intra-personal game, in which the same entrepreneur is illustrated as different "players" at various future points in time. In other words, the **present self devises an optimal investment timing strategy while considering the investment timing strategies that will be chosen by the future selves.** Essentially, resolving the **time-inconsistent investment dilemma** involves employing two interlinked functions: the present self's value function and the continuation value function. Unlike the value function in time-consistent optimization problems, the current self's continuation value function is determined based on the anticipated exercise decisions of future selves.

Behavioural finance applications illustrate **how engaging in temporal discounting activities reflects an individual's perception of patience when making investment choices.** Over the course of their lives, individuals **encounter an array of financial decisions that involve various levels of monetary consumption occurring at different points in time.** As individuals deliberate over **trade-off decisions**, opting to limit immediate consumption in favour of greater future consumption, this cognitive process becomes particularly relevant when contemplating **how people save for retirement instead of immediately utilizing their financial resources.**

The presence of mean reversion in historical equity returns suggests that **there is reduced risk in equity investments for individuals with a long-term investment horizon** (Poterba and Summers, 1988, Campbell and Viceira, 1999). Barberis (2000) estimates that a **longer time horizon is advantageous for equity allocation even when investors are uncertain about the actual risk and return parameters.** Even when there is a high likelihood that **stock returns are independently and identically distributed**, and time horizon might seem irrelevant, **a rational long-term investor will consider the non-negligible possibility that the future may resemble the past and, thus, favor equity investments.**

While some scholars have raised doubts about whether past return patterns should guide household portfolio choices in the absence of a theoretical basis for return predictability (e.g., Bodie, 1995), the conventional wisdom among investment advisors and in the popular press is that the **allocation of one's portfolio to stock should increase with the intended length of the holding period**. It is reasonable to assume that the **average investor, saving for long-term consumption, would prefer to allocate a portion of their portfolio to stock investments.** While the rate of discounting is often assumed to remain constant in both models of life cycle wealth accumulation and household portfolio allocation (e.g., Gomes and Michaelides, 2005), there is a growing body of evidence suggesting that **time discounting varies among households and can be linked to neurological characteristics that influence how future outcomes are valued** (Berns, Laibson, Loewenstein, 2007).

Research into the influence of household **intertemporal consumption** on household financial behaviours primarily revolves around estimating normative choices, considering **the diverse preferences among households**. One of the crucial preferences in this context is the **discount rate applied to future consumption.** Time discounting stands as a fundamental element in models of intertemporal consumption (e.g., Campbell and Viciera, 2002), and the optimal portfolio selection hinges on the **significance attributed to future utility derived from an asset's payout.** The application of a higher discount rate to future consumption theoretically results in a **household assigning more weight to consumption in the near future compared to later stages in life.** This increased emphasis on short-term consumption may also influence optimal asset allocation, especially if optimal portfolios vary depending on the investor's holding period. The favorable return characteristics of equities for long-term holding periods (Barberis, 2000, Campbell and Viceira, 2002) have prompted many investment advisors and academics to consider time horizon as a crucial factor in the process of selecting an optimal portfolio.

While **individual time discounting, or time preference**, is a critical factor in financial asset demand, the predominant focus of research on time discounting and investing has been on assessing its impact within **normative models of life cycle wealth accumulation and asset allocation**. For instance, Bernheim, Skinner, and Weinberg (2001) demonstrate how the optimization of expected

lifetime consumption is significantly influenced by the rate of time discounting. A myopic household, characterized by a higher discount rate for future consumption, will **prioritize early-life consumption** of financial resources at the expense of later years to maximize intertemporal well-being. This **sensitivity of life cycle** wealth to variations in time discounting is also addressed in the modeling by Gourinchas and Parker (2002). **Households with lower rates of future discounting**, on the other hand, **tend to follow a more consistent consumption trajectory over time**, saving during peak earning years to bolster their retirement income.

The inclination to save for retirement can be significantly **affected by the rates of time discounting,** particularly during the **early stages of one's life cycle and especially in accounts that impose penalties for early withdrawals.** In the early phases of life, households encounter substantial **trade-offs between consumption and investment.** These trade-offs may involve expenses related to raising children, low current income relative to future income for individuals with steep earnings trajectories, investments in durable assets like housing, and the pursuit of human capital development. In order for households to find it preferable to consume 30 years in the future rather than today, they must place a high value on future utility. The penalties associated with early withdrawals restrict a household's ability to access their savings in the near future. O'Donaghue and Rabin (1999) emphasize **the significance of myopic preferences in explaining the reluctance to allocate time and effort towards saving for retirement**. While O'Donaghue and Rabin primarily focus on inconsistencies in time preferences to elucidate the widespread tendency to procrastinate, they also illustrate **how a low rate of time discounting can create significant intertemporal trade-offs that can motivate procrastinators to initiate retirement savings**.

5.4.2. Environmental Policy

Similar to investments made in various aspects of daily life, **investments in environmental projects today**, such as those aimed at reducing global warming and addressing climate change, **must be evaluated in terms of their future benefits**. This evaluation is essential for at least two interconnected reasons: the promotion of sustainable development and the consideration of intergenerational equity.

The latter perspective claims that **policies and investments undertaken by the current generation should aim to ensure the continued improvement of well-being for future generations** (Groom et al., 2005). As proposed by Beder (2000), equity is linked to principles of **social justice and the requirement for fairness**, rather than strict equality, in **the distribution of benefits and losses**. When applied to the notion of intergenerational equity, the concept underscores that while **future generations may benefit from economic growth and advancement, these benefits should not come at the cost of environmental degradation.** Many individuals support the presence of a moral duty toward future generations, guided by **altruism**, especially because the choices made today can have consequences on the quality of life for individuals in the next generation and subsequently for those in the generation after that, and so forth. **Intergenerational equity** is, thus, a key concept in the context of sustainable development, as disparities among various generations can potentially result in environmental degradation. The primary concern revolves around the notion that **adjusting the conventional discount rate is essentially a way of requesting greater contributions from the current generation**. This implies that the current generation should reduce its consumption and increase savings to benefit future generations, who are expected to be more affluent than the present one.

Padilla (2002) asserts that there is **no single, straightforward relationship between discounting and environmental degradation.** The author highlights that the risk associated with a **low environmental discount rate**, when applied to global investments, may result in an increase in capital investments. As a consequence, over time, this could reduce natural resources and escalate environmental degradation, even though future generations would inherit greater capital assets. Additional concerns relate to the arbitrary selection of a **low discount rate**, which can compromise efficiency and adjust the discount rate without a rigorous scientific basis. Moreover, an arbitrary extension of time preferences for current generations beyond their lifespans raises equity considerations, particularly if the choice of the discount rate is predicated on the prosperity of future

generations. This essentially translates into **assigning very limited weight to the well-being of future generations, leading to an "optimistic paradox."**

Nonetheless, what factors determine the degree to which environmental morale[2] may impact discounting? The literature suggests that there are **two distinct neural systems that shape how individuals formulate expectations about future outcomes** (Frederick, Loewenstein and O'Donoghue, 2007) a deliberative system that evaluates options in a cognitive manner (e.g., by considering the probable consequences), and an affective (or emotional) system that influences behaviour through emotional states (e.g., hunger, anger, and fear). The deliberative system takes into account both **short and long-term rewards**, while the affective system is primarily driven by **short-term rewards**. How can environmental morale intersect with these systems? Consistent with Frederick (2003), **ethical considerations can engage the deliberative system** through factors such as notions of social justice and responsibility toward future generations. This engagement may **lead individuals with high environmental morale to discount environmental costs and benefits at a lower rate, if at all, compared to individuals with low environmental morale.** In this context, discounting is not normatively justified, and environmental outcomes should be given equal weight regardless of when they occur and their nature. Alternatively, one could argue that environmentally conscious individuals might exhibit negative discount rates, meaning they give more weight to future benefits and costs. They may prefer to **delay experiencing gains until a later time and accept losses in the present rather than in the future.** This perspective implies a more forward-looking approach within the deliberative system.

Furthermore, ethical considerations can intensify the desire for, and immediate enjoyment of, an improved environment. This heightened desire can result in **preference for immediate outcomes** driven by emotions (i.e., present bias or impatience) as characterized by Loewenstein and O'Donoghue (2007), referred to as "the heat of the moment." The affective system, in this regard, tends to lead to **more shortsighted behaviours**. As suggested by prior analyses (as seen in Tsukayama and Duckworth, 2010), it might be anticipated that **individuals with high environmental morale**, when confronted with decisions involving immediate versus future environmental benefits, **will exhibit steeper discount rates compared to those with low environmental morale (indicating impatience).** Similarly, rather than displaying equal discount rates for gains and losses, they may discount gains more heavily than losses.

5.4.3. Health

Individuals' time preference rates have been shown to **influence their health-related behaviour.** Individuals with **high time preference rates tend to place a greater value on the present and assign a lower value to future health benefits** (Fuchs, 1982). This aspect becomes particularly relevant when considering interventions like smoking cessation and exercise, where perceptions of short-term costs (e.g., withdrawal, disruptions to routine) may outweigh the perceived long-term benefits (e.g., improved health, reduced expenses) (Komlos et al., 2004).

Time preference holds significant relevance in the field of health economics for two primary reasons. First, employing **time preference** as a theoretical framework can **enhance our comprehension of health-related behaviours**, as illustrated by studies like Komlos et al. (2004). Understanding how individuals perceive **future costs and benefits allows us to make informed hypotheses about the impact of these beliefs on their behaviour** (Cairns & van der Pol, 2000). Expanding our knowledge of behavioural determinants is valuable for shaping policies and interventions aimed at promoting health, such as those related to smoking cessation and adherence enhancement (Cairns & van der Pol, 2000). Second, time preference must be considered in economic evaluations to estimate the present value of new technologies. This is especially crucial since the **timing of costs and benefits can vary within and between different interventions**. For instance, a medication for hypertension might incur h**igher immediate costs but offer substantially greater long-term benefits compared to its counterpart.** Improper application of discounting methods can yield flawed results and potentially diminish the

[2] Environmental morale or environmental ethics is a branch of practical ethics that focuses on the natural environment, encompasses its utility for both humans and other animals and the potential intrinsic value it holds. Environmental ethics helps define man's moral and ethical obligations toward the environment.

reliability of evidence, affecting the credibility of subsequent decision-making (Cairns & van der Pol, 2000). Numerous prior studies have explored the **connection between temporal discount rates as assessed through hypothetical choices and real-world behaviours that are believed to reflect individuals' time preferences**. In one such study, conducted by Fuchs (1982), monetary discount rates were compared to self-reported engagement in various health behaviours. Fuchs posed a series of monetary time preference questions to 508 community members, such as, "Would you choose $1,500 now or $4,000 in five years?" These questions varied in terms of monetary amounts and time delays to determine the discount rate for each respondent. Additionally, Fuchs inquired about several health behaviours, including smoking, exercise, seat belt usage, dental exams, and weight management. The study revealed that discount rates were **weakly associated with smoking**, and for men, exercise exhibited a relationship with **discount rates that ran counter to the anticipated direction** (men who placed more value on future outcomes tended to exercise less). Discount rates showed **no significant correlation with the other health behaviours, although the associations were in the expected direction.** Notably, a measure of health status displayed a **modest correlation with time preference**, suggesting that i**ndividuals with lower discount rates may be more inclined to engage in health-improving behaviours.** Consequently, **time preferences were linked to certain health behaviour** measures, but not all, and the observed correlations were relatively minor. Fuchs (1982) also identified **that time preference was related to other respondent characteristics, such as age and education, indicating that it is possible to identify correlates of time preference**.

Chapman and Coups (1999) delved into the connection between **responses to hypothetical intertemporal trade-offs and the acceptance of an influenza vaccine**. Their findings revealed a modest but **statistically significant relationship between vaccine acceptance and one of their three hypothetical choice-based measures of time preferences.** These results implied some degree of alignment between measures of hypothetical choice-based time preferences and preventive health behaviours, indicating that **individuals who place a higher value on future outcomes are more likely to engage in such behaviours.** However, it's worth noting that this relationship is small and may be found with some measures but not with others.

Some research provides compelling evidence regarding the l**ink between measures of time preference and addictive behaviour** (Bickel et al., 1999; Kirby et al., 1999). Addictive behaviour can be **conceptualized as a case of intertemporal choice**, wherein the individual decides whether to engage in an immediately satisfying activity (such as substance use) that carries long-term consequences (sustained addiction with adverse effects on health, employment, etc.).

Over the years, we have gained extensive insights into the prevalence of time-inconsistent behaviour in various health-related activities. The principles of behavioural economics have found **frequent application in health, primarily concerning the consumption of addictive substances like alcohol and unhealthy foods**. However, the relevance of these principles extends well beyond this specific domain. For instance, the **issue of nonadherence to medications can often be attributed to the intertemporal choices made by patients.** This may include difficulties or reluctance in enduring **short-term side effects** of medications, misjudgements regarding the consequences of nonadherence, or limitations in memory pertaining to when and how much medication to take. The implications of not addressing **intertemporal choice problems are substantial for public health practitioners** (Roberto, Kawachi, 2015). Individuals often find themselves expressing a **strong desire to abstain from the unhealthy behaviours they are currently engaged in**, and they **frequently make unsuccessful endeavours to cease or reduce their consumption of detrimental products**. For instance, in 2010, a significant 69% of active smokers in the United States expressed their **wish to completely quit smoking** (Malarcher, et al., 2011). More than half of these smokers attempted to quit within the previous year, yet only a mere 6% managed to quit successfully. Unsuccessful quit attempts result **in substantial costs**, including cravings, withdrawal symptoms, and damaged self-esteem. It is unlikely that individuals would willingly subject themselves to such discomfort unless they were genuinely committed to succeeding. Furthermore, individuals frequently make repeated, unsuccessful attempts to modify their behaviour. In a typical study, a group of smokers had an average of four prior failures (Zhou et al., 2009). This recurrent behavioural pattern seems highly inefficient in the pursuit of maximizing personal satisfaction.

Scholars have investigated the phenomena of **restricted focus and prominence in various health-related contexts.** Encouraging individuals to follow through with their plans can be achieved by prompting them to provide details about their plan implementation. This process encourages people to think through the specific aspects of a task, reducing forgetfulness and checking procrastination. **Formulating a plan creates an association between a future moment and the intended plan, effectively serving as a cue for individuals to execute the plan when the moment arrives**. Research by Milkman et al. (2011) has shown that **simple planning prompts can yield modest increases in preventive screening rates.** For instance, sending a planning prompt via mail to encourage individuals to get a flu shot resulted in a 4-percentage point increase in the vaccination rate compared to the 33% of those in the control group who received the shot, representing a 13% relative increase. Similarly, mailing reminders for colonoscopy screenings increased the percentage of individuals who underwent the test by 1 percentage point compared to the 6% in the control group, marking a 16% relative increase. Much like text message reminders, these interventions are cost-effective and have the potential for broad population-wide application.

Models of inattention predict individuals' responsiveness to reminders, which serve to **highlight future consequences of their choices**. Reminders, due to their simplicity, have been extensively studied, and the advent of digital technology has made their implementation more accessible. **Sending reminders** to groups and using phone or computer applications for reminders have **become effortless and cost-effective**. The natural application of reminders is enhancing medication adherence, as reviewed by Vervloet et al. (2012) concerning electronically sent reminders. These reminders use various delivery methods like text messages and electronic devices with visual or auditory alerts. While most studies show short-term improvements in adherence, the long-term impact of electronic reminders remains uncertain. Text message reminders have demonstrated **effectiveness in promoting smoking cessation**, as observed in studies by Free et al. (2011) and Rodgers et al. (2005). This approach can be adapted to various behaviour modification attempts, including dietary changes and physical activity. Furthermore, reminders can prove valuable for scheduled activities like primary care appointments, Pap smears, and colonoscopies.

Agrawal et al. (2023) presents four large-scale online experiments involving **Money Earlier or Later (MEL) decisions**, stress measures, and pandemic mitigation behaviours. Results indicate that stress leads to **impulsivity,** with less stressed and more **patient** individuals practicing more social distancing during the pandemic. These findings not only resolve theoretical debates in the MEL literature but also offer valuable scientific insights for policymakers in developing response **strategies for the future.**

SUMMARY

In chapter 5, we focused on the area of **intertemporal choice**. Examining **intertemporal choices** and **changes in preferences** over time provides a relatively valuable insight into human decision-making across various life domains. Understanding **how individuals make decisions when facing choices at different points in time** is crucial for shaping policies based on insights from behavioural sciences. In the chapter, we also discussed the **hyperbolic discounting model**, which can explain the workings of the human mind when individuals face decisions across different time horizons, with changing preferences. **Hyperbolic discounting** can explain the **change in preferences over time** (time inconsistency of preferences), a phenomenon that the standard model could not describe. Individuals often tend to prioritize **immediate satisfaction** over **future benefits**, leading to suboptimal decisions in the long run. This phenomenon can have an impact on various aspects of life, particularly from an economic perspective, notably in the area of savings.

In the chapter, we also pointed out that examining **preferences over time** can also aid in designing policies aimed at environmental protection. Several studies have confirmed that policymakers must consider the well-being of future generations and focus on sustainable development.

The connection between **intertemporal choices** and health-related behaviour further emphasizes the need for behavioural interventions in this field.

Understanding how preferences develop over time can provide a foundation for better designing interventions that can more effectively reflect individuals' cognitive constraints and take into account changes in preferences over time.

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CHAPTER 6: BEHAVIOURAL GAME THEORY

Analytical **game theory** has achieved significant success, serving as the cornerstone for various subdisciplines within economics, including microeconomics, and expanding its influence into fields such as philosophy, biology, political science, government, public policy, and beyond. However, there is ongoing debate regarding its accuracy in describing **real-world behaviour** and its alignment with normative principles. **Behavioural game theory**, on the other hand, assesses how well analytical game theory reflects the **actions of actual individuals** engaged in **strategic interactions** and suggests modifications to better capture their behaviour. Some of these proposed modifications remain consistent with **neoclassical economic principles**, making them non-behavioural in nature. Others, however, deviate significantly from neoclassical orthodoxy and can be rightfully categorized as behavioural models.

Interdependent **decision-making** involves considering the actions and reactions of multiple decision-makers. Each decision-maker anticipates **how others will respond** and adjusts their choices accordingly. This can lead to complex, infinite **chains of reactions**. While this concept is evident in **strategy games** like tic-tac-toe and chess, real-world scenarios, such as **economic interactions**, can be far more intricate. Even in simple **strategic games**, the boundaries of rational decision-making are tested. Adding to the complexity are uncertainties, both endogenous (from complex interactions between economic agents) and exogenous (external factors impacting rational behaviour). **Strategic interaction** has relevance across various economic domains, including central bank interest rate policies, pricing in oligopolies, labor negotiations, financial bidding, and international trade talks. Furthermore, game theory finds applications in politics, sociology, warfare, sports, and biology, making it a unifying concept in various analyses. Pioneering works by Von Neumann and Morgenstern (1945) and Nash (1951) laid the foundation, and over the second half of the 20th century, numerous economists embraced these ideas, making game theory a crucial tool in economic analysis.

6.1. Understanding Game Theory from a Behavioural Perspective

Game theory offers the conceptual and procedural tools necessary for the analysis of social interactions, encompassing player characteristics, game rules, information structure, and the outcomes of strategic interactions. While different behavioural disciplines, such as economics, psychology, sociology, politics, anthropology, and biology, currently operate on separate principles and data sources, game theory provides a unified analytical framework accessible to all these disciplines. This fosters cross-disciplinary information exchange, potentially leading to a level of cohesion within the behavioural sciences similar to that found in the natural sciences. Furthermore, because behavioural game-theoretic predictions can be subject to systematic testing and replication across different research laboratories (Grether and Plott 1979; Smith 1982; Sally 1995), it elevates social science to the status of a genuine scientific endeavor.

Key Game Theory Terminology

Before exploring into a deeper exploration of behavioural game theory, we provide a brief overview of fundamental concepts in the field of game theory:

1. **Game:** Any specific situation where the final result depends on the actions of two or more decision-makers (referred to as players).
2. **Players:** Individuals or entities making strategic choices within the context of the game.
3. **Strategy:** A comprehensive plan of actions that a player intends to execute based on the potential situations that may occur during the game.
4. **Payoff:** The reward or gain that a player obtains when a specific outcome is achieved. This can be expressed in various measurable forms, such as currency or utility.
5. **Information Set:** The available information at a given point in the game, with this term typically applied when the game possesses a sequential component.

6. **Equilibrium:** The juncture in a game at which both players have finalized their decisions, resulting in an outcome.

Behavioural game theory utilizes experimental observations and insights from psychology to formally model how restrictions on **strategic thinking, learning, and social preferences** come into play when individuals engage in actual games. Emerging theories in games like **ultimatum and trust games** delve into concepts like **aversion to inequality, reciprocity, and the impact of social image concerns on decision-making.** Learning models often revolve around the numerical adjustment of an unobservable inclination to select a strategy, with fictitious play being a special case of updating beliefs. In contrast, models addressing limitations in **strategic thinking** presume that players operate in equilibrium but may make errors or employ a cognitive hierarchy involving progressively more sophisticated reasoning. **Analytical game theory** assumes that players **select strategies** to **maximize their utility** based on their beliefs about others' actions within the game's economic structure and history. In equilibrium, these beliefs are assumed to be accurate. However, **analytical game theory** has two key limitations as a comprehensive model of **human behaviour**, as well as behaviour in other entities like non-human animals and organizations. First, in complex real-world games, instant equilibration of beliefs is unlikely. Therefore, models that predict initial choices and the gradual convergence of beliefs through experience are valuable. Second, in empirical research, only actual or expected payoffs are easily measurable (e.g., auction prices and valuation in experiments). As games are played based on utilities derived from these received payoffs, it is essential to develop a theory of social preferences, explaining how measured payoffs influence players' utility assessments, to make accurate predictions (Camerer, 2008).

Game theory serves as a **mathematical framework for analyzing situations involving conflict, cooperation, and coordination**. In traditional models with **rational players**, it assumes highly rational individuals who possess a complete understanding of the **strategic context** and consistently **maximize their preferences** based on their **well-informed beliefs** about their opponents' behaviour. On the opposite end of the spectrum, evolutionary models represent players with **no cognitive abilities**, functioning as "programmed strategies" subject to survival or extinction in an evolutionary context. In contrast, **behavioural game theory (BGT)** takes a middle-ground approach, focusing on **how real human beings**, as opposed to perfectly rational agents or programmed strategies, **behave in strategic situations**. BGT bridges the gap between these extremes while building upon the foundation laid by formal game theory, without which BGT would not exist. BGT addresses several key research questions, including assessing the extent to which standard game theory approximates **the behaviour of actual individuals**, identifying reasons for any observed deviations from standard theory predictions, exploring players' preferences and their strategic reasoning processes, and understanding how people learn in game settings. Ultimately, BGT aims to develop theories based on plausible psychological foundations. It shares this objective with the field of behavioural finance. Therefore, BGT is not about disproving game theory but rather enhancing its utility as a tool for analyzing strategic situations. The primary research method in BGT involves integrating insights from psychology and conducting controlled laboratory experiments (Gächter, 2004),

6.2. Altruism, Cooperation, Fairness and Reciprocity

Numerous studies have attempted to explore various aspects of **altruistic, fair, and cooperative behaviour** in humans from a wide array of perspectives, including biology, philosophy, economics, sociology, and other fields. Within human society, acts of altruism, such as charitable giving, appear to be widespread (as noted by Gintis et al. (2003) and Ariely et al. (2009)). Cooperation between both related and unrelated individuals is a common event and essentially supports the foundations of our society. Moreover, considerations of **fairness** often lead to revisions in economic or social outcomes, as highlighted by Blount in 1995. Fehr and Fischbacher (2003) assumed that both direct and indirect **reciprocity** play pivotal roles in **human cooperation**, setting humans apart from animals, although labeling humans as "the most cooperative species" remains a nuanced assertion.

Additionally, the concept of costly signalling or image preservation may significantly influence altruistic behaviour, as suggested by Ariely et al. (2009).

In various experimental settings, such as the **Ultimatum Game, Dictator Game, Trust Game, Public Goods Game and Prisoner's Dilemma**, a significant portion of individuals deviates from purely rational, utility-maximizing behaviour. Instead, they show concerns for non-monetary outcomes, as observed in studies by Camerer (2003).

Numerous efforts have been undertaken to explain the behaviour observed in these games. Notable among these efforts are Rabin's (1993) concept rooted in intention-based fairness, Fehr and Schmidt's (1999) theory encompassing fairness as well as Bolton and Ockenfels's (2000) theory cantered around equity, reciprocity, and competition.

In 1993, Rabin brought **the concept of fairness** and the significance of intentions into the framework of game theory. His model posits that **agents are sensitive** to considerations of **fairness** and outlines **fairness equilibria** in which **fairness criteria** are met. These equilibria may intersect with **Nash equilibria**[3] or include them, but they can also yield entirely distinct results dependent upon the specific payoff matrix and the stakes involved. Rabin's model incorporates the notion that the magnitude of stakes plays a role, with behaviour converging more closely to the conventional "Homo economicus" as stakes increase.

In 1999, a model was formulated by Fehr and Schmidt in which **fairness** is characterized as a type of **self-centered aversion to inequity.** Their model anticipates **distinct behavioural outcomes** for identical preference sets, dependent on the economic context, such as whether it involves two players or multiple players, and the presence of competitive dynamics among the participants.

According to Bolton and Ockenfels (2000) the players aim to **find an equilibrium between their aversion to inequity and their material payoffs**. **Fairness is defined as the portion of the total payoff attributed to each individual.**

Defined in 2005 by Fehr and Fischbacher, **social preferences** encompass individuals' inclinations toward others. This implies that individuals exhibiting these preferences consider the impacts, whether positive or negative, on others. They emphasize that **social preferences** involve not only utility but also the significant **role of people's beliefs and emotions**. The ways of assessing (positively or negatively) **social preferences** affect how people perceive the beliefs and intentions of others. The concept of **fairness** is crucial in the context of social preferences. Perceptions of fairness determine **how the costs and benefits of individual behaviour should be distributed**. The concept of **reciprocity** is closely related to the concept of justice. **Reciprocity** is often defined as the desire to treat others as they treat us. In other words, if someone treats us kindly, our behaviour toward them will also be positive, and if they behave negatively towards us, our response will be similar. Fehr and Fischbacher (2005) distinguish between reciprocity and what they call **strong reciprocity**. Strong reciprocity comes into play when, in addition to individuals engaging in conditional cooperation (cooperating only when they know others are doing the same**), individuals who experience strong reciprocity tend to punish those who do not cooperate and do not demonstrate pro-social behaviour**.

6.2.1. The Ultimatum Game

The Ultimatum Game is played by two players, each occupying different roles. The first player is referred to as the **proposer**, and the second player as the **responder**. The proposer decides **how to divide a predetermined amount between the two**, while the responder must decide **whether to accept the offer or not.** If the responder rejects the offer, neither player receives anything. According to the standard model, **the responder should always accept the offer since refusing would result in a worse outcome.** Therefore, they face the dilemma of potentially worsening the proposer's situation.

[3] In game theory, Nash equilibrium refers to a scenario in which the optimal outcome occurs when there is no incentive for players to deviate from their initial strategies. Even with knowledge of their opponent's strategy, players choose not to deviate from their initial chosen strategies, as those strategies continue to be optimal for each player.

In line with classical game theory, proposer is expected to propose the **smallest positive share**, given that responder would **accept any non-zero offer** and remain indifferent about zero. However, empirical experiments have revealed that individuals do not adhere to this rational profit-maximizing behaviour. Offers that are perceived as "too low," "unfair," and occasionally even "too generous" are frequently declined. In most experiments, the most common offer is precisely half of the total amount at stake, while the average offer typically falls in the range of 30-40%. Offers below approximately 20% are frequently rejected (Camerer 2003).

One of the original studies (Güth, Schmittberger, and Schwarze, 1982) showed that **proposers often offered up to 50 percent of the resources**, but **responders frequently rejected these offers**. Additional empirical experiments confirmed this result, which contradicts the standard model. For instance, in a study involving university students, the amount to be divided was $100, and some subjects rejected offers of $30 (Hoffman, McCabe, and Smith, 1996).

A commonly used modification of this game involves setting a **minimum acceptable offer** for the responder. **The Ultimatum Game** has also been used to study the learning effect, where it was found that in some studies, both **the value of offers and the number of rejections decreased over time** (Knez and Camerer, 1995; List and Cherry, 2000). This effect also manifested in games where a minimum acceptable offer was set. Harrison and McCabe (1996) found that **the minimum acceptable offer**, as well as the value of offers, **decreased on average by 15% over the course of fifteen rounds of the experiment.**

One of the factors explaining why responders reject offers is **negative reciprocity.** This is particularly evident in one-shot games where a significant portion of subjects (40-60 percent) displayed **negative reciprocity by rejecting offers** (deeming the contribution too small, rejecting the offer to ensure the proposer received nothing). Carpenter et al. (2005) found that proportionally increasing the initial sum to be divided led to a much less proportional decrease in the size of offers to proposers. For instance, raising the initial sum from $10 to $100 resulted in the average offer decreasing from 33 percent to 25 percent. Andersen (2011) found that while the mean offer value remained relatively constant when changing the initial value, at around 20 percent for the responder, as the initial sum increased, the rejection rate decreased.

6.2.2. The Dictator Game

Compared to the **Ultimatum Game,** the **Dictator Game** is simpler in that the recipient has no choice in **deciding whether to accept an offer**. In this game, **the person allocating financial resources is commonly referred to as the dictator, while the second subject is the recipient, playing a passive role by automatically receiving the amount allocated by the dictator.** The standard theory assumes that **dictators keep all the allocated resources for themselves** and do not give anything to the recipient. However, experiments show that **even though dictators keep more resources for themselves compared to proposers in the Ultimatum Game, a significant portion of dictators choose to allocate a certain sum to the recipient.** Forsythe et al. (1994) compared the outcomes of the Ultimatum Game and the Dictator Game and found that, on average, **dictators allocated about 20 percent fewer resources to recipients in the Dictator Game.** Several experiments confirm that **communication between dictators and recipients had an impact on increasing contributions to the recipient.** Bohnet and Frey (1999a) found that average allocations increased by half, with up to 40 percent of dictators giving recipients more than half of the resources.

There are also experimental studies in which one dictator had two recipients but could only communicate with one of them. Dictators allocated more resources to the recipient with whom they could communicate, and these contributions were often up to twice as high as those for the other recipient (Frey, Bohnet, 1999b).

In an interesting experiment by Dana et al. (2006), all dictators were given $10. In the first experiment, after deciding **whether and how much to transfer** to the recipient but before the recipient learned about the dictator's decision, dictators were given **the option to exit the game** and receive $9. The recipient remained unaware of this offer, and the game ended with the recipient receiving only information about the dictator's departure from the game. Despite the fact that dictators could potentially gain more in the game (by giving nothing to the recipient), a **significant portion of dictators**

(28%) chose to end the game with $9. In the second experiment, the recipient did not know whether the allocated amount came from the dictator or the experimenter in case the dictator decided to exit the game. The recipient was aware of this possibility but did not know whether it had been utilized, and only received information about the allocated amount. In this case, only one dictator out of a total of 24 chose to end the game.

Bardsley (2005) conducted a **Dictator Game** with an expanded range of options. In this study, **both players initially received an endowment,** and Player 1 had the choice to not only give to Player 2 but also to take from her. He introduced several treatments that involved taking. In the first treatment, Player 1 could give up to 4 dollars from a total of 6 (with the amount given doubled by the experimenter) and take up to 2 dollars (with the dollar taken by Player 1 costing Player 2 twice as much). In other treatments, both players received a 4-dollar show-up fee, with Player 1 receiving an additional 7 dollars. In these treatments, Player 1 could give up to 7 dollars or take up to 2 dollars from the other player, with no multiplication. In the third treatment involving taking, Player 1 received a 10-dollar endowment, while Player 2 received half of this amount. Player 1 was allowed to choose no action or take up to 3 dollars from Player 2. In the first treatment, only 1 out of 29 subjects gave money (3 dollars out of 6). Almost half of the subjects **chose to take the maximum** of 2 dollars, while the rest mostly split between choosing no action or taking 1 dollar. In the second treatment, nearly half of the subjects gave money to Player 2 (ranging from 1 to the full 7 dollars). However, more than a third of the sample chose to take the maximum of 2 dollars, and about 5% took one dollar, while roughly 13% neither gave nor took anything. Finally, in the third treatment, 17% of the participants chose not to take anything, while the rest used the opportunity to take something from the other player (with most choosing the maximum of 3 dollars). These experiments demonstrated that **even when given the choice between giving and taking, many people opted to take from another**. Bardsley's (2005) results indicate that individual's decisions can be influenced by the equality or inequality of the initial endowment and the transfer rates.

In a **Dictator Game**, List (2007) presented players with a similar choice. At the start, both players received 5 dollars, with Player 1 additionally receiving an allocation of an extra 5 dollars. Two treatments involving taking were employed: in one, Player 1 could give up to 5 dollars or take up to 1 dollar; in the other, the set of choices was symmetrical, allowing taking up to 5 dollars from Player 2. In the first treatment, 35% of players gave a **positive amount to their co-player**. The median offer was zero, and the mean was 33 cents. The largest portion of subjects **neither gave nor took anything**. However, in the second treatment, the results differed dramatically. Only 10% of players gave positive allocations. The median was -4.50 dollars, and the mean was -2.48 dollars. The majority of players chose to take the maximum of 5 dollars. List (2007) argues about the **influence of the range of options available to the players on their perception of what's "morally wrong" and what is "acceptable."** However, extending the set of options in **Dictator Game** can also complicate the interpretation of the results.

6.2.3. The Trust Game

In the **Trust Game**, there are two players. The first player, referred to as the **proposer,** receives a sum of money from the experimenter and decides whether to keep it all or allocate a certain amount to the second player, known as the **responder.** If the proposer chooses to allocate a specific amount to the responder, the experimenter increases this amount (it could be doubled or tripled). The responder then decides **how much of this increased amount to return to the proposer**. Depending on the amount the responder decides to return, the proposer receives a portion, or the entirety of the sum initially given to the responder.

Camerer and Weigelt (1988) formulated the **trust game as a static game** involving two subjects: the proposer and the responder. Each of them receives an initial endowment of resources at the beginning of the game, for example, 10 experimental tokens. The first player, the proposer, decides whether to send a portion of this endowment, denoted as $i \in \{1,2,3,...,10\}$ to the second player, the responder, through the experimenter. The experimenter multiplies this amount by a factor greater than $1 (m > 1)$. The responder then decides how much to send back to the proposer, denoted as $r \in$

{0,1,2, . . . , m_i}. The utility of the proposer and the responder at the end of the game is determined by *10-i+r* and 10+m_i-r, respectively the values of *i* and *r* represent trust and reputation levels.

In 2011, Eckel and Petrie conducted an experiment within the framework of the **trust game**. In this setup, both the **proposer and responder had the option to view photographs** of each other for a predetermined fee. The authors based their study on previous research, which had shown a **correlation between economic decisions and individual characteristics** such as perceived attractiveness, ethnicity, or gender. Not all subjects chose to "purchase" their opponent's photograph. In different rounds of the game, the experimenters varied the price for the photographs. They found a decreasing demand function, with over 50 percent of subjects willing to buy their opponent's photograph at the lowest price. **As the price increased, the interest in purchasing the photographs decreased.** There were no statistically significant differences in willingness to pay for photographs between proposers and responders. However, differences were observed among ethnic groups. White proposers were up to 40 percent more willing to pay for the photograph than members of other ethnic groups. It was also found that black responders received, on average, 2.5 units less from proposers than white responders.

Examining the **trust game,** Bolton et al. (2004) focused their study within the realm of **feedback on online shopping** platforms such as Amazon or eBay. In the experiment, buyers first decided whether to make a purchase or not. If they chose to buy, they had to **send money in advance, and the seller then decided whether to send the item or not**. The **seller's behaviour** could be influenced by moral hazard, as they could keep the money and not send the item. The study considered three types of markets. In the "stranger market," sellers and buyers only interacted once and had no access to past transactions. In the "feedback market," participants could see previous decisions, but sellers and buyers were randomly paired in each transaction. In the "partner market," there was feedback and a history of transactions, but the same buyers and sellers interacted repeatedly. The study explored efficiency, i.e., the percentage of completed transactions. Trust was measured by the number of orders placed by the buyers, and trustworthiness was measured by the percentage of orders successfully fulfilled by the sellers. The partner market had the best performance in all indicators, followed by the feedback market, while the stranger market had the worst results. The differences are attributed to distinct incentives for building reputation on each of these markets and variations in the quality and interpretation of feedback.

6.2.4. The Prisoner’s dilemma

The Prisoner's dilemma is one of the most well-known games in economics. In its basic form, it explores the **behaviour of two prisoners** who are separated and are suspected of committing a crime. They cannot communicate or make agreements with each other. If neither confesses, they can only be convicted of a lesser offense. If one confesses but the other does not, the one who confesses will be acquitted, and the other will receive a long sentence. If both confess, each of them will receive a five-year sentence. The situation is described in Table 6.1.

Table 6.1 The prisoner's dilemma with dominant strategy

		Player 2	
		Confess	Not confess
Player 1	Confess	5,5	0,10
	Not confess	10,0	1,1

Source: Author’s own

The numbers in the table represent payoffs for each player in terms of the number of years in prison. On the left side, you have the values for Player 2, and on the right side, you have the values for player 1. The goal of both prisoners is to minimize the number of years in prison. The best possible solution for both is for neither of them to **confess, i.e., to behave cooperatively**. In that case, each of them would spend only one year in prison. However, since they cannot reach an agreement, the result is that **both confess, and they each receive a 5-year in prison**. Consider Player's 1 choice between confessing and not confessing, given Player’s 2 choice of either 'confess' or 'not confess'. If P2

confesses, P1 is better off confessing, as P1 will serve only five years instead of a ten-year sentence. If P2 does not confess, P1 is still better off confessing, as P1 will go free instead of serving one year. Therefore, regardless of P2's choice, it is always in P1's best interest to confess. In other words, confessing is a **dominant strategy**[4] for P1. Conversely, 'not confess' is a **dominated strategy**, as it is dominated by 'confess'. Since the game is symmetrical, the same logic applies to P2. Thus, we can conclude that **if P1 and P2 are fully rational, they will both confess.**

Table 6.2 The prisoner's dilemma without dominant strategy

		Player 2	
		Confess	Not confess
Player 1	Confess	5,5	2,10
	Not confess	10,2	1,1

Source: Author's own

The situation becomes more intricate when neither player possesses a **dominant strategy**. In this scenario, we are no longer dealing with a Prisoner's Dilemma, as the payoff structure has evolved, as illustrated in Table 6.2. The table is symmetrical once more, but both players receive a two-year sentence if they confess when the other suspect does not confess.

It's no longer feasible to pinpoint a **dominant strategy** for either player in this game. However, an examination of best-response behaviour still allows us to identify pairs of strategies between the two players that, when combined, represent a rational choice of strategy. To illustrate this, let's imagine that we could identify a **strategy pair** for each player that corresponds to the best response to the other player's best response. In essence, this concept is known as a Nash equilibrium. There are two such equilibria in Table 6.2:

1. If P2 confesses, P1's best choice is to confess, and given this best response, P2's best move is also to confess.
2. If P2 does not confess, P1's optimal decision is not to confess, and given this best response, P2's best move is also not to confess.

These same equilibria can be expressed from the perspective of determining P2's strategy:

1. If P1 confesses, P2's best option is to confess, and given this best response, P1's best move is also to confess.
2. If P1 does not confess, P2's best option is not to confess, and given this best response, P1's best move is also not to confess.

Both P1 and P2 clearly have a **preference for the second equilibrium**. However, there's no further analysis that can help us distinguish between the two equilibria in a way that would allow us to determine which one the players would opt for. This presents a challenge for strategy selection, especially in the context of repeated games. **The concept of Nash equilibrium holds significant importance in game theory, as many games lack dominant strategies and are not amenable to solution through iterated dominance either.**

Initial studies showed an average **cooperation rate in the Prisoner's Dilemma game** to be around 50 percent (e.g., Rapoport, 1988). Zhong et al. (2007) demonstrated that the cooperation rate increases when the game is labeled as a "cooperative game" compared to being labeled as the "Prisoner's Dilemma." Khadjavi and Lange (2013) compared the results of the game when the subjects were actual prisoners with a game in which students were the subjects. It turned out that real prisoners cooperated much more than students, with the cooperation rate among students at 37 percent, while prisoners reached up to 56 percent.

Darai and Grätz (2010) examine **cooperative behaviour** in a high-stakes prisoner's dilemma game with face-to-face communication and two rounds of pre-play, where the final contestants are chosen via a voting process. Using data from the British TV show 'Golden Balls,' they observe a 55%

[4] A dominant strategy is one that is a best response to all possible strategies.

rate of unilateral cooperation and a 33% rate of mutual cooperation. Specifically, they find a **negative correlation between stake size and cooperation.** Certain gestures, like handshakes, reduce the likelihood of cooperation. However, when players mutually promise and shake hands to **cooperate**, **the cooperation rate** increases. Expectations about the stake size also impact cooperation. Player behaviour during pre-play and the outcome of the **prisoner's dilemma** are linked. Players contributing more to the stake size tend to cooperate less, despite their contributions being determined by a random process. Additionally, factors such as **lying in pre-play and experiencing the opponent's goodwill influence cooperation**. Concerning partner selection, contestants base their voting decisions on objective criteria (opponent's monetary contribution) and subjective personal characteristics (trustworthiness).

6.2.5. The Public Goods Game

The public goods game is a simple investment game in which participants are typically randomly assigned to **small groups**. At the beginning of the game, they are allocated a certain number of experimental monetary units. Participants must decide **how to allocate their resources between two types of accounts: a private account and a group account.** In the group account, all members of the group participate, while the private account is for individual use only. The returns on each account are calculated differently. The return from the group account is equal to the deposit made (without multiplication), and the return from the private account is calculated as the sum of contributions made by group members, multiplied, and then evenly distributed among the members, regardless of who and how much contributed. Thus, the group account represents a public good with the characteristics of non-excludability and non-rivalry in consumption.

The public goods game is associated with the problem of the **"free rider,"** which has long been considered a reason **why public goods cannot be provided by the private sector**. A free rider is a person **who does not pay for the use of a public good**. Experiments conducted demonstrated that **while the problem of free riding cannot be completely eliminated, it can be significantly reduced, as there are individuals who do not become free riders even when the conditions are favourable for it.**

One of the first experiments utilizing the public goods game was conducted by Gerald Marwell and Ruth Ames (1979). Their primary objective was to **experimentally test whether individuals are willing to voluntarily participate in funding public goods** and how the size of the group, the proportion of free riders, and specific provisions of the good affect their contributions. They hypothesized that larger groups should provide fewer **public goods** than smaller groups, and that larger groups would have a higher proportion of free riders compared to smaller groups. The most important finding of their study was that **the number of free riders was lower than expected.** In small groups (four participants per group), they found that approximately 57 percent of the resources were allocated to the group account. This finding was revolutionary, as according to the standard theory of public goods, no money should be allocated to a public account because rational decision-making would lead people to become free riders. In this experiment, two-thirds of the subjects contributed more than half of their resources to the group account.

Built upon the hypothesis that disrupting **communication** between individuals with decision-making authority in the context of **voluntary contributions** would lead to a reduction in the number of **free riders** and an increase in contributions to the group account, the research by Issac and Walker (1988) aimed to explore these dynamics. As evident from this hypothesis, during the experiment**, participants were allowed to have informal discussions between rounds**. Strict rules applied to these discussions, and participants could not talk about the amounts of their contributions or whether they were contributing to the group account. All aspects of the experiment were considered confidential information, and the authors monitored compliance with the discussion rules. The results showed that **communication had an impact on reducing the number of free riders**, leading to higher contributions to the group accounts.

Issac, Walker, and Thomas (1984) concluded that in the case of voluntary contributions in both small and large groups, a higher marginal per capita return from the group account leads to a **lower number of free riders** and, thus, greater efficiency in the provision of public goods.

Andreoni (1988) noted that although the number of free riders varies between experiments, three common observations frequently recur. First, there is **no significant occurrence of free riders in**

one-shot games. Second, when subjects play a **repeated game**, **the number of free riders increases** in each iteration. This phenomenon can be observed when subjects know the length of the game (see for example: Isaac, Walker, and Thomas, 1984, Isaac and Walker, 1988), as well as when they do not (see for example Isaac, McCue and Plott, 1985, Kim and Walker, 1984). Third, the number of free riders often increases over multiple rounds, but the **"pure rate of free riders,"** where nobody contributes to the public good, is rarely observed. **Repetition** has an impact on those subjects who are close to becoming free riders. In public goods games, it has also been shown that those who cooperate are strongly motivated to punish those who do not, even when the costs of **punishment** are high and do not yield them any material benefits (Fehr and Gächter, 2000). In the following table we provide an overview of the games we described in the previous text, together with their brief description and the difference between the assumptions in the standard model and the behavioural findings.

Table 6.3 Overview of basic game models that study strategic interactions

Game	Description	Standard Model Assumptions	Behavioural Findings
Prisoner's Dilemma	Two players must decide to cooperate or defect, leading to different payoffs.	Rationality, self-interest, common knowledge of rationality	Tendency toward mutual defection despite mutual cooperation being optimal.
Public Goods Game	Individuals decide how much money to contribute to a public good (grope account). The total is multiplied and evenly shared among participants. Balances self-interest with cooperation.	Rationality, self-interest, common knowledge, free rider problem	Contrary to complete free riding predicted by the standard model, participants often contribute. Cooperation tends to decline over rounds, indicating the challenge of sustaining collective benefits. Varied strategies emerge, including conditional cooperation and punishment of free riders, challenging simplistic predictions.
Dictator Game	One player (the dictator) decides how to split a sum of money with another player, who has no say in the decision.	Self-interest, rationality	Dictators often exhibit prosocial behaviour by sharing some amount.
Trust Game	A trustor decides how much money to send to a trustee, who then decides how much to return (trust and reciprocity).	Rationality, self-interest, common knowledge of rationality	Trustors often send money, and trustees reciprocate by returning some amount.
Ultimatum Game	A proposer suggests a way to split a sum of money, and a responder can either accept or reject the offer. If rejected, neither player receives anything.	Rationality, self-interest	Proposers often offer a substantial share, and responders frequently reject “unfair” offers.

Source: Authors

6.3. Case Studies: Applying Behavioural Game Theory in Real-World Contexts

Behavioural game theory finds a wide array of practical applications in the field of **economics.** It offers valuable insights into various real-world scenarios, shedding light on **how individuals and organizations make strategic decisions, often deviating from purely rational choices.** For example, in the airline industry, airlines frequently engage in **price wars**. Behavioural game theory can be employed to analyze how these players adjust their **pricing strategies** in response to competitors' fare changes, considering factors like customer loyalty and the **psychology of pricing**. Hu and Tang (2014) employs **game theory and information economics analysis** to examine the **competition patterns within the industry** and explore the potential for coordinated pricing behaviour in the area of E-

commerce. The analysis highlights **the importance of technology and product innovation** for home appliance companies seeking to escape the pitfalls of price wars and enhance overall industry competitiveness. Additionally, it emphasizes the need for E-commerce platforms to adopt rational marketing strategies, avoiding the detrimental effects of excessive price wars on the market environment and consumer confidence. Ginevičius and Krivka (2008) assert **the importance of applying game theory to duopoly models**, providing these key reasons. Firstly, it highlights the significance of **strategic interactions among duopoly firms**, illuminating their complex engagement. Secondly, it offers mathematical support for their **distinctive behaviours,** encompassing competition, cartel formation, first-mover advantages, and product differentiation. Lastly, it establishes a clear link between chosen strategies and performance, facilitating comparisons among firms and enhancing our understanding of duopoly markets and corporate strategies.

When companies **enter new markets**, **they must anticipate the reactions of existing competitors**. Behavioural game theory is **invaluable in predicting how incumbents might respond to new entrants and how firms can strategically position themselves to maximize market share**. Zhang and Sun (2019) analyzed four distinct evolutionary equilibrium states concerning the decision-making behaviour related to innovation by high-tech firms. These overarching evolutionary patterns remain consistent, irrespective of the timing of market entry or the level of competition. Furthermore, the study incorporates simulated evidence, emphasizing that **the timing of market entry significantly influences market-leading innovative strategies and dynamic competitive outcomes**, while competition intensity is intricately linked to the pace of evolution in innovation behaviour-based decisions.

In the realm of **advertising and branding**, firms use advertising to **influence consumer behaviour**. Behavioural game theory helps firms determine the optimal advertising budget and content, taking into account how competitors' advertising affects consumer choices.
Liu (2023) provides insights into the **intricate dynamics of strategic interactions between advertisers and users**. To begin, advertisers engage in **strategic competition** involving targeting, segmentation, bidding, pricing, monitoring, and adaptation. Secondly, user behaviour and advertising policies are influenced by factors such as user **preferences, engagement levels, peer recommendations, platform algorithms, privacy concerns, and transparency**. Thirdly, the analysis within **a game theory** framework reveals that in the social media advertising market, equilibrium outcomes and potential market structures are shaped by factors like the oligopoly market structure, targeting, personalization, ad-auctions, and pricing dynamics. An important takeaway from this research is the recognition that successful market participants must possess the ability to predict the equilibrium, disrupt it, and establish a self-advantageous balance.

According to Dominici (2011) **game theory offers potential applications in marketing management decisions, but its effectiveness is constrained by its suitability for specific scenarios**. Game theory can prove useful in marketing decisions when dealing with a limited number of players. The predominant constraint of game theory in marketing is its inherent bias toward rationality. Marketing theory revolves around the premise that intangible and irrational factors hold greater sway in consumer choices. In marketing, consumers don't base their decisions solely on tangible costs and benefits; instead, they make choices influenced by the emotional and symbolic value associated with the products.

Labor negotiations often involve **strategies that go beyond purely rational decision-making. Behavioural game theory** helps to understand how **emotions and social dynamics** influence the negotiation process. Kibris (2010) analyzed **barging theory in the context of behavioural economics**. He argues that bargaining theory holds relevance and can be applied to numerous real-life scenarios, encompassing a broad range of situations. These include, but are not limited to, **international treaty negotiations, corporate agreements, labor conflicts, pre-trial discussions in legal cases, committee decision-making, and even the commonplace negotiations** involved in purchasing a car or a house. Each of these applications introduces fresh perspectives on the qualities of an optimal solution, consequently inspiring the formulation of new principles.

Pinto et al. (2015) presents a **decision support methodology** for electricity market participants in bilateral contract negotiations. It enables them to optimize power quantity negotiations by

employing game theory and reinforcement learning. These methods use a utility function considering economic gain and competitor reputation. Alternative scenarios, based on expected price forecasts and historical contract data, are also considered to enhance decision-making.

Concluding that the application of **game theory** and a systematic trial-and-error approach to employer-employee bargaining holds various practical implications, Mammadova (2023) emphasizes the potential **significance of these methodologies**. Firstly, by **utilizing game theory**, employers and employees can enhance the effectiveness of their negotiations through a deeper understanding of each other's preferences and potential outcomes. Secondly, **game theory** enables both parties to strategize and find ways to balance their bargaining power, resulting in more equitable agreements. Thirdly, employing the trial-and-error method allows the parties to continuously refine their negotiation strategies and adapt to changing circumstances. Fourthly**, game theory** facilitates the sharing of relevant information, leading to improved decision-making. Fifthly, the utilization of game theory fosters enhanced **communication, collaboration, and the maximization of joint gains for both employers and employees.**

Since Akerlof's influential work in 1982, behavioural economists have often framed these **relationships within the context of gift exchange**. **The concept of a trust** contract involves an employer (the principal) offering a generous wage with the expectation that the employee (the agent) will respond by exerting substantial effort. On the other hand, a bonus contract entails the principal potentially rewarding the agent for their diligent effort with a discretionary bonus payment after the fact. Both types of contracts entail one party placing **trust** in the other, with the potential for exploitation, while emphasizing **fairness and reciprocity.** However, despite this inherent symmetry, empirical evidence reveals a notable asymmetry. Research by Fehr, Klein, and Schmidt in 2007 indicates that trust contracts perform poorly and are not profitable, whereas bonus contracts perform exceptionally well and yield high profits. This observed asymmetry is attributed to the differing risks associated with each contract type. The employer faces a higher cost if employees fail to reciprocate by investing minimal effort, compared to the lower cost incurred by the employee when putting forth a significant effort while the employer fails to provide a bonus as a reward. As a result, contracts are more effective when the risk of trusting primarily rests with the party for whom the cost of trust is lower.

Financial markets are another area where behavioural game theory plays a crucial role. Traders may make decisions based on herd behaviour or emotional responses, impacting market volatility and asset prices.

Carfi and Musolino (2011) proposed a **methodology for stabilizing financial markets using Game Theory, specifically the Complete Study of a Differentiable Game**. They focused on an interaction between two key economic players: a real economic entity (referred to as the "Enterprise") and a financially well-endowed institution (such as a bank). The desirable outcome, the only one where both players gain, is an agreement between them. In this scenario, the Enterprise deliberately creates a discrepancy between spot and future markets, while the Financial Institute, unable to arbitrage independently due to a regulatory transaction tax (introduced to stabilize the financial market and curb speculations), seizes the opportunity to maximize the collective (social) sum.

Constructing a model that scrutinizes an entrepreneur's decision between Venture Capital (VC) and Angel Financing, Fairchild (2011) delves into **the dynamics of this strategic choice**. Unlike prior game-theoretic investigations that primarily concentrate on economic attributes, this study introduces a significant dimension by acknowledging that entrepreneurs might consider both economic and behavioural aspects while selecting their financier. In particular, author explore a scenario where VCs offer superior value-adding capabilities compared to angels. However, entrepreneurs and angels share a close, empathetic, and trust-based relationship, resulting in the generation of relational rents.
In a scenario where angels and venture capitalists might be in competition to provide funding to entrepreneurs, it becomes crucial for both types of investors to invest in enhancing their value-adding capabilities, as well as nurturing relational aspects like trust and empathy towards entrepreneurs.

Environmental policies and regulations, aimed at encouraging firms to adopt eco-friendly practices, can benefit from the insights of behavioural game theory. Environmental policies and regulations, aimed at encouraging firms to adopt eco-friendly practices, can benefit from the insights

of behavioural game theory. Understanding how firms react to these regulations is vital for effective policy design.

Gu, Hang and Sun (2022) examined the influence of **external control on the strategies of environmental pollutant-generating enterprises and government regulators within the context of environmental protection**. **An evolutionary game model** was constructed to represent this dynamic. The study evaluates strategies and the system's evolutionary stability under various degrees of third-party regulation through simulation analysis. The findings indicate that **weak third-party supervision is insufficient to stimulate changes in the government and enterprise strategies**. A moderate increase in third-party oversight can induce short-term strategic alterations, but the system fails to achieve a stable equilibrium due to the interplay between both sides.

Governments worldwide are grappling with environmental pollution, resource depletion, and energy scarcity. To address these concerns, they employ carbon taxes to discourage non-eco-friendly manufacturing and subsidies to promote low-carbon production. Chen and Hua-Hu (2018) apply **evolutionary game theory** to investigate manufacturers' responses to varying combinations of carbon taxes and subsidies for products lacking distinct low-carbon attributes. Initially, they create a model encompassing static carbon taxes and subsidies, analyzing the evolutionary stable strategies of governments and manufacturers under different constraints. They subsequently explore three additional models involving dynamic tax and subsidy schemes, both static and dynamic. Simulation results reveal that static mechanisms lack the desired impact on manufacturers' decision-making. Among dynamic approaches, the bilateral dynamic tax and subsidy method proves more effective in incentivizing low-carbon manufacturing. Government-imposed carbon taxes exhibit greater effectiveness than technology subsidies, highlighting the influence of governmental policies on manufacturers' strategies and the need for adaptable governmental strategies.

Behavioural game theory finds practical applications in various domains **within political science. Behavioural game theory models** and analyzes the **strategic interactions** between countries in international scenarios. It helps **understand how countries make decisions in situations like arms races, trade negotiations, and conflict resolution, shedding light on issues such as nuclear disarmament and climate change agreements.** Neck (2003) demonstrates the applicability of dynamic **game theory** to economic policy challenges involving diverse policymakers, focusing on the European Economic and Monetary Union (EMU). The study delves into **strategic interactions** among EMU member country governments responsible for national fiscal policies, the European Central Bank overseeing European monetary policy, and policymakers from other regions. It utilizes **dynamic game theory** concepts within a comprehensive macroeconometric global model. The investigation assesses the relative effectiveness of discretionary versus rule-based policies and the impact of non-cooperative versus cooperative approaches for Europe. The study's objective is to evaluate performance based on **intertemporal objective functions.** The findings reveal that the effectiveness of these policies is contingent on the nature of the economic shocks affecting European and other economies.

Another area for application **behavioural game theory** into practice could be analysis **of voting behaviour.** This approach is used to study **voting behaviour in political elections**. Researchers investigate how voters **strategically decide** whether to vote, who to vote for, and the circumstances under which they engage in strategic voting, coalition building, or protest voting. In committees or elections, individuals can enhance their voting influence by creating coalitions. This **behaviour** leads to a scenario resembling a **prisoner's dilemma**, where a subset of voters can increase their power at the expense of the overall electorate's average voting influence. It's a unique prisoner's dilemma where cooperation is the self-serving action that adversely affects the larger group. Using a straightforward model, Gelman (2003) find that the optimal coalition size, from an individual's perspective, is approximately 1.4 times the square root of the total number of voters. When voter preferences vary, coalitions form primarily when voters exhibit political balance.

Evrenk and Yuan Sher (2015) present a methodology aimed at **mitigating the issue of overestimating strategic voting by distinguishing between two distinct voting behaviours:** strategic voting and the 'bandwagon effect.' In their approach, they acknowledge that a vote is considered strategic when the voter believes it can influence the election outcome with a non-zero probability.

On the other hand, the **bandwagon effect**[5] occurs when individuals vote for the expected winner, irrespective of their preferred choice, to conform to the majority or support the winning side. By utilizing survey data that include respondents' assessments of the importance of their votes, authors apply this methodology to estimate the prevalence of strategic voting in the 2005 UK general election. Their findings indicate that **the estimated extent of strategic voting (4.22%) is lower than self-reported strategic voting (6.94%).** While the discrepancy does not statistically link to the bandwagon effect, it suggests that other motivations, not addressed in the existing literature, may be contributing to the observed behaviour.

There are numerous **behavioural studies** that investigate the effects of **altruism and reciprocity on human decision-making**, with applications to real-life situations. A study conducted by Titmuss in 1971 examined the **relative significance of moral and economic incentives** in the context of blood donation. The majority of blood donors are motivated by **altruistic reasons** and do not receive financial compensation. Interestingly, when a nominal fee was introduced, people tended to donate less blood compared to when no fee was offered. This led to the hypothesis that the introduction of a fee diminished the perceived value of the act of blood donation, reducing people's willingness to participate. However, when considering organ donation, as explored by Deck and Kimbrough in 2013, the results present a different perspective. Their research suggests that in the case of deceased organ donation, individuals do respond positively to market incentives, resulting in an increased supply of organs. Notably, they also find that market-oriented policies disproportionately affect individuals with lower economic means, raising ethical concerns, especially when extending this issue to live organ donation, such as kidney transplants.

Rettie, Burchell, and Barnham in 2014 recommend repositioning these initiatives to make them seem like 'normal' practices rather than targeting them at individuals who are already environmentally conscious. Thus, advertisements highlighting that a significant majority of people recycle waste products or use energy-efficient household appliances may contribute to establishing such norms.

6.4. Applications: Endowment Effect and Behavioural Finance

6.4.1. Endowment Effect

The concept of the **"endowment effect"** was introduced by Richard Thaler in 1980. He identified this **cognitive bias** as a way to explain the phenomenon of loss aversion, a theory previously outlined by Kahneman and Tversky in 1979. More precisely, Thaler employed the endowment effect to clarify why individuals tend to place a higher value on items they own when compared to the perceived value of acquiring or parting with those items, whether financially or emotionally.

Contrary to the **Neoclassical Model**, which suggests ownership should not impact the value of goods, the endowment effect challenges this notion. Additionally, ownership may influence value through experiential effects and the time needed to adapt to market conditions. Despite the Neoclassical Model predicting similar prices for buyers and sellers, anomalies exist. Surveys and experiments revealed significant variance in the **Willingness to Pay (WTP)** and **Willingness to Accept (WTA)** for goods like hunting rights and lottery tickets. Kahneman, Knetsch, and Thaler's 1990 study aimed to clarify the endowment effect from other factors. In experiments with consumer goods, participants showcased significant variations between WTP and WTA. The study challenged the **Neoclassical Model**, highlighting **direction-dependent indifference curves**, **reduced gains from trade, and variability in endowment effects among different goods**.

A newer interpretation of the **endowment effect** centers around ownership. In a 2012 study conducted by Dommer and colleagues, the researchers explored whether **owning an item establishes a connection between the item and the self,** consequently inflating its perceived value. To investigate this hypothesis, the study assessed potential factors influencing the strength of the **endowment effect,**

[5] The Bandwagon effect refers to our habit of adopting certain behaviours or beliefs because many other people do the same.

particularly the relationship between possession and the self-concept. These factors included **social self-threat, social identity, and gender**. It's worth noting that a social self-threat involves situations that directly affect one's self-esteem, such as experiencing interpersonal rejection or receiving negative feedback from a superior. Study participants were instructed to recall a relationship where they felt uneasy being alone and had concerns about the other person not valuing them as much as they valued that person. Subsequently, participants engaged in a buyer or seller task, akin to the original research conducted by Kahneman and colleagues in 1990. The study's results revealed that **participants who experienced a social self-threat were inclined to sell their possessions for more than their actual value, indicating the presence of the endowment effect**. However, this self-threat did not influence buying prices. These findings underscore the idea that **owning items tends to enhance their perceived value as they become intertwined with one's self-concept.** Even a nondescript item can become linked to the self when individuals face a social self-threat. These results are consistent with previous research by Morewedge et al. (2009) and Maddux et al. (2010) offering robust support for the ownership-based explanation of the endowment effect.

Substantial evidence suggests that p**hysical contact with an object can heighten our sense of ownership, potentially triggering the endowment effect.** Businesses that employ this strategy have notably replaced traditional paper menus with tablets like iPads, resulting in increased sales, as customers are required to physically interact with the screen by tapping an item to place an order (Landy, 2005). However, a similar, potent effect can be observed when participants merely visualize touching an object (Murphy, 2006).

In a study featured in The Journal of Consumer Psychology, conducted by Peck and colleagues in 2013, participants were assigned to either visualize an item or physically feel it. Intriguingly, those who imagined **touching an item reported a perceived sense of ownership comparable to participants who physically held the object**. This finding holds significant implications for marketing strategies, particularly in the realm of online shopping. Many company websites employ descriptive language about a product's tactile qualities, its texture, and offer an array of photos to assist consumers in mentally visualizing the product. These tactics contribute to haptic imagery, ultimately enhancing a consumer's perceived sense of ownership, thereby stimulating the endowment effect. Much like free trials, this approach augments the perceived value of the product, increasing the likelihood that potential buyers will make a purchase.

6.4.2. Behavioural Finance

Behavioural finance, a subset within the broader field of behavioural economics, suggests that psychological factors and cognitive biases play a central role in shaping the financial decisions of investors and financial professionals**. These psychological influences and biases** are often cited as explanations for various **market anomalies,** particularly those observed in the stock market, encompassing significant fluctuations in stock prices. **Behavioural finance** can be examined from various points, extending beyond its application to stock market returns. While psychological behaviours are commonly associated with influencing market outcomes and returns, the scope of analysis within behavioural finance encompasses diverse perspectives. The primary aim of classifying **behavioural finance is to gain insights into the underlying reasons driving individuals to make specific financial choices and how these decisions subsequently impact financial markets**.

One of the key concepts of behavioural finance and strategic interactions is the analysis of the phenomenon known as "money illusion."

The rational expectations revolution that took place in the 1970s led to the exclusion of the study of **money illusion** and its consequences from the research agenda of economists for an extended period. The rational expectations framework presumes that individuals are rational, and as rational actors do not display illusions, there seemed to be no basis for studying money illusion. Money illusion became a topic relegated to courses on the history of economic thought rather than an active area of research (Howitt, 1989).

Fehr and Tyran (2001) demonstrated that **money illusion** leads to asymmetrical price adjustments in reaction to anticipated positive and negative monetary shocks. When faced with a negative monetary shock, the presence of money illusion significantly hampers the adjustment of

nominal prices to reach a single equilibrium, whereas prices rapidly adapt to a new equilibrium following a positive shock. However, previous research did not explore the lasting effects of money illusion on coordination failure, i.e., it did not investigate whether money illusion has enduring effects on subjects' behaviour. Furthermore, we extend beyond prior studies by revealing that, even when a substantial level of money illusion initially prevails, this illusion dissipates when the decision regarding equilibrium selection shifts to a repeated individual optimization problem. Nevertheless, our findings on coordination failure illustrate that this aspect is consistent with the potent and persistent impacts of money illusion in a strategic context.

Another Fehr's and Tyran's (2007) findings indicate that the **presence of agents with bounded rationality can have strategic consequences that make bounded rationality significant for overall outcomes.** This significance can exist even if individual learning, in a non-strategic context, could theoretically rectify the suboptimal choices made by individuals. This study reveals that apparently harmless variations in payoff representations have significant impacts on the selection of equilibriums. When payoffs are presented in nominal terms, 84 percent of the participants ultimately converge to a Pareto inferior equilibrium, whereas 98 percent of the subjects ultimately opt for the Pareto efficient equilibrium when real payoffs are used. This provides strong and compelling evidence for the **behavioural importance of money illusion**. Specifically, their findings suggest that **nominal payoff dominance serves as an equilibrium selection principle that influences behaviour in strategic settings**. Furthermore, authors demonstrate that the enduring effects of money illusion persist despite the fact that the majority of individuals can eventually overcome it through repeated individual learning opportunities. Therefore, the argument that the influence of money illusion on aggregate outcomes will ultimately diminish through learning can be highly misleading. In this context, it is deceptive because learning in strategic environments with multiple equilibria can be challenging or even impossible, and if it does occur, it may come too late to significantly impact the aggregate outcome.

SUMMARY

Chapter 6, which explores the **behavioural game theory**, provides a comprehensive perspective on the differences between the assumptions of **standard game theory and behavioural game theory**. In the chapter, we focused on games within which **strategic interactions** can be explored. These games include the **dictator game, public goods game, prisoner's dilemma, trust game, and ultimatum game.** In addition to theoretical models of individual games, we also focused on practical applications of behavioural games in various life situations, encompassing **economic decisions, voting behaviour, and environmental decision-making**. In the final part of the chapter, we concentrated on **the endowment effect** and its implications within the context of strategic interactions and behavioural economics**.**

The neoclassical model primarily operates under the assumption of **self-interest** as the key motivating factor for individuals. It offers the advantage of simplicity, but several empirical anomalies have surfaced, suggesting that this model may not capture the full spectrum of human behaviour effectively.

In contrast, **behavioural models** maintain a foundation in **self-interest** but encompass a broader perspective by accommodating altruistic and spiteful behaviours. Altruistic behaviour, in particular, is significant within this framework. It encompasses actions that benefit others while incurring a cost to the person carrying out the behaviour, with no direct material gain for themselves. Although **altruistic** acts extend beyond pure self-interest, they may still encompass an element of **self-interest in** the form of psychic benefits or personal satisfaction. This expanded view allows **behavioural models** to address a wider range of human behaviours and motivations.

Behavioural Game Theory serves as a crucial analytical framework for understanding various aspects of **social behaviour.** It becomes particularly relevant when examining situations involving strategic interactions among individuals. This means that in such scenarios, **every individual must carefully consider the possible responses of others to their own actions, all while being aware that these individuals are similarly contemplating the reactions to their actions.** The concept of **fairness**

is an integral component within this context. It's important to note that fairness is inherently subjective, not objective. Different individuals and cultures possess varying attitudes and perceptions of what constitutes fairness. Furthermore, these attitudes can undergo significant shifts over time. The principle of **reciprocity** plays a central role in the understanding of fairness, often linked with the idea of dual entitlement. Notably, many individuals exhibit **strong reciprocity**, indicating their willingness to penalize those who violate fair principles, even if it comes at a personal cost. To explore these concepts further and gain insights into attitudes toward **fairness, experimental games** have proven to be valuable tools. Examples of **such games include ultimatum bargaining games, dictator games, trust games, prisoner's dilemma games, and public goods games.** Empirical findings derived from these games have uncovered a plethora of anomalies, demonstrating that the conventional standard model often fails to capture the complexity of human behaviour in these situations.

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CHAPTER 7: BEHAVIOURAL ECONOMICS IN POLICY DESIGN

As philosophers have long acknowledged, humans are **inherently flawed and often make poor decisions that have adverse consequences for themselves and others**. At times, we may recognize our own errors, while in other instances, those around us point them out. In the best-case scenario, we learn from our mistakes; however, there are times when we require the guidance of institutions to lead us towards **better choices.** These institutions can take various forms, such as mentors providing advice for leading more fulfilling lives or the state enforcing laws to safeguard citizens from each other.

In recent years, there have been two significant shifts in the focus of these institutions. Firstly, the emphasis has changes from **examining choices and their outcomes to exploring the processes underlying decision-making**. Psychologists and economists have subjected the decision-making process to new investigation, leading to innovative and captivating research that uncovers distinctive features and irregularities in how we process information and assess options. Traditional models of "rational choice" are gradually being replaced by new concepts of decision-making that incorporate empirical evidence of human psychological imperfections. In essence, we have gained a better understanding of why we make poor choices and **how we can improve our decision-making**. Additionally, government policymakers adapted this recent research and started integrating it into the formulation of regulations and policies. However, policymakers also began utilizing behavioural insights to assist individuals in making improved decisions for their own benefit. This approach can be described as paternalistic and, as a result, may encounter objections from those who maintain that a government's fundamental role is to safeguard its citizens from external threats rather than from their own choices.

In 2004, Richard Thaler and Shlomo Benartzi gained recognition for their widely renowned **"Save More Tomorrow"** method, which aimed to boost workers' inclination **to save a portion of their income**. They identified three psychological barriers to saving: loss aversion, hyperbolic discounting, and status quo bias. "Save More Tomorrow" offered a solution to workers that avoided these obstacles, encouraging them to save more. Bridget Madrian and Dennis Shea (Madrian, Shea, 2001) published research demonstrating that a simpler approach, merely altering **the default option**, could increase participation in savings plans. A decade later, **automatic enrolment** and automatic escalation (a generalized form of "Save More Tomorrow") have had a substantial impact on the financial choices and savings behaviour of millions of people worldwide.

In subsequent writings, including their international bestseller **"Nudge,"** Richard Thaler and Cass Sunstein introduced a policy approach they termed **"libertarian paternalism."** The fundamental concept behind this approach is that societal institutions have a legitimate role in considering individuals' best interests when structuring the choices available to them, such as decisions related to retirement savings. The objective is to facilitate and encourage rational decision-making for those who make choices casually while safeguarding their complete freedom to choose as they wish. This approach has been widely regarded as the manifesto of behavioural economics in policymaking. It is grounded in the premise that the traditional rational agent model is unrealistic, many decisions are made with limited deliberation, and it is justifiable to design a **"choice architecture"** that reduces the occurrence of unwise decisions without impinging on individual freedom.

7.1. Role of Behavioural Economics in Public Policy

Before embarking on a trip to the grocery store, you compile a list of the essential items you need: eggs, milk, and bread. You firmly resolve not to deviate from this list. However, as you stroll through the store's aisles, you are fascinated by a prominent sale sign that advertises all your favorite snacks as "2 for $8." Enticed by what appears to be an excellent deal, you hastily grab four packages, unaware that the original price for each was $3.99. Upon returning home, you realize that you've overspent and question how this familiar scenario has unfolded once more. Would you have made the

same purchases if you had been aware of saving a mere $0.02 per item? This scenario illustrates the concept of choice architecture, which posits that our decision-making is influenced by the way choices are presented to us. In this context, a choice architect is an individual responsible for shaping the environment that guides decision-making. In the example above, consumer choices are influenced by drawing attention to a seemingly advantageous sale, a concept we naturally associate with savings. **Choice architecture** is closely linked to **libertarian paternalism** and **nudge theory**, both of which suggest that positive reinforcement and subtle suggestions can impact our behaviour. However, it's crucial to note that choice architecture isn't always employed for the benefit of those making decisions (Thaler, Sunstein, Baltz, 2013).

The concept of **choice architecture** was initially introduced in **Richard Thaler and Cass Sunstein's** 2008 book, **"Nudge: Improving Decisions about Health, Wealth, and Happiness."** In this context, Thaler introduced the term "**choice architecture**" to describe how insights from behavioural economics could be employed to influence decisions while keeping their inherent values unchanged. Within the framework of **nudges, choice architecture** was employed to mitigate biases stemming from bounded rationality. It aimed to address limitations arising from factors like cognitive capacity, problem complexity, and time constraints by guiding individuals toward advantageous choices with **the help of choice architects.**

The concept of nudging belongs within a broader framework known **as libertarian paternalism** (Thaler, Sunstein, 2003). This framework advocates that desired behaviours should be encouraged, not necessarily through regulations or bans, but by **shaping the environment in a way that promotes the most beneficial choices.** In other words, **individuals should be presented with an environment that promotes the most favourable choice, while still retaining the freedom to make their preferred decision, even if it may not be optimal for them.**

Policymakers can control the psychosocial factors that influence individual decisions to promote behaviours highly valued by society, which might otherwise be overlooked by individual citizens. These behaviours could contain actions like **conserving energy, enhancing road safety, or saving for retirement (specific examples will be explored in subsequent subchapters).** By drawing on rigorous research from behavioural science, **governments can enhance the well-being of their citizens** across a range of domains without compromising their autonomy. They achieve this by aligning policies with the actual behaviour of citizens and conducting pretests of policy solutions before implementing them on a broader scale.

Thaler and Sunstein (2008) insist on preserving **freedom of choice** when implementing nudge policies. People's **choices need to be guided in cases where individuals are not fully focused on their decisions**. **Libertarian paternalism** allows sufficiently rational individuals to make their own decisions, but for those who do not think entirely **rationally** or do not give their decisions full attention, it offers the option of benefiting from so-called **"nudges" from choice architects**. Choice architecture involves **modifying the decision-making environment so that those making decisions select the best option.**

According to Thaler and Sunstein (2008), a **"nudge" is any aspect of alternative architecture that alters behaviour without restricting the choice of any option.** It's important to mention that the **"nudge" method is not about prohibitions**. For example, it would be entirely unthinkable for choice architects to ban unhealthy food consumption for everyone for health reasons. Using the **"nudge"** approach to improve the population's health would simply **motivate individuals** to make healthier dietary choices. In recent years, as Loibl et al. (2018) points out, policymakers have shown a growing interest in **"nudges"** that guide people in specific directions while preserving consumer choice.
The conditions for each nudge according to Thaler (2008) are as follows:

1. It must **not be misleading and must be transparent** - those affected by a given policy must have easy access to all information. This information should be presented concisely and simply.
2. **Opting out of the nudge should be as straightforward as possible** - if it involves nudges based on the aforementioned heuristic that suggests people tend to maintain the status quo, they should have the simplest means to exit the system.
3. There should be **an assumption that the nudge will lead to the well-being of those exposed to it** - the utmost emphasis should be placed on ensuring that each newly created "nudge" is publicly

debated before its implementation to prevent situations where people are influenced in situations where their freedom of choice should remain intact.

7.2. Designing Policies with Behavioural Insights

According to Ewert et al. (2021), **behavioural interventions** go beyond the typical set of public policy tools. This is an **innovative approach** that has the potential to fundamentally reevaluate the approach **to public administration** as a whole. The implementation of **behavioural public policy** is carried out through **behavioural interventions** based on insights primarily related to cognitive biases. Several authors (Hertwig & Grüne-Yanoff, 2017; Loewenstein and Chater, 2017; Tummers, 2019; Oliver, 2015) then adopt different taxonomies and more detailed definitions of interventions. **Behavioural interventions represent a shift in the focus of public policies and their implementation to the individual level, with the aim of altering behaviour in specific situations.** According to Ewert et al. (2021), **their potential in public policy has not yet been fully realized in many areas.**

The first frameworks (in some cases, the term "methodology" may be more appropriate) for applying behavioural insights have expanded with the active operation of the **Behavioural Insights Team (BIT)** in the United Kingdom after 2010. According to Hansen (2018), BIT reports were filled with well-documented evidence of the implementation and impacts of interventions based on approaches such as loss aversion, prosocial aspects of behaviour, or reciprocity, as well as other projects following the methodologies of **MINDSPACE** (Dolan et al., 2012) and later **EAST**. According to Dewiese et al. (2022), among the most popular frameworks are EAST (Behavioural Insights Team, 2014) and **BASIC** (Hansen, 2019).

Shaping behaviour plays a central role in shaping public policy. In recent times, there have been significant breakthroughs in understanding the factors that influence our conduct, and it is imperative for the government to take these insights into account. For policymakers grappling with issues like crime, obesity, or environmental sustainability, **behavioural approaches present a potentially potent arsenal of new strategies.** Employing these approaches can lead to **cost-effective and minimally intrusive methods of gently guiding citizens**, including ourselves, towards **new patterns of behaviour that align with our natural inclinations.** This concept holds great significance at all times, but it becomes particularly relevant in times of fiscal restraint.

7.2.1. MINDSPACE Framework

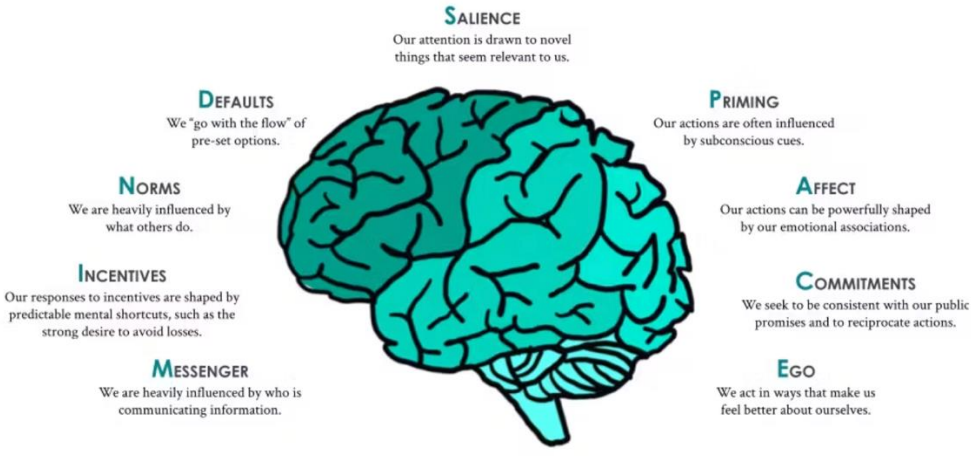

Figure 7.1 MINDSPACE Framework
Source: https://thedecisionlab.com/reference-guide/neuroscience/mindspace-framework

Most public policies aim to **influence behaviour**, and policymakers employ various strategies to achieve this goal. They can utilize "hard" methods like legislation and regulation to enforce specific actions, which can be effective but are often costly and unsuitable. Consequently, governments

frequently employ less coercive yet highly effective measures, such as **incentives** (e.g., excise duties) and **information provision** (e.g., public health guidelines), along with **sophisticated communication techniques**. However, the question arises: Why consider change? **Behavioural theory** provides two compelling reasons. Firstly, existing tools **like incentives and information can be significantly enhanced with new insights into the factors that influence our behaviour**, some of which have already been integrated into government communications. Secondly, there are **novel and potentially more effective methods for government to shape behaviour**. Conventional tools like incentives and information aim to modify behaviour by **"changing minds,"** assuming that by providing incentives and information, people will rationally assess the costs and benefits of their actions and respond accordingly. Unfortunately, evidence indicates that people do not always respond in **this "perfectly rational"** manner. In contrast, approaches based on **"changing contexts"** – altering the environment in which decisions are made and responses to cues occur – **have the potential to induce significant behaviour changes at a relatively low cost.** Aligning policy more closely with our inherent responses to the world presents a promising avenue for **enhancing individual well-being and societal welfare** (Dolan et al., 2010).

MINDSPACE seeks to change the context through which people receive information and incentives, primarily by targeting the automatic thinking of **System 1.** The name **MINDSPACE** is formulated as a mnemonic aid, with each initial letter of the described techniques represented in the name. It describes **nine robust effects** that predominantly **influence automatic decision-making and is intended for policymakers**. The authors utilized the conclusions of an integrative review to underpin the individual components of **MINDSPACE**, focusing on nine effects they believe **have the most significant impact on human behaviour.**

Table 7.1 MINDSPACE Framework

M	Messenger	We are heavily influenced by who is communicating information.
I	Incentives	Our responses to incentives are shaped by predictable mental shortcuts, such as the strong desire to avoid losses.
N	Norms	We are heavily influenced by what others do.
D	Defaults	We “go with the flow” of pre-set options.
S	Salience	Our attention is drawn to novel things that seem relevant to us.
P	Priming	Our actions are often influenced by subconscious cues.
A	Affect	Our actions can be powerfully shaped by our emotional associations.
C	Commitments	We seek to be consistent with our public promises and to reciprocate actions.
E	Ego	We act in ways that make us feel better about ourselves.

Source: Dolan et al. (2012)

When applying **MINDSPACE** in practice, it should not be perceived as a mere substitute for existing methods. **"Behaviour Change"** is an inherent part of the policymaking process, rather than a novel addition that can be tacked onto policies. Therefore, public servants must **gain a deeper understanding of the behavioural aspects of their policies and actions**. According to Dolan et al. (2012), **MINDSPACE** can aid them in this endeavour through three distinct avenues:

- **Enhance: MINDSPACE** can assist policymakers in improving their current efforts to influence behaviour. This may involve gaining a better understanding of how individuals respond to incentives and identifying which types of information hold greater significance. The underlying principle is that if the government is already endeavouring to shape behaviour, it should do so as effectively as possible.
- **Introduce:** Some elements within **MINDSPACE** are underutilized by policymakers but have the potential for a significant impact. For instance, there is room for a more innovative application of social norms and commitment devices in policies. However, introducing new measures in this manner may require substantial efforts to secure public acceptance.

- **Reassess:** The government needs to examine how it unintentionally influences the behaviour of citizens. It is entirely conceivable that government actions lead to unintended – and possibly undesirable – changes in behaviour. Insights from **MINDSPACE** provide a systematic approach to analyse whether and how the government shapes the behaviour of its citizens.

7.2.2. EAST Framework

In 2014, the **Behavioural Insights Team (BIT)** introduced the **EAST** framework, offering policymakers a straightforward blueprint to enhance their efforts using behavioural science. The **EAST** framework is specifically tailored to **enhance public policy through the application of nudging, social engineering, and various psychological and economic methods.** It consists of four core principles, emphasizing that policies should be designed to be **Easy, Attractive, Social, and Timely (EAST).** Furthermore, the **Behavioural Insights Team** has devised an Implementation Plan that delineates the essential steps for implementing policies based on the **EAST** framework.

Figure 7.2 EAST Framework
Source: https://thedecisionlab.com/reference-guide/management/east-framework

Easy

In the **EAST** Framework, the **"E"** signifies **Easy:** designing policies with **minimal required effort**. In general, individuals tend to abandon tasks when they encounter numerous obstacles. The **EAST** framework offers strategies to counteract this tendency. To start, as people commonly gravitate toward **default options**, setting the desired behaviour as the default **state increases the chances of its adoption.** Similarly, policymakers can manipulate the levels of friction to adjust the ease or difficulty of competing behaviours. They streamline the choice of the preferred option while concurrently making less favoured choices more challenging. Lastly, when disseminating information to the public, the **"Easy"** aspect of the framework **recommends delivering clear and uncomplicated messages**. Topics that are overly intricate or detail-oriented are likely to be disregarded (BIT, 2014).

Attractive

For a policy to gain acceptance, it is vital for it to capture people's interest. To grab their **attention**, policy documents and advertisements should incorporate striking visuals, vibrant colours, and personalized elements. Additionally, to boost participation, it is advantageous to employ alluring incentives to encourage specific behaviours. These incentives are tailored to enhance the policy's appeal to participants, achieved through **financial rewards, lottery mechanisms, or gamification of policy activities to make them more enjoyable** (BIT, 2014).

Social

As inherently social beings, people typically find **belonging to groups deeply satisfying**. Moreover, **group membership** used to be essential for survival. Therefore, our thoughts, endorsement, and conduct are profoundly influenced by others. By harnessing our inherent reliance on **social approval,** policymakers can steer behaviour. One technique involves persuading individuals that the vast majority of their social peers engage in the preferred behaviour. This approach capitalizes

on the bandwagon effect[6], which is **our inclination to adopt activities and beliefs as they gain popularity.** Another technique involves nurturing communities and networks to establish social accountability among individuals. This approach is effective because groups develop **social norms**[7], which reduce the effort required by group members to conform to the shared behaviour. For instance, weight loss communities reduce the challenges of losing weight by fostering mutual accountability and cultivating a sense of collective responsibility. Similarly, **we often make commitments but end up procrastinating or forgetting about them.** The **EAST** framework suggests that **making a public commitment to others increases the likelihood of follow-through** (BIT, 2014).

Timely

The **"T"** in the **EAST** Framework stands for **Timely:** It emphasizes **the importance of appropriate timing when implementing policies**, as it significantly impacts public perception. People's perceptions are profoundly influenced by context and their unique life circumstances. The **EAST** Framework recommends that **policies should be introduced when individuals are most receptive to them, often coinciding with significant life changes or events.** As our habits are not easily changed, major life transitions provide opportunities for significant shifts in our behaviour, and this is when people are more likely to embrace change. Additionally, when a policy involves **specific costs or benefits, it is crucial to consider when individuals will experience them.** Many policies entail significant **upfront costs**, while the resulting benefits may not materialize for several years. For instance, consider a government embarking on a much-needed expansion of its healthcare system. This policy, while essential, will take several years to implement and will also lead to higher taxes in the initial stages. People tend to be focused on their present well-being, so this transformation, although necessary, may face public resistance due to its immediate financial burden. Mitigating immediate costs or enhancing immediate benefits can facilitate the acceptance of such programs (BIT, 2014).

Frequently, we fall short of achieving our objectives, despite our best intentions. This shortfall is often attributed to inadequate planning, making it beneficial for policies to include corresponding action plans. These action plans associated with policies are referred to as **"implementation intentions." Implementation intentions outline potential obstacles to accomplishing the intervention's objectives and propose strategies for surmounting these challenges.**

The Behavioural Insights Team (BIT, 2014) presents a four-step process for achieving the goals of a policy intervention:

- **Define the desired outcome:** Clearly articulate the project's purpose and establish specific objectives, quantified using key performance indicators.
- **Analyse the context:** Gain a comprehensive understanding of the constraints within the target business or community. Without a proper grasp of the system's dynamics, interventions may lead to unintended and adverse behavioural consequences.
- **Develop the policy:** Formulate the intervention.
- **Evaluate effectiveness:** Continuously assess the intervention's efficacy through testing, learning, and adjusting resulting behaviours to align with the goals.

7.2.3. BASIC Framework

BASIC is a framework designed **"by practitioners, for practitioners."** It is, in part, a consolidation of existing approaches, frameworks, tools, and guidelines that have already been implicitly employed by behavioural insights (BI) practitioners. It also incorporates tools developed by iNudgeyou – **The Applied behavioural Science Group**, derived from a decade of experience in applying

[6] The Bandwagon effect refers to our habit of adopting certain behaviours or beliefs because many other people do the same.

[7] Social norms are collectively held beliefs about what kind of behaviour is appropriate in a given situation. They range from specific customs—for example, the Western custom of shaking hands with somebody when you meet them for the first time—to more general rules that govern behaviour and influence our understanding of other people.

BI to public policy worldwide. The arrangement of tools and guidelines within this framework serves to emphasize **how behavioural insights can be integrated into the entire policy cycle**, a dimension often overlooked in the behavioural insights literature. These tools underscore the interconnectedness of different stages in the policy cycle: **from how identifying behavioural aspects of a policy issue shapes the focus on specific behaviours to how analyzing these behaviours informs the selection of behavioural strategies for experimentation.** These experiments should be designed to establish a robust foundation for behaviourally informed policy initiatives.

Furthermore, **BASIC** also underscores several **ethical considerations** at each stage, which practitioners must address when working through the framework. These considerations encompass assessing whether **potential behaviour changes align with citizens' interests, evaluating the appropriateness of specific behavioural strategies concerning the addressed issues, and ensuring privacy and equal treatment of citizens in the design of field test**s (Hansen,2019).

The 5 stages of BASIC (Hansen, 2019)

The five stages of **BASIC** seeks to guide the application of BI to a given policy issue in a problem-oriented way:

1. **Behaviour** - addresses the primary phase of implementing behavioural insights at the outset of the policy cycle. This aims to recognize and address critical behavioural facets of policy challenges, distinguishing them from issues arising due to information gaps, incentives, or standard regulations.
2. **Analysis** - involves examining the target behaviours by utilizing theories, insights, and methodologies derived from the behavioural sciences.
3. **Strategies** - offers a structured approach for the practitioner to systematically recognize and develop behaviourally informed strategies, drawing from the behavioural analyses stemming from the amalgamation of Stages 1 and 2.
4. **Intervention** - encompasses fundamental techniques for methodically planning experiments to assess both the effectiveness and efficiency of behavioural interventions.
5. **Change** - offers practitioners tools to: **i)** verify if the initial assumptions and contextual factors have changed before implementing a behaviourally informed intervention; and **ii)** develop plans for implementation, scaling, monitoring, evaluation, maintenance, and dissemination of applications.

Frequently involved in the practical implementation is the process of testing, serving as the initial assessment of whether an intervention is viable. This testing phase becomes integral to pitching the idea to the organization: **assess, identify effective strategies through testing, implement successful policies, and then disseminate the results to others**. Various established methods exist for testing policies, including desk **reviews of available evidence, piloting initiatives, or conducting small studies with limited participants or in specific areas**. More effective evaluation methods demonstrate the impact of what is being tested, typically by comparing it to a counterfactual or an alternative state of affairs. In the realm of translation, the credibility of a test plays a crucial role in persuading stakeholders. The more robust the test, the greater the potential to convince stakeholders, contingent on their belief in and understanding of the method's strength. Although more advanced methods may be challenging to comprehend, and conveying results may be more complex, low-tech stakeholder assessments and straightforward consultancy reports can sometimes prove more effective. The aspiration is that practitioners grasp the robustness of the available methods and choose the most suitable one for the specific problem. Some public managers recognize **the significance of understanding rather than merely legitimizing policies through external evaluations and consultant reports.**

In the realm of **policy evaluation**, a dominant method is the **randomized controlled trial (RCT)** or **field experiment** (John, 2016). The **RCT** involves **randomly assigning participants to either an intervention or comparison group and subsequently comparing outcomes,** ideally both before and after the intervention. The **randomization** process ensures that the groups are equivalent, with the only distinguishing factor being the intervention. By comparing outcomes between the

treatment/intervention and control/comparison groups, the impact of the behavioural cue or other intervention can be determined. Researchers and policymakers can then draw a causal inference that the intervention directly influenced the outcomes. **RCTs** address a primary limitation of many evaluation methods, as they have **the capability to isolate the effects of the intervention from other factors influencing outcomes** (John, 2016). In essence, **RCTs** belong to a family of methods that includes **natural experiments and quasi-experiments**, all of which enable causal inferences by eliminating the influence of observed and unobserved factors correlated with the outcome. **RCTs** hold a distinct position as a method, particularly for testing interventions and simulating scenarios where a policy is either introduced or not. **behavioural interventions** demonstrate effectiveness when subjected to trials. The primary advantage lies in prior research generating several recommendations applicable to distinct stages of the delivery process. Take, for instance, a popular behavioural intervention involving the redesign of payment settlement letters, as implemented by HM Revenue and Customs (HMRC), the UK tax collection agency, to prompt earlier debt payments (Hallsworth et al., 2017). The policymaker's discretion lies in the **wording of these letters and the potential inclusion of different phrases alongside the standard reminder text**. The wording adjustments can be made without seeking legal advice. Instructions can be given to send various letters, followed by an examination of the payment accounts of recipients, linking payment outcomes with identifiers indicating their treatment group. This allows for the creation of tables **comparing payment rates and treatment allocation, facilitating standard statistical significance tests between payment averages or proportions in each group.** The crucial aspect is designing diverse wordings to enable a meaningful comparison of feasible alternatives.

Numerous businesses and occasionally governments have experimented with segmentation, **categorizing people into various groups based on socio-economic factors, age, or attitudes.** Advertising agencies and political analysts often assign catchy names to these segments, like 'soccer moms,' 'Generation X,' or the 'aspirant working class.' While these segments may sound impressive and plausible, **they often lack predictive power.** Many are the result of creative, focus-group exercises rather than **rigorous data analysis**. These segmentations, even when based on real data such as socio-economic profiles and survey responses, may have **surface validity** but do not consistently predict behaviour. This lack of **predictive validity**, akin to horoscopes, led psychologists to lose interest in personality type studies in the 1970s. In contrast, the study found that **behaviour itself is a more reliable predictor of future actions.** For instance, someone who was consistently late last week is likely to be late next week, regardless of their reading preferences, political affiliations, or tea flavor preferences.

This highlights the importance of **behavioural data over attitudinal clusters.** While substantial sums are invested in segmenting American adults for political campaigns based on who is likely to vote or donate, the most predictive data often stems from incidental behaviours like email opens, link clicks, or response times. **Past behaviour emerges as a potent predictor** – if someone has voted or donated before, they are more likely to do so again. Equipped with this understanding, it becomes feasible to construct segmentations rooted in behaviour rather than relying on attitudes or conventional socio-economic factors. **Furthermore, in a data-rich world, it becomes viable to observe how these behaviourally based segments react to various messages or nudges** (Halpern, 2015).

7.3. Case Studies: Behavioural Economics in Environment, Health, and Public Finance Policies

7.3.1. Behavioural Economics in Environment

Policy makers at various levels, ranging **from local to international** are increasingly tasked with **addressing behaviours that impact economic, social, and environmental outcomes**. Considerations extend from attempts to diminish a country's reliance on foreign oil, where multiple options satisfying the policy goal may have diverse effects on economic viability, air quality, and carbon dioxide emissions. Likewise, custodians of water in reservoir systems must regulate release times and levels to

accommodate stakeholders with varying needs and power sources, all while ensuring the future availability of water based on projected upstream rainfalls. In some cases, environmental concerns take center stage, with national or supranational mandates capping regional emissions of harmful substances like sulphur or carbon dioxide. Policy makers in specific regions or industries then grapple with developing interventions to reduce emission-generating activities or implement technologies to lower emission levels. These examples underscore several key points: **(1) Environmental policy decisions often impact multiple dimensions, including economic, social, and environmental aspects, necessitating trade-offs. (2) Many decisions have distributional implications, involving considerations of fairness or equity. (3) Considerable uncertainty surrounds the likely consequences of different actions, requiring intertemporal trade-offs in terms of both costs and benefits. (4) Implementation of such policies often requires persuasion, especially when economic models of rational behaviour may contradict reductions in consumption.** Environmental goods, such as c**lean air, drinkable water, species diversity, and a life-sustaining climate, are common-pool resources.** Rational economic analysis may advocate short-sighted, selfish depletion, even though more farsighted and cooperative behaviour would be socially desirable (Bowles, 2006). While these four characteristics are present to some extent in most policy decisions, they appear particularly prominent in environmental policy decisions.

In Norway, a field experiment revealed that **the inclusion of labels indicating** the lifetime energy operating cost of products, alongside training for sales staff**, led to a 4.9% increase in the purchase of more energy-efficient tumble dryers.** However, no similar effect was observed for fridge-freezers (Kallbekken et al., 2012).

In another field experiment conducted at a **London hall of residence**, researchers investigated the **impact of providing feedback on students' electricity and heating usage**. Drawing inspiration from Opower's energy reports (Allcott 2011), the experiment utilized **social norms to promote energy conservation**. Over a 10-week period starting from June 3, 2013, students in the treatment group received **weekly energy reports**, including a comparison of their **energy consumption with that of their neighbors** (all or the 20% most efficient), their ranking among 88 participants, and straightforward **energy-saving tips.** The results demonstrated a noteworthy reduction **of over 20% in overall energy consumption in the treatment group** that received the energy reports, compared to **the control group** (which received a single email at the experiment's outset containing energy-saving tips). Notably, this effect was not driven by cost-saving incentives, as residents did not incur charges for their energy consumption. Intriguingly, a second treatment group, informed about **a prize competition rewarding the most energy-saving resident in addition to receiving weekly energy reports**, exhibited a different outcome. The introduction of an **external reward seemed to diminish or eliminate the intrinsic motivation to save energy**, as the positive effect relative to the control group dissipated after two weeks. The authors emphasize **the importance of considering these findings in the context of energy management and efficiency policies, including smart meter interfaces** (Alberts et al. 2016).

The Governance Global Practice Group of the World Bank, in collaboration with the Central America Countries Unit and ideas42, executed a **randomized controlled trial** in Belén, Costa Rica, to assess various **behavioural interventions** aimed at promoting water conservation. The experiment in Belén aimed to **reduce water consumption through three behavioural interventions**. First, they used **"two peer comparisons, comparing a household's water usage to their "peers"**– defined in one case as the average household in their local neighbourhood (one of six neighbourhoods in Belén) and in the other case as the average household in their city. The third intervention focused on **making relative consumption noticeable, incorporating a planning prompt to assist individuals in setting personal goals and devising concrete plans to decrease water usage.** To address the challenge of increasing salience regarding current consumption levels and the absence of a suitable benchmark, the researchers created **stickers offering feedback on water consumption relative to an appropriate reference point** (Datta et al., 2015). Two peer comparison treatments were established using these stickers:

- **Neighbourhood Comparison:** A brightly-colored sticker on the water bill provided direct feedback on a household's water consumption compared to the average household in their

neighbourhood. Those exceeding the neighbourhood average received a "frowny face" sticker, while those below the mean received a "smiley face" sticker.

- **City Comparison:** Identical to the Neighborhood Comparison, but the reference point was the average consumption in Belén.
- **The third intervention, "Plan Making,"** drew on goal-setting literature to address the lack of a clear plan for water conservation. Participants in this group received a postcard with their July 2014 bill, prompting them to compare their water consumption with the average Belén household and establish personal goals for water use reduction. The postcard also presented six tips for reducing water consumption, aiming to supplement salience with clear intentions and plans for water conservation.

The study found that the **"average water consumption in Treatment households declined more than in Control households for each of the three Treatments, although the difference-in-differences is only significant for the Neighbourhood Norms and Plan-Making interventions".** Both control and treatment households **exhibited lower average monthly water consumption than in the corresponding season of the previous year**, with the decline being more substantial for households in the Treatment group. For the two peer comparison treatment groups (Neighborhood and City comparisons), the authors found that **Neighbourhood comparison reduces water use by between 3.5% and 5.6% of control group consumption, but City comparison has no significant effect on water consumption.** Additionally, the results indicated that **Plan-Making reduces water use by between 3.4% and 5.5% compared to the water consumption of the control group.** Moreover, the study identified that **Plan-Making appears to be most effective for low-consumption households, and Neighbourhood comparison intervention may be most effective for high-consumption household.** The authors highlighted that the average **4 to 5% reduction observed across all estimations for the "Neighbourhood Comparison" and the "Plan-Making" treatments** can be used for a rough cost-benefit analysis. Based on monthly average water consumption and water rates at the time, the monthly water **savings in monetary terms could be estimated from CRC 1.4 million** (USD 2,600) to **CRC 2.8 million** (USD 5,200) (Datta et al., 2015).

To assess the impact of **different labels promoting energy-efficient product choices**, a comprehensive **online experiment and survey** were conducted involving 11,764 consumers across 10 EU countries (France, Germany, Greece, Ireland, Italy, the Netherlands, Poland, Portugal, Romania, and Sweden). In the initial phase, participants engaged in an **online experiment simulating a shopping experience within an online retail environment featuring four distinct appliances** (refrigerators, TVs, washing machines, and light bulbs). They were alternately tasked with forming a consideration set from several product alternatives ("consideration experiment") or making a final product decision from a restricted set of alternatives ("choice experiment"). In the subsequent phase, respondents **provided background information through a questionnaire, covering socio-demographics and purchasing behaviour**. This step aimed to explore potential explanations for variations in responses to energy efficiency information. The experiment tested hypotheses related to both the content of labels and the availability and presentation of information within the labels.

Concerning the content of the labels, the experiment sought to test behaviourally informed hypotheses by comparing various label designs, including:

- **Meaning Effect:** Assessing whether adding textual or visual meaning to the reduced (class-only) label enhances its effectiveness.
- **Frame of Reference Effect:** Investigating whether adding a frame of reference to the reduced label improves its effectiveness, especially in the final choice stage.

Four reduced label variants were created and compared against control groups:

- **Class-Only Label:** Displaying a letter grade representing the energy efficiency of the product (e.g., A+++ to D).
- **Meaning Label:** Incorporating Label 1 with added meaning through the text "energy" on the label.
- **Frame of Reference (FoR):** Combining Label 1 with added meaning through a visual depiction (pictogram).

- **Meaning Plus FoR:** Featuring a visual depiction (pictogram) of environmental efficiency using an ascending scale of green leaves (1 being lowest; 5 being highest)

All proposed labels were observed to increase the consideration of more energy-efficient products compared to the choices made within the control groups, which were exposed to either no or simplified energy efficiency information. The results indicated that the **Frame of Reference label (Label 3) demonstrated the highest performance, offering customers a full scale against which consumers could benchmark their potential appliance choice** (e.g., an A+++ to D scale, presented visually), as opposed to labels in absolute terms (e.g., A-level appliance) or pictograms. During the set formation stage, this label **led to the selection of the most efficient product on average 61% of the time**, compared to 51% in the control group (considering all appliances). In the final choice stage, **the margin was slightly lower, with the most efficient product selected 68% of the time, as opposed to 65% in the control group.** Both results were statistically significant. In comparison, **Label 1 resulted in the most efficient choice selection during the set formation stage 58% of the time and 67% for the final choice stage.** Labels 2 and 4 led to the most efficient **selection 56% and 55% of the time at the set formation stage, respectively, and 65% and 66% at the final choice stage, respectively**. All these findings were statistically significant (OECD, 2016).

Conducted as a segment of a comprehensive behavioural study assessing **consumer choices concerning food sustainability, this field study took place during the Milan Expo 2015.** Executed by CentERdata, GFK, and ECORYS on behalf of the European Commission Consumers, Health, Agriculture and Food Executive Agency (CHAFEA), this particular investigation is part of a larger initiative examining **consumer choices related to food sustainability.** Additional case studies within this overarching project include **"Food waste and best-before/production dates" and "Framing durability and authenticity information to reduce food waste.".** The researchers aimed to examine whether and how consumers utilize the information presented on interactive screens during their decision-making process, with a particular focus on determining if exposure to sustainability-related information in an innovative and interactive format influences the selection of more sustainable food options (European Commission, 2015).

The intervention examined the effects of sustainability-related information on 303 visitors to the Milan Expo. The experiment unfolded in three stages:

- **Sustainability Pre-task:** Participants were tasked with selecting the most sustainable product from a range of non-food categories and evaluating whether a specific action enhances sustainability. The objective of this pre-task was to "investigate if sustainable actions in a non-food domain spill over to the food domain"
- **Visit to the Supermarket of the Future:** Participants interacted with screens providing sustainability information.
- **Post-visit Questionnaire:** Administered to assess the extent to which participants paid attention to sustainability information in the supermarket, considered sustainability an important factor in their food choices, and whether this influenced their current and future sustainability choices. This questionnaire was conducted either at the supermarket exit (treatment groups) or elsewhere at the expo (control group). Respondents were also asked about their willingness to donate to one of three charities, two related to food sustainability and one unrelated.

Participants were divided into **three groups – two treatment groups and one control group** – each comprising approximately 100 individuals. The first treatment group (Group 1) experienced all three stages of the experiment. The second treatment group (Group 2) solely visited the supermarket and completed the post-visit questionnaire. The third group (Group 3) – the control group – only filled in the post-visit questionnaire in another area of the Expo. **The study revealed challenges in the sustainability pre-task, with only 6 out of 100 participants performing well**. Despite this, **all groups showed a pro-environmental inclination in past choices and self-identity.** Consumers prioritized **price, nutritional values, and raw material origin over sustainability information**. No positive spill-over effects were observed based on pre-task participation or Supermarket of the Future visit. However, the **Supermarket triggered longer-term positive impacts, as consumers expressed an increased intent to prioritize sustainability in future shopping**. Visitors also donated more to

sustainable charities, suggesting an abstract incorporation of sustainability into behaviour. The study emphasizes the need for effective education to guide consumers in making concrete, sustainable choices in specific domains (European Commission, 2015)

The Energy Efficiency Strategy of the UK Department of Energy and Climate Change (DECC, now BEIS) acknowledged **the lack of access to trusted and appropriate information** as one of the primary obstacles to energy efficiency. DECC identified energy labeling as a domain where **behavioural nudges could have an impact on the purchasing of energy-efficient products**. Acknowledging common objectives in reducing energy consumption, DECC partnered with **the John Lewis retail chain and the Behavioural Insights Team (BIT) to develop a randomized controlled trial**. The trial aimed to offer **conclusive evidence on whether presenting information on the lifetime electricity running costs during the point of sale influenced purchasing behaviour.** The focus was on enhancing the appeal of appliances with lower energy consumption. In September 2013, lifetime running costs were incorporated into the appliance labels of washing machines, washer dryers, and tumble dryers at select John Lewis stores, with the trial concluding in June 2014. Each John Lewis **store was randomly assigned to either the Intervention group, where the total monetary lifetime running cost was featured on the appliance label along with the EU energy label displaying kWh per year, or the Control group, which only had information on the EU energy label with kWh per year and no details on lifetime running costs on the appliance label.** Upon completion of the trial, John Lewis retailed a total of 60 washing machines, 42 tumble dryers (34 condensing and 8 vented), and 13 washer dryers. The trial yielded **robust evidence supporting the effectiveness of lifetime running cost labels on white goods, particularly washer dryers. In intervention stores, the sold washer dryers consumed, on average, 6.64 kwh/year (equivalent to 0.7%) less energy compared to appliances in control stores, and this difference was statistically significant.** When comparing town center and non-town center stores, the **impact was more pronounced in non-town center stores.** In these stores, purchased washer dryer products consumed an average of 15.26 kWh (1.5%) less energy in intervention stores than in control stores. DECC suggested that the observed effect for washer dryers might be due to their higher lifetime running costs compared to other products in the trial, making the total lifetime running costs more substantial and potentially more noticeable to purchasers. The reason for the difference in the washer dryer result between town center and non-town center stores was not apparent (DECC and BIT, 2014).

7.3.2. Behavioural Economics in Health

Behavioural science holds significant promise in the realm of medical care, addressing the shortcomings of biotechnology. While certain diseases have been nearly eliminated, the global landscape of modern medical care still **leaves numerous patients suffering, especially with the increasing prevalence of chronic conditions.** Even with effective treatments, the costs of medical care pose a substantial societal burden. Despite clinicians recognizing the impact of patient behaviour on health, formal education in behavioural decision science is lacking in medical training. This gap has led to ineffective recommendations and a slow integration of behavioural insights into medical practice.

The Public Health Agency of Canada aimed to explore **the application of behavioural theory in developing an intervention to boost physical activity levels among Canadians, with the ultimate goal of mitigating obesity.** The Agency's Centre for Chronic Disease Prevention set up an incentive-based pilot project to test whether it could motivate Canadian citizens **to do more exercise.**
The initiative was executed in 15 pilot test YMCA locations across Canada, including eight in the Greater Toronto Area, one in Oakville (Ontario), one in Moncton (New Brunswick), and five locations in Calgary (Alberta). The program aimed to reward registered YMCA members in the participating locations with Air Miles Reward Miles for achieving specific physical activity milestones weekly:

- **Base Offer**: Earn one Air Mile Reward Mile for every two visits to a YMCA location.
- **Bonus Offer:** Earn 10 Air Miles Reward Miles for visiting a YMCA twice a week and 20 Air Miles Reward Miles for visiting a YMCA three or more times a week.

The "**Air Miles-YMCA Physical Activity Programme**" demonstrated **remarkable success**, surpassing the initial target by registering over 98,000 participants, well beyond the anticipated 25,000. In a year-over-year comparison**, it was observed that 62% of active YMCA members in the participating locations increased their weekly visits to the YMCA.** Furthermore, members **enrolled in**

the project, specifically Air Miles Reward Miles collectors, **exhibited a significant increase of approximately 17% in the frequency of their YMCA visits compared to non-enrolled members**. These findings clearly indicate the effectiveness of incentives in successfully promoting elevated levels of physical activity, as identified by the Public Health Agency (OECD, 2017).

In 2007, Denmark, like many other countries worldwide, implemented a ban on indoor smoking in workplaces, restaurants, and various settings to protect non-smokers from secondhand smoke exposure. Although this legislation successfully altered smokers' behaviour, a notable consequence emerged—the congregation of smokers just outside public buildings, pubs, and offices. This phenomenon pses challenges, especially concerning the impressions created for companies or organizations. Copenhagen Airports, accommodating over 26 million travelers annually, including 25% who are smokers, has encountered this issue amid its commitment to modern ventilation systems. To address this issue, **the airport initially designated strict non-smoking zones near entrances and areas with high passenger traffic, but compliance was limited**. Instead of resorting to fines, the Airport **collaborated with iNudgeyou to implement nudges aimed at reducing health risks associated with secondhand smoke inside terminals and organizing smoking behaviour more conveniently for all parties involved.** The researchers embarked **on a comprehensive study at Copenhagen Airports, meticulously observing the smoking behaviour of 2,000 individuals in a structured manner.** Their **behavioural mapping** initiative shed light on the multifaceted actions involved in smoking within the airport premises. During the **subsequent analysis, a crucial insight emerged—the inherent human tendency to minimize effort during decision-making, a phenomenon often described as cognitive miserliness.** This psychological inclination was notably evident among smokers at the airport, influencing their choice of smoking locations with minimal cognitive investment. In light of this revelation, **the conventional approach to non-smoking zones seemed counterintuitive.** Rather than relying on proscriptions that demand effort and compliance, the researchers hypothesized that a **prescription-oriented strategy might yield more favourable results**. The intervention was then conceptualized with a nuanced understanding of the predominant smoking behaviour—individuals exiting the building, looking down, lighting a cigarette, and subsequently selecting a place to smoke.
The intervention unfolded in three strategic layers:

- **Stickers on the ground** – guiding the search: To initiate a subtle cue for smokers to actively search for smoking zones, stickers displaying a lit cigarette icon accompanied by distance indicators were strategically placed inside the airport. These locations corresponded to areas where smokers typically initiated their smoking behaviour.
- **Designating zones for smoking** – action directing prescription: The ground stickers served as guides, leading smokers to designated smoking zones located at a safe distance from open areas and air-conditioning intakes. These zones, demarcated by square areas outlined with yellow duct tape, featured cigarette icons and yellow cylindrical ashtrays. The consistent color scheme and design aligned with the aesthetics of Copenhagen Airports, making the designated zones visually prominent and potentially more appealing to smokers.
- **Re-arrangement of environmental affordances:** The researchers strategically reorganized elements that could impact smokers' choices. Some benches were relocated outside the non-smoking zones, ensuring that basic comfort affordances were present within the designated smoking areas.

Researchers selected three specific door areas at Copenhagen Airport—referred to as "door 2," "door 4," and "door 7"—based on initial observations indicating a high concentration of smokers. This strategic selection allowed iNudgeyou to **introduce environmental variations and assess the general effectiveness of the solution.** Over a three-month period, each of the three areas **underwent approximately 25 hours of measurement during the baseline observation**. Following this phase, **Copenhagen Airports implemented the intervention permanently, enabling the researchers to resume observations within a few months.** The intervention observations spanned 24 hours, resulting in a comprehensive sample of 3,184 observed smokers throughout the observational period. A **noteworthy reduction in non-compliant smoking was observed across all implementation sites**. Given the slight differences among the sites, both **intuitively and in terms of base rate compliance levels, the researchers weighted the effects on each door by sample size**. The results unveiled a

weighted **mean reduction of 49.0% in non-compliant smoking, providing a robust estimate of the overall positive impact of the intervention** (Schmidt et al., 2016)

The UK Behavioural Insights Team (BIT), in collaboration with NHS Blood and Transplant (NHSBT), the Government Digital Service (GDS), the Department for Health (DH), and the Driving & Vehicle Licensing Agency (DVLA), **joined forces to investigate the effectiveness of behavioural science-informed interventions in boosting organ donor registrations in the United Kingdom**. BIT conducted a trial involving eight different webpage variants, each featuring distinct messaging and images, to assess their effectiveness in **promoting organ donation among visitors.** After completing their vehicle tax renewal, individuals were randomly assigned to view one of the eight webpage variants. The nudges tested included:

1. **A basic request, serving as the control:** "Please join the NHS Organ Donor Register."
2. **Social norms:** "Every day, thousands of people who see this page decide to register."
3. **Social norms plus visual cue: a generic group photo, testing the effect of salience.**
4. **Social norms plus visual cue: an organ donation website logo, testing the effect of salience.**
5. **Loss framing:** "Three people die every day because there are not enough organ donors."
6. **Gain framing:** "You could save or transform up to nine lives as an organ donor."
7. **Reciprocity:** "If you needed an organ transplant, would you have one? If so, please help others."
8. **Call to action**: "If you support organ donation, please turn your support into action."

All interventions, **except for the one utilizing social norms with a generic group photo, showed a positive impact on increasing organ donor registration rates.** The most effective intervention, inducing reciprocity with the question **"If you needed an organ transplant, would you have one? If so, please help others," resulted in 1,203 more registrations compared to the basic request**. Loss framing, emphasizing "Three people die every day because there are not enough organ donors," proved significantly more effective than gain framing, indicating third-party loss aversion influenced registrations. **While the social norms message "everyday thousands of people who see this page decide to register" alone positively impacted registrations, pairing it with a group photo had a negative effect compared to the basic request. The use of a stock photo may have discouraged individuals, perceived as a marketing gimmick.** The trial results guided subsequent NHS messaging, with the reciprocity message being implemented on the government webpage. This change is expected to yield approximately 96,000 additional registrations in one year compared to using the basic request alone, potentially saving up to six more lives annually (BIT,2013).

In another intervention, the UK BIT team worked with England's Chief Medical Officer to test whether **sending out letters with behaviourally-informed social norms messaging could reduce the over-prescription of antibiotics.** Practices meeting the eligibility criteria were randomly allocated into two groups by the NHS Local Area Team. The treatment group received a letter from England's Chief Medical Officer and an accompanying leaflet on antibiotics for patient use on September 29, 2014. The letter **communicated that the practice had a higher antibiotic prescription rate than 80% of practices in its NHS Local Area Team.** The control group, consisting of GPs, did not receive any communication. Over the course of **six months, doctors who received the letter exhibited a statistically significant 3.3% reduction in antibiotic prescribing compared to those without the letter**. This decrease translated to **73,406 fewer antibiotic doses across 790 practices**. The patient-focused intervention did not yield a significant impact on the primary outcome measured initially. Notably, **after letters were sent to all practices in the sample at the end of March 2015, the control group showed a similar effect as the treatment group.** The researchers estimate that their feedback intervention would result in a **0.85% reduction in national antibiotic items during the study period if the control group was also treated** (Hallsworth, 2016).

7.3.3. Behavioural Economics in Public Finance Policies

The Tax-Free Savings Account (TFSA) program, initiated in 2009, **allows Canadians to save money tax-free over their lifetime.** Contributions are not tax-deductible, and there are annual limits. The Canadian Revenue Agency (CRA) **identified that some account holders exceeded these limits,**

with 0.2% making contributions surpassing the legal limit by CAD 75 to CAD 149.99 in 2013. The CRA sought a solution to prevent excess contributions and ensure compliance with TFSA rules.

The Agency conducted an experiment to assess the effectiveness of behavioural "nudges" in reducing excess contributions from TFSA holders. Among 14,822 non-compliant account holders, four groups received different communications:

1. Group 1 received a letter **emphasizing the majority's compliance with contribution room**, testing the impact of social norms messaging.
2. Group 2 received a **letter with simplified information**, evaluating the effectiveness of simplification.
3. Group 3 received the **so-called compliance letter**
4. Group 4, serving as the control group, **received the standard lette**r that the Agency was utilizing at that time. This letter included a pre-filled return form for individuals to repay the tax owed on their overcontribution.

The trial revealed that **the social norms and simplified letters sent to Groups 1 and 2 were significantly more effective than the compliance letter in prompting the removal of excess contributions from TFSA accounts**. All three letters **effectively reduced responses to the CRA**, with only 14-16% of recipients contacting the CRA, compared to 51% for those receiving only the proposed return. Following the trial, **the majority of TFSA holders self-corrected and did not over-contribute in 2014.** Among the 4,000 individuals with excess contributions, **47% of those receiving social norms or simplified information voluntarily removed the money, while only 41% with the compliance letter and 38% with the proposed return alone did so.** This indicates that **nudges, particularly social norms and simplification, were significantly more effective than the compliance letter**. The CRA concluded that using nudges in letters could effectively enhance compliance among TFSA holders, leading to the implementation of a nudge-based letter to replace the standard proposed return package cover letter sent to TFSA holders with excess contributions (OECD, 2017).

The Employer Health Tax (EHT) is a payroll tax in Ontario, Canada, imposed on **remuneration paid to employees and former employees**. Employers in Ontario must submit an annual EHT return for each tax year by March 15 of the following calendar year. In 2014, 7021 employers filed their tax returns late, and in 2015, the number decreased to 6800. The Government of Ontario **desired to determine if incorporating principles from behavioural science into its communications could improve the effectiveness of tax collection from employers**. The Ontario Government conducted a **Randomized Controlled Trial** to assess the effectiveness of incorporating implementation intentions in its communications with indebted employers, encouraging them to fulfill their tax obligations. The trial occurred in 2014 and 2015, encompassing all late-filing employers. **Those with overdue accounts received a collection letter modified to include specific details on where, how, and when to file the overdue annual return.** The inclusion of a direct and detailed plan aimed to stimulate implementation intentions among employers, motivating them to take action. **The intervention resulted in a 4.2% and 6.1% increase in tax filing in 2014 and 2015, respectively, compared to the unmodified letter. Within one month of receiving the letter, the filing rate rose from 45.7% to 49.9% in 2014 and from 46.9% to 53.0% in 2015 when implementation intentions were included**. The trial demonstrated that providing employers with a clear plan on how, where, and when to file taxes enhances the timely filing of overdue returns. **The Ontario Government decided to implement the behaviourally informed intervention in 2016, estimating an annual cost avoidance of approximately CAD 12,000** (OECD, 2017).

In a local government experiment in London (London Borough of Lambeth), efforts were made to **improve tax collection success**. This **locality is highly heterogeneous**, with only 57.1% of residents belonging to the white ethnic group, and significant income and wealth disparities. Taxpayers were divided into four groups. The first group received **a standard tax calculation letter**. The second group **received a modified letter with essential details at the top, such as the amount due, payment deadline, and contact information for inquiries or corrections**. The third group received **a letter with the tax calculation plus information that over 95% of people in the local community pay taxes on time**. The **last group received letters combining a simplified format and a social norm**. This means key information and the message that 95% of taxpayers in the community fulfill their tax obligations

were included at the beginning of the letter. The experiment revealed **that incorporating a social norm had no statistically significant impact**. In contrast, **simplifying the letter with the tax calculation proved to be a successful behavioural intervention, increasing the number of taxpayers by 3.8%.** The most successful outcome was achieved with a reminder combining a social norm with simplified information, **resulting in a 4.3% increase in the proportion of taxpayers** (John, Blume, 2018).

In the years 1995-1996, experiments aimed at promoting voluntary tax compliance were conducted in the American city of Minnesota (Coleman, 2007). The intervention took the form **of reminder letters that included an element focused on morality and confronted taxpayers with perceived social norms.** Taxpayers were divided into two groups: a control group receiving a standard reminder and an intervention group receiving a reminder appealing to morality. In the realm of income tax payments, the focus was on **raising awareness that cheating on taxes is not common but rather a rare occurrence committed by a minority of individuals.** The decision to target this secondary goal was based on survey results conducted two years before the intervention, which found that residents believed 20-50% of people engage in tax evasion. In the letter utilizing the social norm, taxpayers were informed that 93% of people pay taxes on time. **The results confirmed that tax collection was statistically significantly higher for recipients of the letter containing a reference to the social norm compared to the control group.**

Lamberton (2013) concluded **that introducing the option for taxpayers to decide how a portion of their taxes would be allocated (i.e., what it would be used for) could enhance the satisfaction derived from paying taxes and increase tax compliance**. For instance, consumers might have the opportunity to direct **part of their taxes towards various government services (e.g., allocating a portion of their taxes to education, community development, etc.)**. Lamberton (2013) suggested that this effect does not stem from taxpayers feeling that they have successfully allocated the money they contribute in taxes to meet their own needs but rather from perceiving the overall utility derived from their taxes as higher. While this experiment was successfully conducted on a smaller scale, larger implementation of such an incentive scheme would be complex and time-consuming. Additionally, certain areas might lack financial resources, as taxpayers may permanently prioritize specific areas over others, leaving some underfunded.

Castro and Scartascini (2015) conducted an **extensive field experiment** in one of the municipalities in Argentina, aiming to influence compliance with **property tax regulations**. The focus was on individual levels of **enforcement, reciprocity linked to the use of tax revenue, and the impact of attitudes of other taxpayers in the municipality**. Participants were divided into control and intervention groups. Individuals in the intervention group received attachments along with the tax regulations containing information about tax enforcement and penalties, the behaviour of other taxpayers, and how the government utilizes tax revenues. Probit model results **suggest that the sent information meant to deter taxpayers from not paying taxes (e.g., information about tax enforcement and penalties) had a positive, statistically, and economically significant impact on compliance.** Sending such information **increased tax compliance by nearly 5 percentage points**. On the other hand, information about how others in the municipality pay taxes or how the municipality utilizes tax revenue did not have a statistically significant impact. **However, the results indicate that, for the decision-making of some individuals regarding tax payment, information about the use of collected resources and the behaviour of other taxpayers is significant—after accounting for individual characteristics, those who had complied with tax regulations in the past tended to react in the same direction to information about how others comply with tax regulations.**

SUMMARY

Since the initial implementation of the **nudge concept** and the introduction of libertarian paternalism, more than a decade has passed. Over the years, **behavioural science** has been able to provide evidence that **people do not behave rationally**, and in cases where they are confronted with numerous options, it is necessary to **"nudge"** them in the right direction. In this context, **choice architects** play a significant role as they can design choices to guide individuals towards optimal decisions, always under the assumption of free choice.

Today, we observe that many public policies are behavioural, meaning they use to advantage insights from behavioural science. Within this chapter, we highlighted the importance of following specific concepts, such as **MINDSPACE, EAST**, and **BASIC,** to enhance the effectiveness of policymaking. We also demonstrated that behavioural interventions in **policymaking can effectively address significant societal challenges**. In this chapter, we characterized the designs and results of numerous behavioural interventions applied in policies related to **environmental protection, health, and public finances.**

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CHAPTER 8: BEHAVIOURAL ECONOMICS AND ENVIRONMENTAL DECISIONS

Behavioural economics is an example of an interesting 'Cross Disciplinary' study because in addition to psychology, **Behavioural economics** is also related to neuroscience, computer technology, artificial intelligence, human evolution, Deep Psychology, and many other sciences are believed to be in the future. The frontiers of behavioural economics will continue to widen. Therefore, getting to know **behavioural economics is probably quite necessary**. Because **behavioural economics** is a science that is gaining popularity and interest. It is used to design policies intended to help nudge each person to make decisions that are more beneficial and appropriate for themselves. But with this same science if it is used unethically, it can have disastrous results. It makes people decide in a direction that creates profits and benefits for the business. It is worth thinking about if users switch **from nudging to spelling the future of behavioural economic. The behavioural economics is a large field of science** that intends to study decision-making in managing limited resources to meet unlimited needs. By using economics and psychology to combine knowledge to understand the irrationality of humans in making various decisions. What is popular and people are very interested in these days is the **behavioural nudge theory** (Loewenstein, Brennan & Volpp, 2012; Thaler & Sunstein, 2008; Kahneman & Tversky, 1979).

8.1 Cognitive Biases and Environmental Decisions

Daniel Kahneman and Amos Tversky are considered the fathers of **behavioural economics** who were the first to develop the theory of **Heuristics and Cognitive biases.** Daniel himself is also the author of the book called "Thinking Fast and Slow" about the cognitive functioning of the brain. This expresses as: **System 1**) Think using intuition and **System 2**) Think using reflection which is also an important variable in the work of various biases (Tversky & Kahneman, 1974). The thoughts have various limitations. These various limitations cause someone to have biases, which are inherent to human beings. Cognitive limitations cause errors in the thinking process called **"Cognitive Error"** that will affect perception, discrimination, and decision making. It makes him act or think things not according to what is appropriate as it should be. This mistake often happens 'regularly'. And it creates obstacles that often destroy his reasoning without realizing it. For example, one tends to overestimate his own knowledge. Making the **risky decisions**, one chooses to receive only information that will confirm his previous **beliefs.** But even so, there are some advantages to thinking mistakes. There are some situations where one must use speed in making decisions such as avoiding danger. Therefore, it can be considered that having these errors makes him human and able to survive.

8.1.1 Key Cognitive Biases and Implications for Environmental Decisions

Because Cognitive Biases in each person can occur in every process of product development. Therefore, one will not classify specific processes into categories because categorizing them limits the possibilities for interpreting and applying **"Cognitive Biases**" to each process shown as:

Confirmation Bias:

Someone is biased in choosing to receive only information that confirms his previous beliefs. That is, he tends to filter out new information that contradicts his views or beliefs. This bias happens very often. It shows in the Figure 8.1 Confirmation Bias (Tabrizi & Aghdaei, 2021).

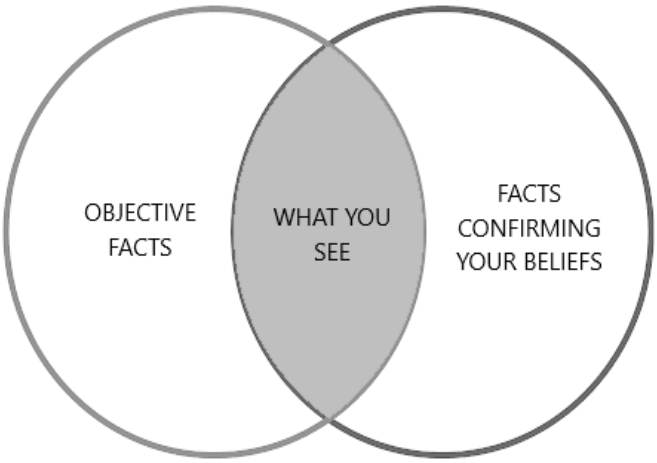

Figure 8.1 Confirmation Bias

The example from Tabrizi & Aghdaei (2021) explains that after the executive team selects a strategic plan, everyone on the team prepares to celebrate anything that shows the plan is working. No matter where he or she look, he or she will see supporting evidence. But one has not seen any signs to the contrary or saw it but quickly overlooked it.

Framing Effect:

In the same matter, one person can produce different results. It depends on how the information is framed and conveyed in what sense. Simply, it is not about what he says, but it is how he says it. Even though the main idea is the same if communicated in a different way, the results will be different. Therefore, one should be careful of the words he uses whether it is researching, collecting feedback, asking for opinions. Because framing has a direct impact on the listener, which makes the results unbiased.

For example, during the period when credit cards and stores became popular, some stores must increase product prices if customers pay by credit card. Of course, credit card companies do not want that. He wants credit card use to be seen as free. So, it made the store adjust its words to be “Paying by credit card is the 'normal price' and paying by cash is used as 'normal price' or 'Special discount price'” instead (Traub, 1999).

Social Desirability Bias:

Because humans are social animals. It is not strange that he likes to talk, answer questions, or do things that present himself to look good. Even though it is not true, if one asks, “Has anyone ever been unable to shower?” Most will answer never. But there must be some truth (Sheng, 2015). This simple example causes one to be fooled by the answer results when he does questionnaires, market research, etc. Therefore, it is important to set and adjust the questions. Questions that will make that person tell his story, complain about the topic that one wants to know about.

Availability Heuristic:

When making decisions one often gives weight and believes that information is accurate, if his mind could easily imagine that matter, especially with fresh data. For example: The team was excited to make the decision to switch to a Chat Bot system and respond to both buyers and sellers. Because everyone has only seen the media talk about it being good; also, plus the news just came out this morning. Of course, if everyone does not consider the probability from finding reliable information and study the suitability of that information with the actual company or products. It may result in the incorrect decisions and lead to retribution that will cost on both time and money.

Clustering illusion:

Someone will accidentally focus on and believe in small pieces of information that this is a pattern. This is what he is looking for. It is an optical illusion caused by the clustering illusion phenomenon.

For example, do not just believe the estimated results. 'That more customers come to buy things'. It is because one just changed the look of the site last week. In fact, the pattern or the results that come out might just be randomness that just happens to be similar. Because using data that is too small will cause high fragmentation and inaccuracy. It would be better if one interpreted the hypothesis to answer something from a slightly larger amount of data. It would enough to make the results different from the original and look like a stable pattern, whether it is Qualitative or Quantitative data.

Focusing Effect:

Someone places too much importance and emphasis on one thing until it makes his or her overlook other related matters such as the research by Schkade & Kahneman (2009) conducted an experiment that measured the happiness of Californians and Midwesterners "which city's people will be happier?". As a result, most people responded to Californians because everyone focused on the image in their heads of California of clear skies and good weather. Although it had little to do with the happiness of the townspeople. So, what harm does focusing so much have? It prevents his or her by looking at the picture carefully and comprehensively, leading to decisions that may not be in his or her best interest or a condition occurs that causes previous problems to be preserved. Because there are new things that one thinks should be done more. This will affect the prioritization of work as well.

Bizarreness Effect:

When one has a lot of information, he tends to ignore the normal information and tends to give importance to information that is different and too obvious from other people's faces. This bias should be given importance. For teams that are looking for patterns to find insights, such as doing data analysis, where one focuses on things that are obvious from everything else and ignores other things. It may cause him to be deceived by information. and leads to setting strategies that are not accurate.

Curse of Knowledge:

One needs to make sure that what he says is understood by not only him or his group. Avoid jargon but if it is difficult to avoid, try to give a brief explanation about the word. It is worse than not understanding is misunderstanding. Thinking that others will already understand what he is saying. As a result, when explaining to anyone, they are not as clear as they should be. Part of this is due to overestimating the listener's baseline, causing him to think that they understand what he is saying. This is important in matters of communication that may cause misinterpretation and misunderstanding including communication regarding the team's project overview, explaining the possibilities of new technology, and explaining the products and products to users or even pitching to find investment funds with investors (Shatz, 2016).

Groupthink:

Ignoring or agreeing with everything, it often happens in organizations that have a lot of ties to each other. This kind of illusion will occur by thinking that they will never fail if the leader or most of the team members believe that. Otherwise, if a lot of people on the team think in one way, he or she will think that his or her idea that contradict theirs must be wrong called "The Illusion of Consensus". This has happened with many decisions that have had serious negative consequences. Aside from the destruction that will drive all together, blindness will not create alternative solutions and will stifle individual creativity. Do not view arguments as counterproductive if his results in the team becoming aware of an overlooked perspective. Sometimes one must express his honest opinion even if his teammates do not like it. Be reasonably suspicious of other people's assumptions to prevent the spread of things that should not happen. This is like "Bias" that may be familiar to one is called the Bandwagon effect (Kiss & Simonovits, 2014).

For example, in 2001, the case of the world-class airline Swissair, the highly paid consultants and CEO were proud and confident of their past successes. They expanded their business with high-risk strategies such as buying multiple European airlines. They agreed that even reasonable arguments were ignored. In the end, their decision was to bankrupt themselves (Hermann & Rammal, 2010).

Omission Bias:

The inaction will make him feel less bad about what happened than if he had acted. Because he is afraid that the results will not be good. So, he chooses to stay still and do nothing such as some employees choose not to come up with ideas in new project meetings. Because they fear that if the

idea does not work, it will make them look bad and other people will think that he sucks. One knows that taking action that he feels confident in and makes sense of might prevent damage or has a positive impact in the future. But he chooses not to do it. This is what is happening in society in general. In the 1960s, American writer and political activist whose name is Eldridge Cleaver who was one of the best known and most recognizable symbols of African American rebellion in the 1960s. He came out with the slogan: “If you are not a part of helping to find a solution to the problem. You are part of the problem”.

Pro Innovation Bias:

In this real world, everyone is the people who like new things or crazy about technology, new innovations and believes that it would be extremely cool if used in the company or product that we make. As one gets excited about the words 'New' and 'Innovation', he often overlooks the possibilities its limitations and weaknesses. It is not that new things are bad. Because everything has advantages and disadvantages. It is up to one how he manages it. Before one use thing he must invest effort in developing and studying before he wastes time and money. He should take the time to study its feasibility and scope to use it or he must ask the question: 'How can I know as quickly as possible? that it can really be made into something real and what to do to know if it is possible to work'. Going back in 2001, the Segway company announced its launch as it was dubbed "future transportation" and received $160 million in funding, but game-changers did not like it as much as they thought when it was actually in use “. It is suitable for use in buildings but not suitable for the street, and it still looks like a fat person. It is also lazy, expensive, clunky and stupid.” Peter Shankman said, “The technology was awesome, the world just wasn't ready for it” (Golson, 2015).

Overconfidence Effect:

Overconfidence it does not just happen with big companies that have to work with a lot of people, but also the small companies, working within a team or even working alone. Be aware of tendency to evaluate abilities. The knowledge is too high. In addition, sometimes it also affects not being able to work as a team and being at risk of making incorrect decisions. Because he thinks he is confident that he knows this well. He can do it himself. The phenomenon of overconfidence, it makes one fool into thinking that he is more skilled than he really is. Whether it is predicting things including evaluating his own abilities that he thinks he is very good at. But the truth is, it is just being overconfident. In the past, there has rarely been a major project that was completed ahead of schedule and cost less than estimated but opposite. It can be seen from the fact that the budget is continually increasing and must be postponed. For example, the Airbus A400M military transport aircraft project, the tunnel project called Gotthard that is the longest railway tunnel in the world, but it has used to build for 17 years, and many more. When doing anything, think of the pessimistic situation, then you will assess the situation more realistically. This can be used with many things. Since the project creation plan to allocating tasks that are appropriate for the people on the team.

Planning Fallacy:

One tends to underestimate the time it takes to do something. This happens when he estimates time for himself because he has an “Optimism Bias” that makes him too optimistic. But if other people come and evaluate the time for him, he will overestimate time because he has a “Pessimistic Bias” that tends to be more negative than normal. This bias will overlap with Previous Overconfidence Effect.

For example, in 1994, there was a classic study by a psychology professor who asked undergraduates to estimate how long it would take them to complete their thesis. On average, students said they could finish in 34 days, in the fastest case 27 days, and in the worst case 49 days, but most took an average of 55 days (Buehler, Griffin & Ross, 1994). Therefore, being too negative or too optimistic may cause his or her to make incorrect predictions about his or her own performance over time. But if he thinks about both sides, try to weigh them equally. It may help in evaluating things that are closer to reality. And even more so if he underestimates the completion time and did not finish it in time as planned. It may also affect his own confidence to think that he did not complete anything as planned at all. It will take him out of energy to work for nothing.

Social Loafing:

When it is not possible to clearly see how dedicated each person is to that work it will cause a phenomenon called “social labor”. Most of the time, the effort is often swallowed up by the dedication of the entire 'team'. Social labor is more common in tug-of-war than in relay races. Because relay racing is a sport where it can be clearly seen how dedicated each person is. But eating hard happens unless he thinks 'Many others have done it. There is nothing wrong with saving a little more. It happens even when he does not even realize it. When he works as a team: The bigger the team, The more likely it is that labor consumption will occur. When effort occurs, efficiency will decrease. But it will not stop working. Because if he stops, there will be other people who will notice his laziness. Another reason for overeating is in addition to being on a team where he does not have to be fully involved, the responsibility also does not belong to him alone. This is called “Diffusion of responsibility or distribution of responsibility”. Therefore, in arranging the duties and responsibilities of each person, duties should be clearly allocated. Determine who will take which matter as the main issue. In addition to being able to clearly see the dedication of each person that will help in reducing the symptoms of overwork. It also increases the efficiency of the team's work very well.

Action Bias:

Of course, acting is a good asset. Not only with leaders but one often gives importance to stopping to reflect, to observe the situation or exploring the root of the problem less than thinking that something must be done, take it easy and slow down. Do not forget that the things one does will have long-term consequences. Things that one does in a bad way may create additional problems for him or her and make it even more difficult for him or her to find the root of the original problem. Because he probably cannot imagine that what he tried to do to solve the problem will come back. It is the problem itself. If one is going to do something, gives importance to reflection. And gradually try to use it, such as with prototyping and testing. It is better to do it quickly and save the most budget. The bias of believing that action must be taken. Even though in the end, what one did was hardly anything or one did not get any benefit from it. It often occurs in situations that he is not familiar with and is full of uncertainty. So, one chooses to do all this and that without restraint. This bias has its origins since ancient humans still had to hunt. Of course, at that time acting was more important than pausing to think for survival itself. But nowadays, sometimes doing nothing at all does not always have good results.

Hindsight bias:

One often likes to pretend to understand problems that has happened or has passed. Which when he knows the results of it, he likes to say, 'This is it, he expected it to be like this...' by making an assertion without any evidence at all. It is also called “I knew it all along” phenomenon. Because thinking like this makes, he thinks. He is exceedingly good forecasters. This results in him having too much confidence in his own knowledge and ideas in sense of “arrogance, intolerance”, causing decisions that are too risky. Good or bad, it will make him a person who has never learned from the mistakes of the past (Soros, 2015).

Fundamental Attribution Error:

It is well known how useful “Complain” or words that customers complain about are. But if one blocks the noise from the servant. It means that he blocks the opportunity to develop his own things. Maybe these complaints are the way to make his business break even. Often, one will be biased towards his own mistakes. For example, if he is wrong about something, he will say that it is because of other factors that cause him to make mistakes. But if someone else made a mistake, he will see it as purely their owns. Simply put, its bias. For example, when one listens to the company's operating results for better or for worse, all eyes are on the CEO, even though he knows that they really are. The success of a business depends not only on the cleverness of its leaders, but also includes many factors, including the overall economic condition (Dobelli, 2014).

Sunk Cost Fallacy:

When one is dedicated to doing something even though he thinks that it does not seem useful or has negative effects such as time, money. But he will still push through and finish it. He often hears words like, “We have done a lot…”; “I have been studying this field for two years now…”; “I have paid a lot for this project…” If he is familiar with these words, it means that he has experienced sunk cost fallacy. One will be motivated to complete the task. Because he has put in effort, money, and time into

it. Which is a good thing if he can get the job done. But it becomes bad immediately if he knows that what he is doing is not beneficial or does not meet his goals or usage. So, do not let 'getting it done' be 'forcing it to get done'. The sunk cost fallacy is related to bias called “Loss Aversion” meaning that one often fears loss more than fears of not being happy.

Peak End Rule:

The Peak–end rule can be applied to sales and user experience design. 'How do we make our customers have good memories after they come to use our services?'. One tool that will allow us to see an overview of all our services from the moment the customer enters, services of employees in every point where customers can reach. People tend to judge stories, events, or recent experiences as good or bad based on 1) Peak episode and 2) End episode. It is easy to compare if people decide whether they like a movie or not. His brain will decide whether the climax scene of the story and the ending is to his liking or not. If they do not like it, they will think that the movie is bad. But in the end, one must be sure that one can really solve problems with customers. This is the most important aspect of the product, rather than trying to please customers.

Bias Blind Spot:

One can easily spot other people's biases more easily than his own. This happens more easily when he knows his cognitive biases. One knows enough to be able to define what biases he has. So, he tricks himself into thinking he is better, that he is wrong, or that he is biased. That is less than others even though he is not very good at avoiding his biases.

8.2 Behaviour – Based Policies for environmental protection

In the 19th century, it was discovered that the brain affected human behaviour, for example, Paul Broca discovered the area of the brain involved in language formation. This area was named Broca's Aphasia or Carl Wernicke discovered the area in the brain. That is responsible for language comprehension. This area became known as Wernicke's Aphasia. Therefore, interest in a new type of psychology began to arise. It is the psychology called “Cognitive Psychology”, which some people call it Cognitive Psychology.

The Behavioural Science Foundation

If the market is truly efficient, **why do financial crises always happen**? Why do we "break the brakes" and eat our favorite things until we forget? Why do we always lose to “price tags”? The principle of economics believes that humans are rational. But many times, humans have this kind of "mindless" behaviour, aren't they?

Richard Thaler, Professor of Behavioural Economics, at Booth School of Business, University of Chicago is one of the pioneers in applying psychological research results. Until many studies indicate that there are many **behaviours of real human beings**. That contradicts the general assumptions of economic theory that people are **rational and selfish,** such as the fact that people sacrifice benefits to punish those who take advantage of others, and the “banker's money phenomenon” that makes us take more risks in gambling games.

Nudging Toward Sustainability

In addition to using **behavioural economics** to help making decisions about various matters in life, everyone can also use this way of thinking to help design public policy. The most common method that policy designers choose to use is 'nudge' or 'nudge', which means creating an environment or conditions that motivate people to make decisions in the way the government expects without issuing any mandatory regulations. Many countries use this concept to help design policies. While some countries are so serious that they have set up agencies specifically to work in this area, for example, England has **'The Behavioural Insight Team',** also known by the nickname **'Nudge Unit'**, to provide advice to the Cabinet. **Using experiments and behavioural economic analysis to help**. It has become another important cog that plays a role in managing the COVID-19 problem of the British government so that everyone can see more of the picture using example of the campaign called the **Financial**

Services Authority (FSA), a former independent organization that was responsible for regulating and overseeing financial products in the UK for a time.

At the time, the agency faced a problem with people often making bad financial decisions or choosing to buy financial products that are not suitable for them. The agency tries to provide financial knowledge to the public as much as possible. But it was not as successful as it should have been. They consulted a group of management professors at the London School of Economics and Political Science to help analyzed the issue. This group of professors has summarized the true roots of the problem into three points: Providing too much information may not be as beneficial as you think. Product sellers have a great influence on consumer decisions. And financial knowledge hardly helps at all. Because people often **make decisions based on their emotions and personal biases**. From this analysis, FSA has a better understanding that the problem is not caused by people's lack of financial knowledge. But it is a natural matter of human nature. So, they changed from giving a magnificent information to the people or forcing financial institutions disclosing the complete information to enact rules to change the way these financial institutions operate. Later, the agency banned financial advisers receiving commissions from financial product sales. As a result, they began giving advice that was more tailored to their customers' needs instead of choosing to recommend only the products that agency is currently doing well.

Information-Based Initiatives

The development of **Cognitive Psychology** is related to technology in many areas, especially 'War technology' in World War II. Because both warring sides want to understand how to 'use' their own soldiers most effectively. This has led to the granting of enormous funding for research in this area. But one more thing Economists themselves are dissatisfied with their own framework. Because it is not enough to describe the world. So, I had to turn to other sciences as well. Now, with the advent of computers and developments in medical technology related to the brain, especially neurology or Neuroscience, the more Cognitive Psychology advances when new psychology that is more empiricist is combined with economics. As a result, the economics of the Rational Actor Model has gradually been reduced in importance, with new Models of Rationality emerging in its place, models that are more 'human' and not just 'economic animals' only. It turns out that this human model is a less 'rational' model. That is, more irrationalities, but it is better at explaining human economic behaviour in the 'real world'. Research in Behavioural economics is becoming more common.

Incentives and Disincentives

Research is said to have two characteristics. The first is to use discoveries in psychology to explain economics such as the work of George Akerloff or Alvin Roth. The second is the opposite, 'importing' economics into psychology such as the award-winning work of Daniel Kahneman, Nobel in 2002. But in the end, these two things blended and began to expand its borders to other sciences, such as game theory, to predict the **behaviour of consumers and society**. That are not completely rational, but have become more accurate, until now **behavioural economics** has become a 'pop science' that everyone must talk about. There are books on **behavioural economics** that are overflowing in the market. Someone predicted that **Behavioural economics** would continue to prosper for at least another five decades, counting on Richard Thaler's Nudge Who is the co-authored with Cass Sustein, the book that created a sensation in **behavioural economics** and world class. This book caused many changes in **public policy.** The essence of it is Nudge or creating conditions in the form of 'poking and nudging'.

However, there are those who criticize it. **Behavioural economics has its own set of problems**. Because **behavioural economics** is a science that uses the 'subconscious mind' of humans that often cannot be explained. The subconscious mind is a closed 'black box'. **Behavioural economics** does not directly study this black box. But use the indirect method called Nudge to bring about certain results as desired.

Social Norms and Community-Based Approaches

Norms play an important role in **regulating the relationships of individuals in society, helping to control individual behaviour**. It is as society desires to create a good pattern. It helps to regulate **how humans in a society can behave**. Quickly and accurately, without wasting time thinking about how

in such a situation and What should he do or how should he do it? **Norms** arise from the fact that people in a society act or refrain from following the maxims of that society until they become a pattern or tradition. **The maxims often have important roots in religious beliefs**. For example, a society may have traditions. Killing a goat to worship God causing such norms to arise. In addition, values are an important foundation from which the norms are derived. In sociology, it means **behaviour and roles within a society or group**. This word is defined as: The rules by which the group for distinguishing values appropriate and inappropriate attitudes. **Behaviour such rules may be explicit or implied.** Those who do not conform to social norms may be severely punished which may lead to exclusion from the group. Describing it as "Rules of behaviour that coordinate interactions with others".

Technological Innovations in Behaviour-Based Policies

In the future, **behavioural economics** will become even more 'fun' as technology becomes more advanced. Technology in neuroscience will allow the 'black box' to be opened more and more because it can more accurately 'pin' which **behaviours are caused by brain activity** or chemicals in the body. When combined with other new sciences such as evolutionary psychology, etc., including communication technology that will create Big Data in many dimensions. It will allow **behavioural economics to use these sciences to analyze human irrationality more and more deeply.**

Challenges and Criticisms

New questions that **behavioural economics** has begun to ask and must continue to be asked in the future. There are many points, such as the choosing **behaviour of each human** being as an individual. How can it be grown and scaled up to become a joint decision of a large group of people? How can collective decision-making among large groups of people grow into a macro-economy? The complexity of 'players' in society in terms of economics that will occur in the future. How can financial or economic institutions regulate the financial system? There will be new financial models. How can it come from behavioural economics?

Success Stories

Behavioural economics is an example of an interesting 'Cross Disciplinary' study because in addition to psychology. **Behavioural economics** is also related to neuroscience, computer technology, artificial intelligence, human evolution, Depth Psychology, and many other sciences are believed to be in the future. The frontiers of **behavioural economics** will continue to widen. Therefore, getting to know behavioural economics is probably quite necessary. **Behavioural economics**, it is a new field of economics that has great influence in both academics and policy, such as the field of behavioural finance that is a new star in the financial world, the **"Tomorrow will save more**" project, which helps solve the problem of people not saving enough money for retirement and "nudges" to remind people not to forget to take medicines that are very important to life. **Behavioural economics therefore provides a way for us to develop existing theories and improve public policy to provide enormous benefits to many people who are earthlings. It is not a hypothetical human being that exists only in theories.**

Case Studies

"Behavioural Economics will look at the decision making of people as the main thing developed from the foundation of the original concept of economics that believed that people make reasonable decisions all along. But later behavioural scientists began to prove that People do not always make rational decisions". Applying the concept of behavioural economics can be divided into many approaches. For example, the work of the House of Lords (the upper house of the parliament of the United Kingdom) is an example. He concluded that government agencies or groups of organizations that want to change behaviour can be divided into groups.

Case Study 1: The Power of Defaults - Organ Donation (Jaipuria, 2018)

A lag of organ donors is decreasing since 2000s. The policy makers consider trailing with changing the default option for organ donation on form. Hard-core economists consider that a market for buying and selling organs should be allowed. For example, each of us has two kidneys, but we only

need one kidney to live. So, if kidney trading were allowed, this will cause more kidneys to circulate in the market. This creates an opportunity to save the lives of more patients who need a kidney transplant. But the idea of an economist who looks at everything including organs is money like this. Ordinary people can't accept it. Because you can resist buy and sell organs. Rich people pay ahead of the queue to buy organs. In the future, there may even be a competitive auction for organs while poor people will be pressured to sell their organs to make ends meet. More importantly, people's feelings Organs are not objects that can be bought and sold. People are not objects. The method to increase organ volume is people must be encouraged to express their wishes in advance that they want to donate their organs when they die. The success of this intervention in Australia demonstrates the potential for applying behavioural insights in policy design beyond traditional economic models. Because acknowledging inertia and reducing the friction for desirable actions can lead to substantial positive outcomes. The same as in UK, previously, organ donation in the UK is a system in which those wishing to donate their bodies for medical use must approach various institutions that accept donations themselves. To provide personal information and make a body donor card which according to the point of view "Push Theory". The inconvenient system will be an obstacle to increasing the number of people wishing to donate their bodies. Even though many people already have charitable minds and want to donate. There has been a change in the donation system. From a system in which each person expresses their own wishes (opt in) to a system in which health service agencies throughout the country will first consider everyone who dies as a body donor. But a form will be given out to everyone in advance. So that people who do not wish to donate can choose to mark the blank space to indicate that they do not wish to donate their body as well (opt out). This system is more convenient for the public. This causes the number of body donors to increase automatically.

Case Study 2: Gamification for Energy Conservation - Opower's Home Energy Reports (Allcott & Rogers, 2024)

'Energy' is essential to all our daily lives. The Ministry of Energy has launched a campaign for all citizens to use energy. Economically, cost-effectively and with maximum benefit. To conserve energy for continued use in the future and ways to save energy. It can be done easily in a variety of ways.
Opower, a software company specializing in energy efficiency solutions, recognized the potential for gamification and behavioural psychology to drive energy conservation. The results were impressive. Opower's program consistently led to a reduction in energy consumption among participating households. The combination of personalized feedback, social comparison, and the gamified approach successfully engaged individuals and motivated them to adopt more energy-efficient practices. Organizing simple activities is achievable and has clear results. It helps motivate the organization's personnel making the change behaviour in energy used and volunteers to participate in helping conserve the building's energy even more. The more you do activities, the more knowledge you gain. The more you do activities, it is even more fun to meet new friends. Energy saving is to use energy wisely and use energy efficiently.

Future Directions and Policy Recommendations

Improving the behaviour of government agencies usually ends with the use of laws and regulations to capture them, such as prohibiting the use of drugs, or reducing them, such as controlling smoking places. or the requirement that places selling alcohol not be near educational institutions. In addition, there will be the principle of persuasion. Providing knowledge through experts and that is often found. That is, using fiscal measures such as collecting taxes or providing financial and fiscal benefits, such as when one wants people to consume or buy EV cars, using the way of reducing the tax on EV cars. The part that behavioural economists are very interested in is the concept of nudge. It is a behaviour adjustment that is not caused by prohibition. or eliminate options. Instead, one uses behavioural economics to create tendencies in choosing what he wants to be. Moreover, changing the way one uses words to communicate, it is one way to frame the situation and options for people to decide what they should do more, such as measures to encourage tax payments to be made on time without evading. During the time of former Prime Minister David Cameron of the United Kingdom, the Government Behaviour Unit has designed a variety of messages to communicate to taxpayers, such as

revealing among the taxpayer's co-workers. Has anyone already filled out the form to submit income tax? who believe that adhering to the norms of their society. It will help that person start filling out forms to file taxes as well. In the case of those who refuse to pay car tax, the British government at the time used a large headline on their warning letters: "Pay your taxes or lose your Ford Fiesta" (if the person's car is a Ford Fiesta) and include a photo of a vehicle for which taxes have not been paid too. Messages offering only two options fuel fear of car loss. Until having to choose to pay taxes immediately.

8.3 Case Studies: Behavioural Interventions in Environmental Policy

According to the article called **What Can Be Learned from Behavioural Economics for Environmental Policy?** (Pasche, 2016) It can confirm that environmental economists have shown interest in **Behavioural Economics** as it can provide insights into why individuals may not respond to environmental policy measures, as anticipated by neoclassical assumptions and theory. Additionally, gaining an understanding of the motives and driving forces behind pro-social, pro-environmental, and **cooperative behaviours can contribute to enhancing the design of environmental policies**. This paper aims to critically discuss how the field interprets the explanatory power and normative implications of **Behavioural Economics** in this context. For example, cafeterias in foreign countries arrange food in rows. It is like a buffet banquet in a hotel. People would line up to scoop up the food they wanted. If one changes the order in which nutritious food is placed first, such as salad, vegetables and fruits are placed, people will pick them up first. The parts that may not be good for his health are placed last. Or an example that is often cited is placing a sign on hotel towels that says “75% of people who stay before you reuse their towels.” This kind of message will help reduce people changing towels. Hotels also save on the cost of cleaning towels and the environmental costs of laundry detergent. It is not an informative message. But what do most people do?

Case Study 1: Plastic Bag Bans in California (Beam, 2024)

The case study of plastic bag bans in California underscores the effectiveness of combining legislative measures with behavioural interventions to address environmental issues. By integrating education, community engagement, and incentives, the state achieved a significant reduction in single-use plastic bag consumption, contributing to a more sustainable and environmentally conscious society. This case serves as a valuable example for policymakers and environmental advocates seeking comprehensive approaches to tackle plastic pollution and promote sustainable behaviours.

Case Study 2: Energy Conservation in the United Kingdom (Gorge & Morel, 1982)

The case study of energy conservation in the United Kingdom demonstrates the effectiveness of incorporating behavioural interventions into comprehensive energy sustainability initiatives. By leveraging social norms, competition, and positive reinforcement, the program successfully engaged individuals in the collective effort to reduce energy consumption. This case serves as a valuable example for policymakers worldwide seeking to address energy challenges through a combination of policy measures and behaviours-focused interventions.

Case Study 3: Water Conservation in Australia (Dolnicar, Hurlimann & Crun, 2012)

The Australian case study on water conservation underscores the importance of integrating behavioural interventions with policy measures to address environmental challenges. By combining regulatory restrictions with community engagement, real-time feedback, and incentives, Australia achieved significant reductions in water consumption during drought conditions. This case serves as a valuable reference for regions worldwide grappling with water scarcity, showcasing the effectiveness of a holistic approach that considers both policy and individual behaviours in achieving sustainable water management.

The Complex Tapestry of Procrastination: Understanding its Applications Across Various Domains

Procrastination behaviour (procrastination) which is commonly seen among humans, for example, one often plans that in the next month he will save more money, exercise to lose weight, intend to read books or telling the feelings to the person he secretly likes, etc. But when the next month comes, he does not follow the plans he had previously laid out and postpone the plans he had planned again. Even though he knows that procrastination behaviour is detrimental. The economists whose names Ted O'Donoghue of Cornell University and Matthew Rabin of the University of California which is trying to research to answer the question: Why do people procrastinate? They explain that procrastination behaviour having two components:

1. Satisfaction with the present or present-biased preference
2. time inconsistency

As their example, if a millionaire bequeathed 100 million dollars, would you want to receive the inheritance today, next year, or 10 years from now? That is, we tend to give different weights or values to what we consume at different times. The same thing, if consumed in the present, will have more value than if consumed in the future called present bias. And the longer it is consumed, the less value it will receive from consumption. This matter can be used to explain investment behaviour as well. For example, one may always have the best investment plan. For example, when he plans his investment by choosing to invest in 3-5 stocks that he thinks are the best. Will hold to receive dividends until the fundamentals of the stock change? Such behaviour has the effect of the ex-ante optimum plan is different from the ex-post optimum plan. This behaviour is explained by timing inconsistencies and with satisfaction with the present. So, he is once again deferring his best plans to the future and procrastinate without end.

SUMMARY

Behavioural economics is a science that is gaining popularity and interest. It is used to design **policies intended to help nudge each person to make decisions** that are more beneficial and appropriate for themselves. If it is used unethically, it can have disastrous results. It makes people decide in a direction that creates profits and benefits for the business. It is worth thinking about if users switch from nudging to spelling. **Behavioural economics is a large field of science** that intends to study decisions in managing limited resources to meet unlimited needs. By using economics and psychology to combine knowledge to understand the irrationality of humans is in making various decisions in what is popular, and people are very interested in these days is the **behaviour nudge theory**. Design timing and the appearance of the options to influence the decision. Make people who make quick or quick decisions based on their emotions “choose” what the designer expected them to choose. There is a code of ethics in using it that it must be beneficial to the person, have respect in making decisions and must be able to change back or have the freedom to choose. When there are **behavioural economists** who have good intentions and respect ethics, there is another group of people who use these theoretical principles to make profits. Convince people to "choose to consume" or "buy" products and services that create profits for the business but may not be good or beneficial to the decision maker.

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CHAPTER 9: BEHAVIOURAL ECONOMICS AND SOCIAL NORMS

Behavioural economics has its own set of problems. **Because behavioural economics is a science** that uses the **'subconscious mind' of humans** that often cannot be explained. The subconscious mind is a closed 'black box'. **Behavioural economics** does not directly study this black box. But use the indirect method called **Nudge to bring about certain results as desired**. In the future, behavioural economics will become even more 'fun' as technology becomes more advanced. Technology in neuroscience will allow the 'black box' to be opened more and more because it can more accurately 'pin' which behaviours are caused by brain activity or chemicals in the body. The choosing behaviour of each human being as an individual. How can it be scaled up to become a joint decision of large groups of people? And how can the joint decisions of various large groups of people grow to the macro-economy? How can financial or economic institutions regulate the financial system? There will be new financial models. How can it come from behavioural economics?

9.1 Influence of Social norms on Economics Behaviour

9.1.1 Social Norms

In sociology, **social norms** mean behaviour and roles within a society or group. This word is defined as the rules by distinguishing values whether appropriate or inappropriate, attitudes and proper behaviour. Such those rules, it can express in the sense of either **explicit or implicit**. Those who do not follow social norms may be severely punished which may lead to exclusion from the group. Moreover, the describing it as "rules of behaviour that coordinate interactions with others" (Durlauf & Blume, n.d**). Social norms indicate socially acceptable ways of acting**, dressing, speaking, or appearance. This norm is very different and has evolved not only at different times. But it also includes age differences. social class and social groups as well. **The norms of one group may not be accepted by another group**. Following social norms brings acceptance and popularity within the group. Ignoring social norms can cause one to not be accepted by the group or not accepted. It may even be expelled from the group. Social norms are often the language or non-verbal communication between individuals in general society. Knowing what to say, what to use any specific words, what topic should be discussed, what kind of clothes I should wear and when it should not. Such knowledge is a cultural norm. That is critical to organizing self-expression, which regulates individuals' non-verbal behaviour (Kamau, 2009).

Social norms can be viewed as statements that regulate behaviour and actions as informal social controls. This norm often depends on some level of consent and is sustained by social coercion. There are three forms of norm regulation:

1. **Focuses attention on the actions of one's personal ego.**
2. **Focus on the ego's reaction to another action.**
3. **A negotiation between the ego and another act.**

Norms are rules that govern behaviour. There are both formal and informal forms. But informal norms are found to be stronger than the former. Informal norms can be divided into three types:

1. **Civil way or Folkways**, informal rules and norms violating the civil way does not have much effect. But everyone in the group is expected to follow suit. The civil way is a type of habit of adjustment and consent. Those who do not comply will be reprimanded or given a warning. Moreover, civil way is a social norm that people accept and respect until they become accustomed to it. It is related to the daily life of individuals in society. It does not have content related to good and evil like in the tradition. So, some call it the Pracha way. "People's ways" such as raising hands to worship or wearing black at a funeral. Most of them are behavioural standards. There is no strict control when there is a violation, the violator only receives criticism and gossip.

2. **Tradition or Mores**, informal rules those who do not comply will be severely punished and excluded from that society or religion. Tradition is a norm that defines people in society to behave strictly. Severe controls are in place to prevent violations. People in that society consider such practices to be good and beautiful. The violator is a wrong person, an evil person, etc. Customs are therefore characterized as prohibitions such as prohibiting marriage between blood relatives and asking to be observed, such as having to help others, etc. Which can be considered a tradition? It must be a code of conduct that has continued for a long time. The practitioners feel together that they must comply. It is a rule regulating behaviour just like the law. Traditions evolve from morality, which arises from the feelings and thoughts of each human being about what is right to do. I do not like it. It arises from the conscience of each person. It exists because each person has the wisdom to understand what he or she has done. How will the other party feel? And what will be the reaction?
3. **Laws**, because human society tends to be complex. Therefore, there is a problem of dispute regarding human behaviour patterns. Therefore, it is the duty of society to enact written provisions and laws to control society, maintain peace and order. As well as organizing officers to monitor and arrest violators and punish them are according to the provisions of the law. Therefore, law is a matter of the country or government. It is not a matter between individual to individual. In addition, the law that has come into force may be changed. It is always amended or canceled and re-enforced as appropriate and necessary. Laws are often rooted in the way of the people or the discipline of ethics. Therefore, good laws should be consistent with or not inconsistent with the way of the people and the discipline of ethics.

In some situations, conflicts of **norms may occur the norm-conflict**, that is, a person must choose to follow one form or another. Let us give an example: Mrs. Christmas is the mother of 4 children. Mrs. Christmas has a duty to follow certain standards, such as respecting the ownership of other people's property, that is, not stealing other people's things. At the same time, Mrs. Christmas has a duty to follow the norms that a mother should have for her child. So, Mrs. Christmas had to take care of her children, but because of poverty, Mrs. Christmas had to steal other people's property to take care of their children. Therefore, there will have the "**Social Control"** to manage the human behaviour. The **social control is a social process** of organizing the behaviour of human beings/members of society in accordance with the set goals including **social lawlessness, social disorganization**. One also needs to know many other things, such as social phenomena and what their origins are or social change in what direction it is likely to go and what are the driving factors, etc. And the most important thing of society is culture. It is everything that exists in society which is a pattern of behaviour that society accepts and has been passed down from generation to generation. So that the social control by motivating members to comply with social norms includes praising and rewarding those who comply with social norms according to their status and social role will be the part to learn from **"Economics Behaviour".**

9.1.2 Economics Behaviour

Behavioural economics and related fields are behavioural finance is an academic field of study. Effects of various psychological, social, cognitive, and emotional elements on economic decision-making of both the individual and institutional levels. **Behavioural economics** focuses on limited rational decision making of organizations and individuals. Behavioural models used in the field combine insights from various academic disciplines, including psychology, neuroscience, and microeconomics. Behavioural economics is sometimes referred to as it is a choice of neoclassical economics (Minton & Khale, 2014). What behavioural economics studies includes market decisions and the mechanisms that drive public choice. The use of the term "behavioural economics" in academic literature in the United States has increased steadily over the past few years. The article "Prospect Theory Kahneman and Tversky's "An Analysis of Decision under Risk" (1979) is "the founding article of the field of economics behaviour (Kahneman & Tversky, 1979; Shafir & LeBoeuf, 2002).

One can consider the decision-making process according to the concept of behavioural economics from three important factors related to decision-making: (1) perception (2) preferences (preference) and (3) institutions (institution).

1. Perception

Consists of three important points: Providing news and information, illusion, and framing. In terms of policy, one can change the provision of information, data staging or even an illusion to enable people to have desired behaviour, such as using solid lines across the road with progressively narrower distances at dangerous curves to reduce driving speed, etc.

2. Satisfaction or Preference

Consists of four important points: Decision making using rough criteria called the rules of thumbs, fear of loss called loss aversion, being overconfident and state of mind. Decision making based on crude criteria leads to biased decisions towards certain options that are often based on too much guesswork or intuition. The fear of loss leads to attachment to the original choice called status quo bias. The overconfidence and a state of mind that is stimulated by stimuli causing people to engage in risky behaviour, lack of caution and make decisions without consideration. This causes people to often make wrong decisions. This can be detrimental to oneself and society. As a matter of policy, one should warn and try to avoid the possibility that people will have to use their satisfaction in the four characteristics above.

3. Institution

Consisting of organizations and rules of the game, which means rules, regulations, norms, cultures, or traditions that the people involved hold together. In this sense, institutions inevitably influence people's behaviour. The patterns of relationships between individuals and institutions in behavioural economics can be divided into two types: market norms and social norms.

9.1.3 Social Norms and Economics Behaviour Perspective

Economics is a field of study that plays a **very important role in the well-being of humans in society**. Because it involves the efficient allocation of resources for maximum benefit, economic knowledge must be combined between science as a tool for **analyzing problems and art in interpretation to lead the policy recommendations that are appropriate for each society**. For this reason, "**Experimental Economics**" is a science that uses the principles of scientific experimentation to answer social questions, which in this case refers to the process of collecting data under a carefully determined environment. Intention of the researcher makes it possible to change the variables in the experiment. To clearly study the decision-making process or the impact of variables on educational outcomes (Smith, 1994). Many people think that **'Behavioural Economics'** is a new science that has only recently spread. But, if you go back to 2002, there was a behavioural economist who received the Nobel Prize before Thaler. That person is Daniel Kahneman. Kahneman is half-American Jewish. He is a psychologist who studies decision-making and judgment. And therefore, it is also related to behavioural economics. He is 'Father of Behavioural Economics' along with Amos Tversky, 'Mathematical Psychologist' is the study of psychology using various mathematical models coming to grips with all mental processes and thoughts. Kahneman and Tversky's collaboration is a perfect pairing. Because one side is interested in social and behavioural sciences. The other side is interested in numbers and calculations. The results came out like the 2002 Nobel Prize said: 'Integrating knowledge from research in psychology into economics, especially in areas related to various decisions. under uncertain conditions. People make decisions with reason or rationality. Because many people's behaviours are not like that, behavioural economics has been created to explain those behaviours.

The behavioural economics is like a marriage between economics that focuses on profit, money and psychology that focuses on the brain, behaviour, and society. **Behavioural economists view that humans (individuals) have emotions and feelings that cover decision-making**. In biology, there are two parts of the brain that play a role in thinking and decision-making: the frontal lobe and

the limbic system. The frontal lobe tends to be used for slow, logical thinking. As a result, while the limbic system occurs more quickly It is automatic and related to emotions. All human beings have "Economic man" who makes rational decisions. **Our thinking is divided into two systems**. The first is a system of intuition. The second is a system of rational thinking. More than 95 percent of our daily decisions are made through our first system, and only 5 percent by our second system. That is, when we have a need **The first system** makes purchasing decisions quickly. Because if we do not buy it, that is when the **second system works**. To analyze worthiness or necessity, such analytical thinking uses a large amount of the body's energy. Buying on the spot is considered to save the body's energy. Brain mechanisms involved in dual-system decision making, we are faced with many choices. **Cognitive bias** consists of four situations in which we are forced to ignore careful decision-making: too much information, not enough meaning, and needing to make decisions quickly. We need to act fast and what should we remember? Theory that will influence decision making and is expected to be useful for solving those problems. The first theory is priming. **Priming** (meaning preparation of perception) is a phenomenon related to implicit memory in which exposure to one stimulus influences response to another stimulus. The influential experiments of David Meier and Roger Schwaneveldt in the early 19th century (Meyer & Schvaneveldt, 1971; Schvaneveldt & Meyer, 1972; Meyer, Schvaneveldt & Ruddy, 1975). Their original work showed that team can more quickly decide whether consecutive letters form a word if the words follow words that are related by meaning or relationship. The phenomenon of priming can occur because of the repetition of a stimulus, whether it be perceptual, semantic, or conceptual. Another theory is anchoring. In the field of psychology, the English word "**Anchoring"** meaning to establish a foothold or focalism refers to the **cognitive biases of humans**. The tendency to rely too much on first information when making decisions. This phenomenon occurs when one considers the first information obtained in evaluating the unknown which will become the principle that will be used later, and once the principle is established. Subsequent evaluations will adjust the cost of using that primary data (Kahneman, 2011). Therefore, there may be bias because subsequent data are interpreted as values close to the baseline that may not be relevant or unreasonably (Tversky & Kahneman, 1974; Kudryavtsev, Cohen & Hon-Snir, 2013).

9.2 Harnessing Social norms for Sustainable Outcomes

9.2.1 Harnessing Social Norms

It is well known that humans are social animals because they like to socialize and need to communicate with other people. To feel safe and survive humans therefore live together as a society. Human society arises from being a member of a group of any group. A group here refers to two or more people interacting with each other. The smallest group is the family group, which consists of a husband, wife, and possibly children. For nuclear families, some families may have more members because they live together with relatives (Kinship), such as having grandparents living with them, which is a characteristic of an extended family (Extended family). Groups that are larger than families include groups in the community (Community groups), groups in educational institutions (Institution groups), groups of friends at work (Colleague groups), groups of people who work in the same profession (Professional group), etc., where each human being may be a member of many groups depending on the context. For example, when one is at home, he is a member of the family. And when he goes to school, he is a member of the school, etc. Human social grouping leads to learning together caused an increase on the strength and bargaining power of the group and made it more likely to survive. When humans live together in groups, there is interaction with each other, such as communication and doing activities together. **However, each human being has different attitudes, temperaments, likes and dislikes.** Therefore, when humans come together, it will be the differences inevitably lead to disagreements or there may be conflicts that may occur. **The conflicts and disagreements may create problems and divisions in the group.** Most humans want everyone in their group to live together peacefully. Humans therefore must have control over each other. **By creating rules, methods and tools have been developed to control people in society to accept and follow**. Each member of a group wants to be accepted by other members of the group. Therefore, **the rules and regulations that the people in the group have created must be followed so that the people in the group can accept them and live**

together peacefully. These rules are passed down in the group from generation to generation both direct transfer through training and teaching and indirect transfer by observing what others do in their daily lives. **This process is called socialization**. Such rules and regulations that have been passed down from generation to generation will be used as norms of the group. Such norms are both informal norms but are generally accepted of group members. It ranges from low to high in strictness. Informal norms include Folkways and Morals, and Formal Norms that are stricter than the first type, namely Rules and Regulations and Laws.

However, some informal norms can be more strict than official ones, such as the norm forbidding siblings or biological relatives from marrying or having incest. Although the law has not been officially specified but people in society consider it to be very contrary to tradition. Therefore, people in society strictly adhere to this tradition even though it is not against the law. **Therefore, norms are a tool for social control.** These norms they tend to hold each other only in groups. Therefore, each human being must conform to the group's norms depending on which group he or she is in at the time. This is because humans often do not belong to just one group. Throughout one's life, a person may have the opportunity to be a member of many groups. Therefore, **the norms of one group may be applied to another group of which they are members**. This causes the spread of norms called norm dissemination from one group to another. The spread of norms occurs in addition to members adopting from one group and applying them to another group. There is also the adoption of the norm of another group called norm adoption that one is never a member of and applies to one's own group. **A norm is something that most of a group accepts, both tacitly whether willingly or not.** If anyone violates these norms, they may be punished by members of the group or people in society according to methods that are open to them as informal methods such as censure, reprimand, or expulsion from the group. Being ignored by the group is called social sanction, including formal methods such as being punished by law, etc. Those who follow the norm will be accepted by group members or if it is better than the group's norm, it may be praised and exalted. Therefore, **human social interaction consists of creating norms called Formation, training to convey the norm called Transfer, responding to the norm called Response, and controlling it according to the norm.** The control process causes the group's norms to remain enforced norm enforcement and be upheld conformity from the group over time. If both positive and negative responses are strong and widespread from members of a social group to which normative behaviour. This will cause the norm to be adhered to more strictly than a norm that receives little positive or negative response. Humans learn from such positive and negative responses how to behave according to group norms. What should and should not when are actions that, when performed, receive a positive response? Humans tend to adhere to and continue to follow. But if one, does it and get a negative response, humans tend not to do that anymore. Therefore, transferring and controlling norms is a socialization process that will occur throughout a person's lifetime.

9.2.2 Sustainable Outcomes

Running a business faces many challenges brought risks and opportunities. Therefore, businesses must constantly adapt and develop themselves to survive and grow steadily and sustainably. Organizational development towards sustainability is therefore “Important matters” that every business must integrate and drive concretely, which can be done in many forms according to the organizational context.

1. **Studying and understanding the organizational context:** So that the business can drive the organization according to sustainable development guidelines. It is integrated as part of normal business processes. Businesses need to first understand the context or "identity" of the organization. It can be studied and analysed from the vision, mission, organizational culture, and value chain of business strategy. Business risks and opportunities as well as the direction and trends of the industry will help the organization to clearly see the organization's context. Leading to an analysis of stakeholders and sustainability issues, businesses should focus on and manage effectively to support businesses growing strongly in the long term.
2. **Stakeholder identification and Analysis of issues:** in which stakeholders and the business affect each other along with determining how to engage with stakeholders. In addition to analysing the organizational context, businesses should also analyse the relationships between the business and

stakeholders throughout the business value chain. This can be done as follows. Businesses should be able to identify which stakeholders they relate to throughout the value chain and be able to prioritize each stakeholder group both direct stakeholders and indirect stakeholders. A business should be able to assess both the positive and negative impacts that stakeholders have on the business and that the business has on stakeholders. To see that in the relationship between business and stakeholders Who creates the impact and who is affected? And is this impact a positive or negative impact and what issues does it cover? Businesses should take steps to increase positive impacts and reduce negative impacts and to maintain competitiveness and develop the potential for long-term business growth. When a business identifies stakeholder groups and assess which issues are the impacts between them. Businesses should determine methods or formats for engaging with each stakeholder group. In order to have guidelines for communicating and managing such issues effectively. Each stakeholder group may have different access channels or participation formats.

3. **Defining and prioritizing key sustainability issues**: From the process of engaging with stakeholders, businesses can see where stakeholders are impacting the business and where the business is impacting stakeholders. Businesses should therefore consider these impact issues as important sustainability issues and prioritize them. One can proceed as follows: Businesses select and define sustainability issues based on impact issues that are important to both the business and stakeholders which covers economic, social, and environmental impacts. This will affect the business's ability to operate sustainably. Businesses should assess the severity of the impact of a given sustainability issue. To see the importance and urgency of managing each important sustainability issue. In evaluating this impact, businesses should analyse from two perspectives: assess to what extent such sustainability issues affect the business; And to what extent does that issue affect stakeholders?
4. **Establishing an organization's sustainability policy**: Most of the time, announcements of policies and goals at the organizational level usually come from the board of directors or top executives to make it clear to stakeholders. The organization has principles, a mindset, direction, and goals in which direction the business will go. This is beneficial for creating understanding and participation from stakeholders. Especially employees in the organization to have ideas and operations in a direction. That is consistent with the organization's sustainability policy and goals. Because driving an organization towards sustainability is not a matter of any one person or department. But it is a matter that concerns everyone in the organization. Therefore, everyone's work responsibilities are related and have an impact on the sustainability of the organization. However, in order to have clarity in work and performance tracking, businesses should clearly define the roles and responsibilities of the operators and main responsibilities in each issue.

However, determining who is responsible and their roles in driving sustainability operations may not have a fixed format or method of operation. It depends on the structure and context of each organization which businesses can consider as appropriate. Sustainability frameworks generally look to the medium or long term. Therefore, it does not change every year. Except in cases where the business context or organizational management characteristics have changed from the original. The components of sustainable development must consist of three main parts, which are the economic system, the social system, and the environmental ecosystem which have a relationship and depend on each other. Sustainable development occurs in the overlapping areas of the three elements or shaded areas in the image, that is, economic development, developing society and protecting the environment at the same time along with social norms.

9.3.3 Harnessing Social Norms and Sustainable Outcomes

Social control means various social processes intended to be accepted by members of society and comply with social norms. The orderliness of society arises from social norms, social status and social role. It also occurs when society uses various methods to control the behaviour of members of society to follow the rules that members agree upon together. **Social control by motivating, members follow social norms, such as praising and rewarding those who follow social norms according to their**

status and social role. For example, children who follow their parents' instruction will be praised for being a good child. Students who behave according to school discipline receiving compliments or certificates of honor gives members the encouragement to behave according to social norms. **Social control by punishing members who violate social norms**. Including those who violate the way of life of the people will receive various reactions from other members such as criticism, gossip, ridicule. And those who dress contrary to social norms will be criticized by others for being immodestly dressed. Those who do not follow the etiquette of society will be criticized and gossiped by others.

Humans hold two opposing values at the same time. Because we live on two completely different worlds. The first world was ruled by **"Market Norms"** The other world is ruled by **"Social Norms".** Market Norms is a rational decision proceed according to principles. There is a clear calculation of costs and profits. Social norms is a decision made to maintain relationships between people who have close relationships with each other without considering the main return. Behavioural economists whose names are James Heyman and Dan Arieley (2004) conducted experiments on human market and social norms by having participants drag a circle into a square. Three-minute timer, participants must drag the circle into the square as much as possible. He randomly divided the participants into three groups: a control group; highly paid group and low-paying groups. The results showed that participants who received more compensation will be more dedicated than low-paid experimental participants. Their behaviour is based on the "market norm" states that you will put efforts with the same amount of money you earn. But in the control group, the researchers did not offer any compensation, saying only that it is an assistance to researchers. The result is that this group of people is the most dedicated. Dedicated more than the paid group. Behaviour does not conform to market norms, but rather conforms to **"social norms".** Anything that has money involved, if it is not big enough, motivation will immediately be low. Giving the gifts is as of money even though it appears to be the most beneficial in terms of economics, but it is immediately valued as too little or too much. People often buy consumer products, entertainment, clothes, and accessories for other people. But what people expect is usually artwork, electrical appliances, and travel. From the experiment, it was found that if the company aims to make employees work harder by giving bonuses in the form of money. Of course, during the bonus period, employees will perform significantly better. But when the bonus disappeared, they performed worse than before they received the bonus. Therefore, **extrinsic motivation** is not sustainable in the long run. If we want people to do well in the long term, we must create their own internal motivation. In conclusion, choosing what kind of **"motivation"** to use that affects people's "motivation" and "action" is very important. Asking people to do something without talking about money stimulates the power of "Social norms" that we work hard because we have good intentions and want to be good members of society.

9.3 Case Studies: Social norms and Public Policy

Humans do not always use reason and effect in making decisions. Human decisions may be based on intuition, emotions, or feelings in different situations. "**Economic experiments"** are therefore the science of designing simulations of real situations. To collect data or observe actual behaviour under an environment that has been determined intentionally, the behaviour that occurs does not result from just rationality. "**Experimental economics"** is now a new tool of economics and the main tool of behavioural economics that is gaining widespread attention. This is because experiments can be designed to analyze human decisions that produce results that are as close to reality as possible. In the past, economists often collected data on human decisions using questionnaires. Makes the respondent think twice before answering. The answer thus obtained is reasonable (Rationalization) according to general assumptions in economic theory. Therefore, norms play an important role in regulating the relationships of individuals in society, helping to control individual behaviour. It is as society desires to create a good pattern. It helps to regulate how humans in a society can behave. Quickly and accurately, without wasting time thinking about how in such a situation What should he do or how should he do it?

Policy Design for Urban

Urban policy design should consider designing a choice architecture that motivates people to make choices. It must be the most beneficial to them or society and avoid decisions that are harmful or cause external economic consequences. Removing negative externalities while maintaining freedom of choice or libertarian paternalism is different from command and control which lacks flexibility to the context and may violate a person's freedom of choice. Policy design should begin by considering what the problem needs to be solved. It is caused by what behaviours of people. Then design measures to solve problems using perception or satisfaction correction or change institutional factors or is it a combination of measures? After that conduct an experiment to see the results of the measures. It is used to analyse the worthiness of the project using appropriate techniques such as cost-benefit analysis (CBA) of a policy by measuring all economic benefits and costs relative to each other seeing which policy or method is likely to provide the greatest net benefit. Moreover, since the concept of behavioural economics varies according to the context, situation, social and cultural factors of each area, the application of the concept is therefore very diverse making the application in one area successful. It may not have an effect in another area. In addition, trials of designed measures may not always be possible. In many cases, trial and error may not be possible and waste too many resources. In fact, there are quite a few measures that attempt to correct people's behaviour that have failed. Therefore, policy design should focus on designing policies that are low cost or it is a supplementary measure that may not replace the usual incentive measures. Examples of city policies that apply behavioural economics to motivating people to engage in desirable behaviours include:

Solving the cleanliness problem of public restrooms

Schiphol Airport in Amsterdam Netherlands solves the problem of urine smearing outside the toilet bowl by printing housefly patterns into the urinal. To make the user have intention or "aim" while urinating. The results show that it can reduce the mess outside the bowl by up to 80 percent. In addition if you want to analyse the worthiness of following this example. The main cost of the project will be the cost of printing the design on the urinal. And the project benefit is the value that can be saved from reducing the number of people and cleaning time. Then it may be compared with the worthiness of other policies, such as making campaign signs.

COVID-19 Pandemic and Public Health Measures

People continue to face the COVID-19 situation, but in the different approach. Therefore, there are guidelines to help restore adequate physical activity at the individual, family, and community levels according to the basic recommendations of the World Health Organization (WHO, 2010), as follows:

1) Communication campaigns to create awareness about the meaning and benefits of physical activity;

2) create motivation for physical activity.

3) promote the raising of safety and sterility standards in organizing health activities and mass sports to promote a society that does not Active Society.

4) Promote the use of community as a base for physical activity to increase its fullest potential, and

5) Promote a safe healthy space for children and youth in educational institutions so that children and youth can have physical activity that is enough to guidelines. It will help to promote and support healthy behaviour in physical activity of people in the new normal way of life to be more adequate both now and soon. When looking back at the physical activities of people. In the past, the level of physical activity among people tends to continually increase every year. For example, in 2019, Thai people had the highest level of physical activity at 74.6 percent, an increase of 8.3 percent from 2012, despite the situation. Humans are rational animals.

They always calculate the costs and benefits of actions. Behavioural economists believe that humans may have more complex ways of thinking. In the human thinking system, it can be divided into 2 types.

1) **Quick thinking and response system** which may lack consideration and is dominated by biases in various ways, ranging bias from weighing present and immediate benefits with benefits that will occur

in the long run (present bias), bias from not knowing the results of current actions that will be sent future results (cognitive bias) and bias from habit or traditional behaviour (status quo bias).
2) **Thinking and responding with consideration** that consider the cost and benefits carefully. Behavioural economics has been widely used to study health issues, especially studying the occurrence of non-communicable diseases among people (NCDs) in which behaviour is an important part that causes disease.

Therefore, the study of behavioural economics can be designed as a policy guideline to adjust health behaviour into 3 approaches. Each time, it may be necessary to combine each approach to implement the policy effectively.

1. **Nudges:** an approach that focuses on allowing people to change their own behaviour through thought stimulation. The main principles of this approach are “Keep it simple” or making it easy for people to recognize and access that stimulus. There are many ways to use nudges, such as:

- Default option/ setting: example of problems in most restaurants, fish sauce and chili is prepared on every table. It is like setting the default for food to have chili sauce added. And it will become an automatic behaviour. Therefore, this type of method is the default setting that will promote health, such as setting the main dishes on the menu to be healthy foods or always asking the customer to choose the level of sweetness of the drink.
- Sending a warning to remind: some important activity must be done which triggers certain behaviours depending on the nature of the message used in the notification. Incorporate certain social values into the notification, such as only notifying you of a doctor's appointment with notification of what the cost would be to oneself or society. If one misses an appointment, it can create motivation that is different from sending a simple notification.
- Planning prompts: it encourages individuals to see the benefits of friendly planning for their health or other quality of life.
- Information design: priming or guiding awareness by using images and symbols to convey and attract feelings or decide to take certain actions.
- Social Norms/Social Information: it shows information or trends that most people in society do in a certain way to motivate compliance or avoid doing.
- Warning of the negative effects of actions: this may be reflected in images that can be seen frequently to create memories and awareness of negative effects.
- Communication that relies on environments or situations: the receiver is familiar with to easily access the communication, such as using a pyramid picture of healthy food consumption to show the benefits of choosing, to consume food in each group or placing healthy products or food at a level that is easy to see and pick up.
- Providing results based on past selection activities: in England, Midata will help display medical history, helping patients see progress and readiness for continued treatment.

2. **Economic incentives:** they are a way to change behaviour by using economic incentives on both the producer and consumer sides, starting with financial support measures. Collection of taxes is on certain products with an example from Singapore where there are subsidies for food entrepreneurs throughout the supply chain. To support funds on promoting healthy food Includes marketing promotions to reach consumers more easily.

3. **Mandates and Bans:** Using legal tools to enforce and impose penalties. For example, England has a law banning products in the high levels of fat, sugar, and salt. Prohibited at the local level from prohibiting placing products at store entrances, payment points, or displaying on the homepage, including prohibiting promotions on such products, or requiring calorie counts to be displayed on U.S. restaurant menus which is a combination of nudge, another way to provide information to consumers in making choices.

Designing a new business model

According to world trends, there are policies, measures, and regulations that will be announced, such as the EU Green Deal. Therefore, it is necessary for Asia and Europe continentals to prepare for the circular economy in trade with trading partners that have also made policy adjustments. This concept does not consider the recycling of resources, materials, or anything else in a circular production system. Once production is complete, it is passed on to consumers for use and end with discarding or destroying with removal system. Both these wastes or leftover materials have the potential to be used in new production or as starting materials for other productions. And this is the point that causes problems. The first is the gradual depletion of resources, followed by an increase in the amount of waste. Another thing that makes the problem more serious. The world's population is set to reach 9 billion by 2030, according to the white paper. 'Developing systems for the transition to a circular economy' affects economic growth and people's consumption causing resources that are now limited. It is even more insufficient to meet the needs. What follows is an environmental problem. Both global warming conditions, resources are in short supply and garbage overflows. The world, especially plastic waste spreads in the sea. For this reason, there must be a change leading to the concept of circular economy. This is another key to the transition to a more sustainable world. Nowadays, there are businesses that are starting to recognize the importance and apply the concept of circular economy to their systems and products. This article will give some business examples. To give you a better understanding of the circular economy and its application in business.

Coca-Cola, or Coke as it is affectionately called, has the idea of collecting used packaging for recycling. The same amount as sold to the market to reach 100% before 2030, with startup companies like GEPP, a new waste collection platform. Its role is to act as an intermediary between stores that carry recycled waste and buyers. There are also campaigns that help reduce resource use. Along with promoting new business opportunities as well.

Renault, one of the French car manufacturers. There is a new car design that is environmentally friendly. It uses recycled plastic as one of five production materials. In addition, key materials such as copper, aluminum and cloth are reused. Moreover, the brand has also established a subsidiary company to oversee and control the flow of materials. It also manages waste and works with more than 300 used car scrapping companies to collect still useful materials from old cars that are discarded each year and reuse them into parts such as windshields and side windows. Body parts, engine, transmission, and injection system have been modified to be usable as before.

The circular economy is not limited to just the business world. But it can also be adapted to suit his or her own lifestyle what is known as living a Circular Living life, which the idea is "Change the method of use Create a well-being and Do not destroy the environment any more than before." It is about creating awareness and cultivating the thoughts of people who want to preserve the environment. It might start with something nearby and easy to do at home, like separating garbage properly and send it to various projects. Place for a box to receive some types of waste such as milk cartons and plastic bottles at department stores. This leads to being a second raw material in production to reduce the use of natural resources called Virgin Material. Using personal drinking glasses when buying drinks to reduce the number of plastic cups left behind or try to use existing things to the best value. Even though these lifestyle behaviours seem like very small things, but if one works together, these little things can be the starting point for a circular economy society. A sustainable society that will help make the world a better place to live in.

We must understand that mainstream economic concepts are being taught and the concept of various models that are currently used, by themselves, were not created for direct use in economic development. But it is a concept used to explain the allocation of various resources that has occurred in the economies of developed countries over the past hundred years. Institutions or economic and social structures in North's concept (2003) are not necessary. If we live in a world where there is no friction or obstacles, and everything is completely predictable. Institutions are motivational systems that shape human interactions. It helps us to predict things that can occur in society at some level compared to not being able to predict at all. Therefore, the institute was born from trying to understand humans and society in various ways such as in economics, political science, social sciences, and

humanities. Institutions have three main components: 1) formal rules 2) restrictions that are not formal such as social norms, etc. 3. characteristics of managing, controlling, and enforcing various rules official. It is just a small part in leading the decisions and behaviour of people in society. This is because the social structure has developed continuously. What affects the emergence of various social institutions and structures is the cultural and historical basis of that society or means structural development. They were allocated to meet the different needs of each society. One must consider the basic idea and social norms of that society. However, new things such as technology, thinking, behaviour, etc. will gradually be integrated into the existing culture and create characteristics that adapt over time. New beliefs arise and some old beliefs may disappear such as the belief that the world is flat, etc. Let's try to figure it out. In addition to improving the legal system and enforcement in the society and economy. How can we improve and develop the norms, culture, or beliefs of society? especially basic thoughts and behaviours to suit the present and is beneficial to the further development of the country.

SUMMARY

Behavioural economics has a history that goes back at least to 2002. We must tell that it is about microeconomics. Microeconomics has been related to psychology since Adam Smith wrote “The Theory of Moral Sentiments”, he has used psychological explanations to explain individual behaviour (Bonar, 1926). Jeremy Bentham also wrote about “utility” using psychological aspects to explain on an aspect of psychology (Quinn, 2021). Applying behavioural economics concepts to various policies to change people's attitudes and behaviour, especially in the nudge approach that will help frame certain concepts and behaviours. The design must consider the environment related to those behaviours. whether it is conducive to behavioural adjustment or not. Because if you design to stimulate people's behaviour in conflict with the environment or structure that governs that behaviour, it will become a major challenge in changing people's behaviour. It can be said that behavioural adjustments that focus on the individual alone may not have much effect. There must be other structural changes that will facilitate behavioural adjustment in parallel. In addition, it agrees that behavioural economics is only one part that can help change approaches to sustainable development. Living together is a human society and rules are established. Guidelines for everyone in society to follow for peace, smoothness throughout the stability of that society. It does not mean that everyone in society will strictly follow these rules and regulations. There are always people who break and avoid the rules of society. It is necessary for society to find a way to force and control individuals to maintain social order.

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CHPATER 10: GLOBAL PERSPECTIVES IN BEHAVIOURAL ECONOMICS

Unlike neoclassical economics, which assumes rationality as a constant, behavioural economics explores **how cultural differences and social norms shape economic judgments**. The importance of studying behavioural economics has empowered our understanding of human decision-making, **highlighting the cognitive biases, social influences, and psychological factors that shape economic behaviours**. With the notion that human behaviour is socially and culturally influenced, studying behavioural economics in different cultural and national contexts is crucial to **develop a comprehensive understanding of economic decision-making across diverse and globalized societies**. If culture systematically affects economic decision-making, behavioural and financial models should adjust to recognize the importance of culture. Although economists, psychologists, and legal scholars have only begun to explore how cultural forces affect financial decision-making in systematic and predictable ways, much of the foundational research and theories in behavioural economics has been developed and tested in Western contexts. Therefore, this chapter is developed to review concepts and studies in behavioural economics that take cultural and social differences into account, particularly in the context of Asian countries, among other contexts.

10.1. Behavioural Economics in Different Cultural and National Contexts

Before we dive into the details of Behavioural Economics in different cultural and national settings, it's important to recognize that the **relationship between culture and economic behaviour is like a complex pattern**. As we unravel this pattern, it becomes clear that cultural dynamics have a big influence on the principles of Behavioural Economics worldwide because **cultural aspects are crucial in shaping how people see and react to economic situations**. As we navigate through different societies, we will explore how cultural differences affect humans 'decisions. Understanding these culturally different dimensions helps us understand how they interact with and shape Behavioural Economic principles in various cultural landscapes.

10.1.1. Hofstede's Six Dimensions of Culture

Geert Hofstede, and his empirically comprehensive research on the framework development capturing differences in national culture, has been regarded as the widely cited scholar known as **Hofstede's (1980, 1991, 2001) cultural dimensions theory**. He conducted empirical studies in over 70 countries to identify differences in values and beliefs varying from one country to another in order to highlight one of the most influential factors on human's decision, **culture**. According to Hofstede (1991, 2001), culture is the collective programming of the mind which distinguishes the member of one group or category of people from another. In the decision-making process, culture is expressed through expected behaviours, norms, and ideas that characterize a group of people (Hoyer, McInnis, and Pieter, 2018). Thus, cultural differences may explain decisions of a group of people that deviate from similar economic behaviours in other parts of the world.

Hofstede's initial attempts to develop his model were based on surveys administered to over 88,000 employees in IBM subsidiaries from 72 countries (Hofstede, 2001). This foundational work was a steppingstone to subsequent research in cultural studies and consequently developed into a framework for understanding how cultural values, encompassing **power distance**, **individualism**, **masculinity**, **long-term orientation**, **indulgence**, and **uncertainty**, that influence economic behaviour across societies (Hofstede, 2001). **Power distance represents a range of values between high-power distance** where people show respect for authority, seniority, and status in vertical levels, and **low-power distance** in which people treat other more equally and less about their authority, seniority, and status in horizontal levels. For example, the United States has a power distance score of 40, compared to a score of 80 for Ghana (Hofstede, 2001). Comparing the scores, this means that status and rank

distinctions matter less in the United States, but they have a greater influence in Ghana's cultural and value system.

Individualism is a social relationship in which people in that society emphasize the care and protection of themselves, valuing and recognizing individual achievement, and encouraging independent thought and action. **Collectivism refers to a tight social relationship in which people prioritize caring for and protecting the group's peace and wellbeing**. An example from Hofstede's (2001) findings shows that the United States score highly on individualism of 91, while Egypt registers a much lower individualism score of 25. In practical terms, this means people from the U.S. may view the importance of personal choices and success in different perspectives than people in Egypt.

These individualism versus collectivism may intersect with the vertical and/or horizontal aspects of power distance. Based on findings from a study in China, Gao (2009) stated that **collectivists in vertical social relationship** may willingly submit to the norms of their groups and sacrifice for the benefits and integrity of in-group goals, whereas **individualists in horizontal social relationship** or low-power distance are not interested in being distinguished from others or in having high status despite being unique and highly self-reliant because they seek individuality rather than distinctiveness. In contrast, individualists in vertical social relationships view themselves as different from others and may exhibit competitiveness and higher status (Triandis & Gelfand, 1998). Surprisingly, collectivists in horizontal social relationships are interdependent but may not submit easily to authority related to equal right and status within groups (Triandis & Gelfand, 1998).

Masculinity and **femininity** have been defined as characteristics of culture in each nation. Chen and Starosta (2005) describe this dimension as "**the extent to which stereotypically masculine and feminine traits prevail in the culture**" (p. 53). The expressions of masculine cultures include that men are expected to be assertive, ambitious, and competitive; women are expected to be supportive, nurturing, and deferent (Dainton & Zelley, 2011, p. 186). In contrast, feminine cultures score low on the measure of masculinity and score high on the measure of femininity (Hofstede, 1998). However, China is an example of having medium traits of masculinity and femininity. Masculine cultures include Japan, United States of America, Mexico, and Germany, while feminine cultures include Sweden, Costa Rica, Portugal, and Thailand (Chen & Starosta, 2005; Hofstede, 1998).

Cultures with **a long-term orientation are characterized by "thrift, savings, perseverance, and the willingness to subordinate oneself to achieve a goal**" (Dainton & Zelley, 2011, p. 187), while life in cultures with **a short-term orientation "centers on a desire for immediate gratification**" (p. 187). According to Hofstede (2011), short-term-orientation cultures emphasize the past, stability, universal morality, nationalism, and luck; whereas long-term-orientation cultures place emphasis on the future, adaptability, situational morality, internationalism, and effort. For examples, Canada, China, the U.S., Germany, and Japan have scored on the measure of long-term orientations of 36, 87, 26, 83, and 88, respectively, which indicate that Japanese people focus on savings and future more strongly than Canadians (Hofstede, 2011).

Indulgence serves as a cultural dimension that characterizes how people in **a culture incline towards instant gratification and desires to enjoy life and to have fun** (Hofstede, 2011, p. 15). In essence, cultures with high indulgence scores place greater value on seeking happiness, compared to cultures that lean toward restraint (Hofstede, 2011). Research related to this dimension reveals an indulgence score of 24 for China, 48 for France, 68 for the U.S., 72 for Ghana, and 80 for Trinidad and Tobago, which suggests that people in Trinidad and Tobago may prefer seeking happiness and instant gratifications over restraint when compared to China.

Uncertainty avoidance is the measure of "the level of stress in a society in the face of an unknow future" (Hofstede, 1991, p. 29). As Arasaratnam (2011) further explains, "cultures high in uncertainty avoidance tend to be traditional, prefer methods that are tried and true, and prefer stability over change or even innovation" (p. 49). A country such as Mexico, for example, has an uncertainty avoidance score of 82, compared to 46 for the Unites States (Hofstede, 1991). Thus, Mexican culture is viewed as more risk averse and more inclined towards stability than U.S. culture.

10.1.2. The Global Case Studies and Implications of Hofstede's Framework

There are practical and theoretical reasons for studying economic decision-making across cultures. In practical sense, **Hofstede's framework captures the differences in main six cultural values; uncertainty avoidance, masculinity/femininity, indulgence, long-term/short-term orientation, power distance, and collectivism/individualism**, which provides a better understanding of how people in different cultures behave differently in economical decisions such as saving, investing, and other sustainability-related behaviours. Such understanding can provide organizations and policy makers some guidelines to design behavioural changing interventions and systematically compare behavioural changes and effectiveness of the policy design in the society. In theory, Hofstede's framework provides a systematic way to measure, analyze, and estimate for understanding how cultural values influence economic decisions across nations, especially similar economic situations. Such an exploration reveals not only that people make economic judgments and financial estimations in systematically different ways across cultural groups, but also that understanding cultural differences themselves may help debiasing efforts. Here are some global case studies that utilize Hofstede's theory in behavioural economics.

In an earlier study comparing four countries' risk perception, Weber and Hsee (1998) attempted to capture the role of **Hofstede's collectivism-individualism dimension** in financial and economic decision-making differences among people in China, Poland, Germany, and the United States. The authors focused on the contributions of cultural differences (i.e., customs and beliefs) in the two distinctive concepts as the sources of risk preference (or willingness-to-pay for risky options) with respect to a variety of decisions (e.g., gambling, stock market, and commuting decisions); (1) attitude towards perceived risk, and (2) risk perception. The **attitude toward risk was defined as an individual trait and affective response towards perceived risk** such as being optimistic towards risky opportunities in business (Weber & Hsee, 1998). On the contrary, **risk perception come from cognitive assessment of gathered information about the risky options** (Weber & Hsee, 1998). Guided by Hofstede's collectivism-individualism dimension, the authors hypothesized that people from individualistic-oriented countries such as the United States would have higher risk perception towards risk options when compared with collectivistic-oriented countries (i.e., China, Poland) because such orientation emphasizes on helping members in their network out against losses, in which acts as insurance for individuals to take risky options or being less risk-averse (Weber & Hsee, 1998).

The results of this study confirmed the hypotheses that perceived-risk attitude maybe explained by individual differences rather than cultural differences. Additionally, perception of the risk was in similar levels between Americans and Germans whereas Chinese respondents judged the risk of risky options to be the lowest, and smallest degree of perceived-risk aversion compared to other countries due to the high degree of collectivistic orientation among people in China (Weber & Hsee, 1998). Thus, the results confirmed that risk perception maybe explained by the cultural differences in the value of Hofstede's collectivism-individualism dimension.

In previous study, risk tolerance preferences in financial domains emerge as one clear source of cultural differences. In another example of a study applying Hofstede's cultural dimensions theory, the authors investigate **the relationship between culture and savings**, and macro data across 48 countries over the period 1990–2013 (Ye, Pan, Lian, & Ng, 2021). The authors focused on three dimensions potentially impacting savings: **Long-term orientation** (LTO): This dimension reflects a society's preference for future rewards over present gratification. Cultures with high LTO are expected to save more. **Uncertainty avoidance** (UAI): This dimension reflects a society's discomfort with ambiguity and risk. Societies high in UAI might save more as a safety net.

Individualism (IDV): This dimension reflects the emphasis on individualism vs. collectivism. Individualistic cultures might prioritize personal savings, while collectivistic cultures might rely on family support. The results from Relative Importance Analysis (RIA) measuring the importance of the cultural dimensions in affecting saving rates show that higher levels of **LTO** significantly affect higher savings rates, followed by UAI and IDV. These cultural dimensions emphasize the importance of family and community support, leading individuals to prioritize saving for future security and intergenerational wealth transfer. The authors discover that culture can explain much of these

individual effects, along with other variables more commonly used in the economics literature, such as economic growth, social security, and demographics (Ye et al., 2021).

Another study, conducted by Guo, Liu, Li, and Qiao (2018), rather employed a more recently established dimension of Hofstede's, **indulgence-restrain dimension** in their attempt to investigate the relationship between cultural differences and country-level **prosocial behaviours defined** as World Giving Index **(i.e., donating, volunteering time, and helping a stranger**). WGI data was published by the Charities Aid Foundation collected from the religiosity of 96 countries across the world in terms of church attendance, prayer, deity importance, religion importance, and the proportion of religious people across 96 countries in the different continents (e.g., Europe, America, Asia, or Africa). In the analyses, the authors examine how **indulgence-restraint (IVR), individualism (IND), and long-term orientation (LTO)** influence a nation's prosocial behaviours.

In previous research, the literature suggest that IND culture was found positively correlated with prosociality, while power distance, uncertainty avoidance, and LTO were negatively correlated with prosociality. Specifically, in countries with low power distance and uncertainty avoidance, IND is more strongly associated with prosocial behaviour. Winterich and Zhang (2014) also found a negative association between power distance and country-level prosocial behaviour. In the same vein, the current study's findings reveal a negative correlation between long-term orientation (LTO) and helping strangers (Guo et al., 2018). It could be explained that long-term orientated societies encourage thrift and perseverance and discourage service to others, unless IVR are high in that society resulting in the gratification of human basic needs and feelings are prioritized over conservative attitude toward money. Interestingly, the study's findings show a positive correlation between indulgence (IVR) and WGI scores, suggesting that cultures with a greater emphasis on enjoying life tend to exhibit higher levels of prosocial behaviour (Guo et al., 2018).

Based on these findings, IVR may be the most important cultural dimension accounting for prosocial behaviour across nations because **the indulgence dimension indicates the extent to which people in that society is encouraged or restrained to express their emotions and enjoy life**. Thus, freedom and happiness may be a positive sign and gift to pay forward, becoming charitable acts of kindness. Another mechanism that **indulgence promotes prosocial behaviour may be the freedom in making personal choice and control** (Guo et al., 2018). Therefore, countries that support prosociality may encourage indulgence even in the culture with high levels of long-term orientation, power distance, or individualistic because this indulgence dimension can serve as an instant prioritizing factor focusing on others' well-being and happiness as important as oneself by helping and giving to others in needs.

In Section 10.1, where we explore cultural differences as vital factors in understanding Behavioural Economics in different cultural and national contexts, it is important to keep these factors in mind when we design behavioural changing policies and interventions. As we have learned about nudging as effective strategies in previous chapter, **it is vital to recognize that nudges are not a one-size-fits-all solution. Cultural differences play a significant role in how people respond to nudges, influencing the effectiveness of these interventions. Nudges tend to be more effective in groups with common culture. Taken together, cross-cultural studies have frequently shown that cultural differences emerge in complex, yet systematic ways**.

Our analysis of their findings also shows, however, that existing cross-cultural findings have still only scratched the surface of developing a competent cross-cultural model of decision-making. Nonetheless, the importance of understanding cultural influences on thought emerges as a clear theme for those who want to create accurate decision-making models. In Section 10.2, we will further explore nudging techniques in other global case studies where cultural differences are recognized and incorporated into policy development and interventions designed to benefit the individuals' behavioural economic decisions and public goals.

10.2. Global Case Studies

In addition to Hofstede's cultural dimensions theory, the nudge theory has been recognized as a widely-use concept in understand human's economic decisions and policymaking. First and foremost,

it is known that the nudge theory emphasizes how choices are presented can have a significant impact on decision-making. Compared to traditional policy tools, **the nudge theory represents a concept of making small changes to existing systems or infrastructure, rather than introducing entirely new courses of action, helping to reduce anxiety of people involved and minimize costs and investment of policy enforcement.** By using subtle changes and small adjustments in the nudge theory when design a policy, **people are discreetly guided towards choices that are beneficial to both themselves and society**.

Most importantly, **the nudge theory is not a restrictive approach that involves forcing people to have no choice but rather shaping the context in which choices are offered, steering them in a particular direction while maintaining individuals' autonomy**. Lastly, **the nudge theory can be applied to different challenges and a wide range of policy areas**, from public healthcare and education to environmental protection and taxation without resorting to coercion. To illustrate the versatile applications and the effectiveness of the nudge theory, now in this Section we will dive into the details and real case studies of Behavioural Economics in different cultural and national settings that show how policymakers can lead individuals towards decisions that benefit them and also align with broader societal objectives.

10.2.1. Public Policy in UK

One distinct example of the application of the nudge theory is from the firsthand source and experience of **David Halpern, the head of the UK's "Nudge Unit" – the world's first government unit applying behavioural science to policy development**. In his book, Inside the Nudge Unit: How Small Changes Can Make a Big Difference (2016), the key takeaways revolve around the effectiveness of nudging in influencing behaviour for positive changes by using **the EAST concepts: 'Easy', 'Attractive', 'Social' and 'Timely' (see Chapter 7)**. The Behavioural Insights Teams (BITs) have developed the EAST framework in designing any policies and programs that the officials have planned to change namely reducing medical errors, increasing organ donors, reducing suicide rates, etc.

In the case of **UK's tax collection efforts**, the department realized that people often forget or procrastinate to pay taxes, causing the late payments and issues with revenue falling short for the government. BIT or **the nudge unit recognized an issue with the way language, tone, and the emphasis on penalties in the tax reminding letters was presented**. The application of nudge approach to this issue was **the change in tone and content in the tax letters** using the strategies that are in line with the four concepts in the EAST framework. For example, to apply "Attractive," instead of highlighting penalties on tax late payment, the letters expressed appreciation for anyone who make timely payments because the tax money would make positive contributions on public services and well-being of the society as a whole. As a result, **the small changes in tone and framing of information presented to the taxpayers significantly increased on-time tax payments**. Nevertheless, the author suggested that the long-term effectiveness of this approach may need to be observed and may diminish the fact that tax-paying is an obligation rather than a voluntary action (Halpern, 2016). Thus, additional changes or other programs may need to be re-designed and incorporated into the policy development for this issue in the long run, and to recognize the characteristics of this culture as well.

Pension enrollment is another economic behaviour that BITs focused on and aimed to improve individual participation in pension plans, in order to increase financial security in retirement (Halpern, 2016). **The concept of "EASY" was applied to replace the traditional opt-in process**, requiring employees to take the initiative. Rather, **the automatic enrollment where employees were automatically enrolled in a pension plan with the option to opt-out if they wished was the default option**. Although this automatic enrollment strategy raised concerns about individual choice and financial literacy, **the results of this plan suggested that individuals became more participatory in their own financial security**. As it was easy and subtle for the individuals to be automatically enrollment in a minimum plan for pension saving, the change in economic behaviour began and maintained in which was beneficial to the individuals and the society. These practical applications in government policy indicate how subtle behavioural interventions can lead to substantial

. These case studies also highlight that the cultural dimensions of individualistic and long-term orientation may have influenced people's mindset in saving and paying attention to public policies in

which is seemingly helpful to keep in mind when developing strategies and programs to change people's decisions and behaviours.

Another case study by John (2016) focuses on the growing influence and values of nudging and behavioural science in public policymaking and how **the use of randomized controlled trials (RCTs) to evaluate different behavioural cues is more appropriate in providing precise estimates of savings delivered and benefits achieved**. The BIT teams used RCTs to test out the various nudges designed by multiple teams, such as **an initiative to test whether mobile text messaging would encourage those who owed a court fine to pay before further proceedings were taken against them** (John, 2016). The teams carried out **two RCTs to test different kinds of messages that varied the personalization and detail on the message**, employing the nudging techniques that are subtle and more socially personable to encourage the desirable results (John, 2016). The most effective message was crafted and selected for the subsequent rollouts**.**

These trials allowed the BIT teams to effectively calculate nontrivial increases to government revenue and thus helped them show proof of the concepts they were applying (John, 2016). The BIT teams also employed these trials to develop other behavioural approaches to design electricity bills, charitable giving, health checkups, and communication with employment centers and job seekers (John, 2016).

10.2.2. Behavioural Economics in Healthcare

Shifting the focus to healthcare, this section explores the deployment of Behavioural Economics to improve outcomes and healthcare decision-making. Case studies focus the use of behavioural insights in healthcare areas. This part revolves around understanding how nudges and behavioural interventions have played a role in enhancing health behaviours and fostering patient satisfaction.

In this Section, we cover a variety of topics in healthcare ranging from healthcare preventive choices to healthcare cost reduction, and from smoking cessation and weight loss decisions.

[1] Healthcare Choices

According to multiple evidence showing how **nudges have been effective tools for health policy particularly for decreasing healthcare costs in the U.S.** (Shaffer, 2017), two case studies conducted in the U.S. healthcare context highlight the effectiveness of second opinions use and the default setting on prescriptions, which will be discussed in this Section.

The first case study utilized **a nudging intervention technique in the form of a recommendation based on the grade letter (A, B, C, D, or I)** assigned by the U.S. Preventative Services Task Force ("USPSTF"), an independent committee of national experts in preventative and evidence-based medicine founded in 1984, **to each type of tests and screening services**, that each grade symbolizes the quality of evidence for the recommendation and the ratio of benefits to harms of the preventive services (Shaffer, 2017).

For example, the USPSTF gave the use of mammograms to screen for breast cancer in women ages forty to forty-nine a "C," which indicates that there is likely only a small net benefit (e.g., detecting the sign of cancer) compared to harms (e.g., the false positive rates) of this preventive service to the patients at forty years of age and older. **This recommendation may prompt the physician to seek alternative preventive services that may be higher effective diagnostic for the patients in this age condition**. Thus, this form of **nudges serves the physicians and patients as a second opinion and allows a collaborative decision between doctors and their patients after an informed discussion about the benefits and harms inherent in each of preventive services**.

As a result, the services that may not be of utmost importance for the health and safety of patients could be reduced while other more beneficial choices of preventive services could be used instead. More importantly, this nudging technique is a low-cost recommendation to apply and does not constrain choice of physicians and patients in selecting the best or a combination of choices in preventive services.

Malhotra, Cheriff, Gossey, Cole, Kaushal, and Ancker (2016) proved that defaults should be chosen carefully because they can have an important impact on behaviour. In their study of **the default**

functions as a nudge in the form of e-prescribing interface when ordering the prescription refill choice, the default setting visible to the physicians and patients is the generic version of the drug display in the case of multiple options (including generic and name brand medications) (Malhotra et al., 2016). The study aimed to find out whether changing the design of electronic prescribing systems (e-prescribing) can influence doctors' prescribing habits from the name-brand medications to generics. In this case**, the default functions as a nudge because it gently reminds physicians of the generic option but does not constrain choice**. **The doctors still can deselect the default generic option and select the brand-name choice if they insist on giving the alternatives to the generic option, which are typically more affordable for patients.**

The findings of the study show that the proportion of generic drugs prescribed increased from approximately forty percent to ninety-six percent after the trials of this technology-based nudge (Malhotra et al., 2016), suggesting that **the default setting is effective in this context of electronic prescribing systems with preselection generic option of patient's prescription can influence physicians in opting the recommendation**. However, this default does not omit the careful consideration of the physician on the patient's needs. Rather, **this default nudge the physician to select a more affordable option** for the patient's prescription medication, resulting in potentially lowering the cost of healthcare for patients.

[2] Smoking Cessation Programs

Behavioural Economics interventions in the U.S. have been applied to address smoking cessation. Programs offering financial incentives, such as cash rewards or reductions in insurance premiums, have demonstrated success in encouraging individuals to quit smoking (Halpern et al., 2015). This aligns with the principles of operant conditioning, leveraging positive reinforcement to promote healthier behaviours.

The research conducted by Halpern and the team (2015) provides **a practical example of how financial incentives can help people quit smoking, demonstrating the influences of nudging on individuals' attempts to quit smoking**. In the context of public health, this empirical study implemented a nudging strategy that focused on **encouraging smoking cessation through monetary rewards. The participants were divided into two groups: one group was offered a monetary reward for abstaining from smoking while the other group served as the control group receiving standard support for quitting**. The objective of the study was to evaluate how effective financial incentives are in nudging individuals toward quitting smoking.

Regarding the results, **the group offered financial incentives exhibited a significantly higher rate of successful smoking cessation compared to the control group**. **The financial reward served as a potent motivator, nudging individuals to adjust their behaviour in line with the desired outcome of quitting smoking**. This empirical example aligns with the behavioural principle of reward-based motivation, as individuals are more likely to engage in behaviour associated with positive reinforcement, such as financial rewards. By strategically incorporating financial incentives into the smoking cessation program, the study effectively used nudging to tap into participants' motivation for achieving a desirable outcome.

The significance of this study lies in its potential to enhance smoking cessation efforts through a non-coercive and psychologically informed approach. Nudging based on financial incentives can address the challenges of addiction by providing tangible and immediate rewards, encouraging individuals to make healthier choices. The empirical example of enhancing smoking cessation with financial incentives underscores the effectiveness of nudging in public health initiatives. **By strategically employing financial rewards, policymakers and healthcare providers can positively influence individuals' efforts to quit smoking**. This approach aligns with the principles of behavioural economics, recognizing the transformative impact of subtle nudges on decision-making in the context of smoking cessation.

Regarding smoking prevention in other cultural contexts, a behavioural economic study conducted in high schools in Thailand by Tangtammaruk (2017) sheds light on **the effectiveness of different smoking prevention signs**. Despite the prevalent use of the standard no smoking sign—**a red**

circle with a red diagonal line through a cigarette picture—since 1992, statistical data reveals a consistent number of new smokers between 2001 and 2014, with most individuals starting smoking between the ages of 15-19 years old. This study aims to explore smoker and non-smoker preferences concerning the standard smoking signs and other types associated with various behavioural economic principles and psychological ideas.

Utilizing the reveal preference approach (RP) and state preference approach (SP), the study tested preferences, employing the economic binary choices model with maximum likelihood (ML) estimation to measure factors influencing smoking prevalence. **The findings indicate that both smokers and non-smokers predominantly prefer Pictorial Health Warning (PHWs) signs**, aligning with the principle of loss aversion compared to other smoking warning signs. **PHWs are typically displayed on cigarette packages, less visible to non-smokers, and can be avoided by smokers using cigarette holder cases.**

However, **implementing PHWs as signs in schools, universities, and public places can create awareness among individuals about potential future losses from smoking**. Additionally, the study identified two significant factors influencing individual smoking behaviour: being male and having friends who smoke. In conclusion, this research suggests that **the application of PHWs on smoking signs, grounded in the concept of loss aversion, could be further developed as a strategy to prevent smoking, especially among youths in schools and universities**.

[3] Weight Management Programs: Social Norms and Peer Support

Effectively addressing obesity and promoting healthy weight management involves understanding and leveraging social dynamics. **In the United States, interventions have employed social norms and peer support to encourage healthier eating habits and increased physical activity**. **Utilizing community networks and emphasizing the social benefits of these behaviours has shown promise in guiding individuals toward healthier choices**.

An empirical example of this approach is the study by Wing, Jeffery, Burton, Thorson, Nissinoff, and Baxter (1996), in which focused on encouraging weight loss through social norms and peer support. This study demonstrated the significant impact of nudging on individuals' efforts to manage their weight loss. **The nudging intervention in this study entailed having participants enrolled into the program, engaged in group activities, shared common goals, and had regular interactions with their peers**. The study successfully explored how **the inclusion of social norms and peer support influenced participants' adherence to the weight management program**.

The results revealed that **participants in the group emphasizing social norms and peer support experienced a significantly higher rate of weight loss compared to those in individual-focused programs**. The communal aspect of the intervention served as a powerful nudge, encouraging individuals to conform to positive social norms and benefit from the collective support of their peers. This empirical example aligns with the behavioural principle of social norms and the influential power of social interactions. Individuals often conform to what is considered acceptable or normal within their social groups.

By strategically incorporating social norms and peer support into weight management programs, the study effectively harnessed the motivational force of collective encouragement. The significance of this study lies in its potential to enhance weight management efforts through a supportive and socially informed approach**. Nudging based on social norms and peer support can address common challenges associated with maintaining a healthy weight, providing individuals with a sense of community and shared commitment to wellness**.

In conclusion, the empirical example of fostering weight loss through social norms and peer support highlights the effectiveness of nudging in health and wellness programs. By strategically integrating social dynamics and peer interactions, healthcare providers and policymakers can positively influence individuals' efforts to manage their weight. This approach aligns with the principles of behavioural economics, recognizing the transformative impact of subtle nudges on decision-making in the context of weight management.

10.2.3. Saving Scheme in Africa

Behavioural Economics interventions have been applied to African countries because saving programs, such as retirement funds, as a promising poverty alleviation strategy for international development. We will discuss two case studies conducted in the context of African countries that address the decisions with respect to economic related behaviours, particularly saving behaviours. These

The first study has an important impact on the literature and the practical understanding of the behavioural economics. Steinert, Zenker, Filipiak, Movsisyan, Cluver, and Shenderovich (2017) conducted a generalizable study with a systematic synthesis across multiple studies that provide quantitatively synthesise evidence on the effectiveness of saving promotion in Sub-Saharan Africa. **The interventions of interest include any studies conducted in the Sub-Saharan Africa with randomised controlled trials (RCTs) evaluation on saving promotion programs with the reported impacts on saving and poverty-related outcomes**, The programs can be any related to three categories of formal financial instruments: savings (e.g., account deposits, cash savings, total savings, etc.), consumption proxies (e.g., food costs, household expenditures, etc.), and future-oriented investments (i.e., expenditures in health and education) (Steinert et al., 2017).

The RCTs evaluation method ensures that to the selected data provide internal validity for the present study. The dataset is consisted of 9,330 records from a total of 27 studies that met the eligibility criteria of this present study. After a series of analyzes, **savings interventions do have significant impacts on poverty-related aspects when looking at respective outcomes, including increases in household expenditures, incomes, and improved food security**, as well as on intermediate outcomes such as increases in total savings amounts and promotion of small-scale family businesses such as agricultures (Steinert et al., 2017). Findings from the study suggest **that savings and related forms such as improved budgeting for consumption and investments can translate into poverty relevant outcomes**. Although, increased savings seem to be a basic economic behaviour that is beneficially proven, **people in many developing countries such as African countries may not have been supported by public policies and interventions designed to help building funds and savings**. Therefore, the needs to educate and develop saving habits to people in particular cultures should be built into national efforts and rooted in every aspect of public service foundations.

Another study is related to South African economic, demographic landscape, and the retirement funds conducted van Zyl and van Zyl (2016). Based on some official statistics, South Africans seem to be doing a poor job of smoothing consumption into retirement partly because a lack of saving and financial illiteracy, as well as high unemployment and employers not commonly sponsor a retirement fund. Nearly 40% of working South Africans do not save for retirement via a retirement funds. This study focuses on the defined benefit (DB) funds, defined as balance-of-cost funds where the employer bears the majority of risk in the fund, and defined contribution (DC) funds where members bear the majority of risk (van Zyl & van Zyl, 2016). **With different financial responsibility, focusing on DB funds can weaken employees from actively engaging and making personal decisions in retirement funds**. Thus, this study focused on **the transition in South Africa's retirement funds** from defined benefit plans, where employers guarantee retirement income, **to defined contribution plans, where the retirement benefit depends on the amount contributed and investment returns**.

This change is due to the need to **shift more responsibility to individuals to save adequately in order to reduce behavioural biases, based on overconfidence, gratification over future benefits, loss aversion, and mental accounting, potentially neglecting retirement savings** (van Zyl & van Zyl, 2016). The paper emphasizes the importance of understanding these biases to design interventions that encourage better retirement saving behaviours. Supporting the occupational retirement funds reform made by National Treasury. Many suggestions are provided based on cultural differences and applicable concepts in behavioural economics that may improve public policy and individuals' effort to understand and create retirement funds. Some suggestions include automatic enrolment, communications, or simplified investment options. The study summarizes the causes, problems, and recommendations to the issue related to financial decisions and policy development needs for the long-term savings of people in South Africa.

10.2.4. Environmental Policy in European Union

We continue to examine how Behavioural Economics has shaped environmental policies. This case study dissects the integration of Behavioural insights into initiatives addressing climate change, resource conservation, and sustainable living. We examine how behavioural nudges and incentives have shaped consumer decisions, influenced corporate behaviours, and impacted policy results in the quest for a more sustainable future.

Our next case study specifically analyzes **the implementation of Eco-Friendly Choices and Green Nudges within the European Union**, drawing insights from Schubert (2017). This research examines the introduction of "green nudges" in the European Union, exploring how behavioural interventions guide individuals and businesses towards environmental-friendly decisions. The research also evaluates the effectiveness of strategies like carbon footprint labeling, energy consumption feedback, and sustainable consumption incentives through case studies. **The adoption of "green nudges" in the European Union signifies a collaborative endeavor to direct individuals and businesses toward choices that promote environmental sustainability**. Through the analysis of case studies and empirical research in the next section, we shed light on the crucial role of Behavioural Economics in fostering a collective commitment to environmental sustainability.

An interesting example related to Carbon Footprint Labeling is highlighted in a study by Griskevicius, Tybur, and Van den Bergh (2010). The research findings revealed **the influence of carbon footprint labels on consumer decisions through a series of experiments, showing that consumers exhibited a higher tendency to select products with lower carbon footprints when the labels provided clear and easily understandable information on carbon emissions**.

Moving on to the case of energy consumption feedback, a study conducted by Schultz, Khazian, and Zaleski (2008) explored the effects of offering households personalized feedback on their energy consumption. The research entailed **delivering monthly statements containing information about energy usage**. The outcomes revealed **a notable decrease in energy consumption among households that received personalized feedback, underscoring the success of behavioural interventions in encouraging energy conservation**.

Finally, in the case of sustainable consumption incentives, a study conducted by Allcott and Taubinsky (2015) focused on the effectiveness of incentives given to sustainable consumption. The research specifically examined **the influence of tax incentives for energy-efficient products. The results revealed a substantial increase in the adoption of eco-friendly technologies when coupled with financial incentives, emphasizing the role of economic nudges in encouraging sustainable choices**.

In summary, the real-life example comparing opting-out and opting-in for renewable energy along with using social norms to encourage eco-friendly behaviour emphasizes the power of default options and social norms in nudging people toward environmentally conscious choices. This approach follows the principles of behavioural economics, recognizing that small adjustments in how choices are framed can greatly influence decision-making. By thoughtfully shaping default options, policymakers and organizations have the potential to effectively guide individuals toward behaviours that support environmental conservation, playing a crucial role in building a more sustainable future.

10.3. Global Trends and Future Directions

10.3.1. Technological Advances in Behavioural Economics

In the dynamic field of behavioural economics, technological advancements play a crucial role in driving changes. The integration of big data analytics, artificial intelligence, and machine learning has brought forth a new era, transforming how we understand and influence economic behaviours globally. **Current trends suggest an increasing reliance on technology to analyze extensive datasets, uncover intricate decision-making patterns, and create personalized interventions**. Looking ahead, there is the promise of even more sophisticated technological tools, providing researchers and policymakers with unparalleled insights into the complexities of human behaviour and the potential for finely tailored behavioural interventions.

A significant advancement in behavioural economics is the use of big data analytics. The diffusion of digital platforms uses and the interconnected nature of our lives has constantly generated extensive datasets that offer rich data for analysis. Researchers now have access to real-world behaviours on an unprecedented scale, revealing trends, correlations, and anomalies that were once hard to grasp. This data-driven approach fosters a more nuanced understanding of how individuals make economic decisions across various contexts.

10.3.2. Sustainable Development and Global Behavioural Economics

In the face of interconnected economic and sustainability challenges, behavioural economics is increasingly becoming a crucial factor in the pursuit of sustainable development. Current trends underscore a growing emphasis on incorporating behavioural insights into policies dealing with climate change, resource conservation, and social equity. Future directions indicate a more profound integration of behavioural economics principles in global sustainability initiatives. As societies confront the need to transition to more sustainable practices, behavioural interventions will play a pivotal role in influencing individual and collective behaviours towards environmentally conscious choices.

The convergence of sustainable development and global behavioural economics provides a dynamic perspective for addressing the intricate challenges our world is facing. Behavioural economics, with its focus on understanding how individuals make decisions, offers valuable insights for shaping effective policies and interventions that foster sustainability on a global scale. As sustainable practices encompass human awareness of and behaviours towards the Sustainability Development Goals (SDGs), **future directions of policy development and behavioural economics studies should focus on the essential dimensions of sustainable development within the framework of Behavioural economics**, **examining behavioural drivers, policy implications, and the potential for transformative change.**

A case study conducted by Halpern & Sanders (2016) offers an interesting example. They aimed to **influence residents' energy choices by manipulating the default option when signing up for their energy provider**. Traditionally, residents had to actively choose renewable energy, a process termed opt-in. However, the researchers introduced a significant change by making renewable energy the default choice unless residents actively opted out. Regarding the outcomes, **the switch to renewable energy as the default option led to a substantial increase in residents choosing eco-friendly energy sources. The group of residents who had to opt-out, actively selecting traditional energy, was much smaller compared to the opt-in group**. This phenomenon aligns with the behavioural principle known as status quo bias, where people tend to stick with the default because it requires the least effort. This case study holds profound implications for environmental conservation efforts. By leveraging the power of default options through nudging, there can be a significant uptick in the adoption of sustainable practices. In this instance, more residents opted for renewable energy sources, contributing to a noteworthy reduction in carbon emissions and fostering a community more attuned to environmental consciousness.

The case study is among manyempirical research that takes into account the current trends on sustainable consumptions that require understanding of human decisions in the context of renewable energy choices. However, other dimensions of sustainability development do need attentions from the society, including education and social development, and financial sustainability, in addition to environmental sustainability. The importance of financial education and public programs to create responsible spending and saving habits among people will be discussed in next section.

10.3.3. Financial education

Financial education is crucial for ensuring strong financial well-being. However, the effectiveness of traditional programs in turning knowledge into practical behaviour has been questioned. Riitsalu's (2018) study aims to fill this gap by blending behavioural insights into financial education. This research, conducted in Estonia, explores the potential of these insights in five different financial education courses. **The main goal is to understand how behavioural insights can shape financial education to not only provide knowledge but also influence and improve financial behaviours**. The study argues that **to comprehend individual financial behaviours, we need an interpretive approach. Using a case study method, the research covers five financial education**

courses of varying durations and participant backgrounds. The intervention includes various behavioural elements like goal setting, commitment, partitioning, deadlines, feedback, peer pressure, and advice. Assessments involve measurements before and after the courses, along with a follow-up survey to assess long-term changes.

Regarding the first intervention Motivational Goals, the study reveals that goals promoting positive outcomes, like saving for a specific purchase, are more motivating than goals centered on prevention, such as cutting costs. **Participants with promotional goals show higher motivation, emphasizing the importance of setting clear and achievable financial objectives**. Secondly, peer effects and group dynamics, **the study emphasizes that peer effects work best in groups with similar backgrounds that meet regularly. One-time or brief training sessions are less effective in leveraging peer pressure and advice, highlighting the need for careful group selection**.

Thirdly, partitioning effectiveness, the research explains that breaking down larger goals into manageable sub-goals (partitioning) works well when accompanied by well-designed or incentivized reminders. Regular reminders and commitment devices, like pre-filled multiple-choice cards, prove valuable in making partitioning effective. In addition, a notable finding is that **positive changes in behaviour last even six months after the financial education course ends. Participants report sustained alterations in their financial behaviours, suggesting the potential for a lasting impact from well-designed financial education initiatives.** The study offers insights for crafting effective financial education programs, including incorporating motivational goals for enhanced engagement, careful group selection to maximize peer effects, using incentivized partitioning with effective reminders, stressing the importance of regular, repeated meetings for a lasting impact.

In conclusion, this study provides a significant contribution at the intersection of behavioural economics and financial education. **By understanding the motivational aspects of financial goals and recognizing the importance of group dynamics, the study provides nuanced recommendations for policymakers and educators.** The call is for continual refinement and testing of interventions to align financial education with individuals' behavioural nuances, fostering enduring and impactful changes.

10.3.4. Financial Empowerment

The case study titled "The Importance of Default Options for Retirement Saving Outcomes: Evidence from the United States" by Beshears et al. (2009) explores the profound impact of default options on retirement savings outcomes, challenging conventional economic theories. The research expands on various stages of the savings lifecycle, encompassing plan participation, savings rates, asset allocation, and post-retirement distributions, which acknowledges the substantial influence defaults on economic outcomes. The aims of the study include to **understand the role of defaults in shaping retirement savings outcomes and to evaluate their impact on financial savings behaviour, within the context of the United States**. Drawing on empirical evidence from the United States and other countries like Chile, Mexico, and Sweden, this case study seeks to unfold the psychological complexities of economic decision-making influenced by defaults.

The research utilizes empirical evidence to illustrate how defaults affect different aspects of retirement savings, examining various retirement income institutions and their characteristics**. The study finds that defaults significantly influence savings outcomes across multiple stages, including plan participation, contributions, asset allocation, rollovers, and decumulation. It underscores the non-neutrality of defaults, emphasizing their potential to either facilitate or hinder improved savings outcomes.** The implications for public policy are discussed, stressing the need for a nuanced approach in leveraging defaults for positive economic impact. The paper concludes by suggesting that **public policies regarding retirement savings should acknowledge the potent role of defaults, portraying them as non-neutral factors that shape individual savings behaviour. Policymakers are encouraged to design defaults that foster better savings outcomes, aligning with the principles of behavioural economics**.

In summary, the study highlights that default options significantly influence how people save for retirement, challenging traditional economic notions. It underscores the importance of recognizing and strategically utilizing these defaults to shape individuals' financial management. This insight holds

significance for policymakers and financial institutions aiming to assist people in making sound financial decisions.

10.3.5. Charitable Giving

In the context of social sustainability development, charitable giving is a means to distribute the community's wealth and collaborations. To accomplish the sustainability goals, **charitable giving behaviour is not only the positive gestures for the greater good, but contributions of this behaviour also indicate freedom in financial powers and economic standing of the society**. Therefore, we will discuss about case studies in this global direction to learn how to improve willingness to give and to increase contributions. The following studies will address platforms that use an opt-out rather than an opt-in approach for donation options have shown higher participation rates. **By making charitable contributions the default option, individuals are nudged toward altruistic choices, contributing to the public good**.

A study of Zarghamee, Messer, Fooks, Schulze, Wu, & Yan (2017) is an empirical example of this case. In a series of three experiments involving 328 people, this study examines how we can encourage more donations to real charities. **The focus is on simple but effective strategies like how choices are presented, what people think is normal, and how they feel. Regarding the first study they aim to change the default donation, at the University of Delaware, they found that when they made donating an automatic choice (opt-out) instead of something people had to actively choose (opt-in), donations to an environmental charity increased by a big 25%. This shows that small changes in how choices are set up can make a big difference in how much people give.**

In the second experiment at St. Luke's United Methodist Church which creating and sustaining a giving norm, they tried a one-time trick. **By talking about donating and letting people vote on it, they managed to keep donations to an HIV/AIDS charity 47.3% higher over ten months. This means that once people started giving, they kept giving because it became a normal thing to do**. Finally, the effects of mood and stigma, in a different test, they looked at how people felt about a charity that talked about HIV/AIDS. Surprisingly, **people did not feel negatively about it. But what did matter was how people felt after seeing the charity's information – if it made them feel good, they were more likely to donate**.

These experiments show that simple changes in how donation choices are presented, creating a sense of normalcy, and considering people's feelings can really boost giving. This has important implications for charities and suggests that with thoughtful planning, we can encourage more giving to make the world a better place. Nevertheless, it's important to note that this study predominantly concentrates on Western countries. **Exploring the behavioural economics of giving in Eastern countries, with their diverse cultures, beliefs, and religions, may offer a more comprehensive global perspective**.

SUMMARY

Chapter 10 explores the dynamic landscape of behavioural economics, providing insights into its applications across various domains and shedding light on global trends and future directions. The chapter begins by delving into the multi-dimension of Hofstede's cultural theory in different realms, including risk preference and risk perception, savings, and prosociality. This section highlights the underlying reasons of cultural differences influencing economic behaviours among case studies.

The narrative then shifts to the global case studies that have applied the Hofstede's cultural dimensions theory into understanding decisions. Public policy in UK encompasses discussions about insight of how to change people behaviours and habits from the Nudge Unite or BITs in the UK. Followed by the behavioural economics in healthcare, case studies provide insights into addressing challenges related to medication adherence and smoking cessation. Leveraging social norms and peer comparisons, interventions in healthcare encourage positive behaviours.

The discussions turn to case studies related to weight management programs, where social norms and peer support play a crucial role in fostering healthier choices. The chapter underscores the importance of understanding and leveraging social dynamics in health and wellness programs. It

concludes that nudging, when strategically implemented, positively influences decision-making in healthcare contexts. The chapter emphasizes the significance of non-coercive strategies, illustrating how nudging based on behavioural insights positively influences patient outcomes.

The chapter then transitions to global trends and future directions in behavioural economics. Technological advances, including big data analytics and artificial intelligence, are identified as pivotal drivers of change. The integration of technology promises more sophisticated tools, providing unparalleled insights into the complexities of human behaviour and enabling finely tailored interventions.

In the context of sustainable development, behavioural economics emerges as a crucial factor. The chapter outlines current trends that highlight the growing emphasis on incorporating behavioural insights into policies dealing with climate change, resource conservation, and social equity. The integration of behavioural economics principles is anticipated to play a more profound role in global sustainability initiatives.

Expanding to financial education and empowerment, the chapter explores nudges in retirement savings and financial education. The power of default options in retirement savings is examined, challenging traditional economic notions. Additionally, the integration of behavioural insights into financial education programs is explored, emphasizing the need for nuanced approaches like goal-setting, peer effects, and partitioning.

The section concludes by exploring charitable giving as a means to redistribute the community's wealth, collaborations, and well-being. The chapter highlights the effectiveness of an opt-out approach in donation platforms, making charitable contributions the default option. A study reveals that small changes in how choices are presented significantly impact the amount people give. Notably, the study focuses on Western countries, suggesting the need for exploring the behavioural economics of giving in diverse cultural contexts globally.

Finally, Chapter 10 navigates the expansive terrain of behavioural economics, uncovering its applications in diverse fields and projecting its future trajectory. From influencing commuter choices to promoting sustainable consumption, behavioural economics proves to be a versatile and influential framework. The chapter emphasizes the need for context-sensitive approaches, recognizing the diversity of human behaviour and the evolving interplay between technology and decision-making. As we look ahead, the integration of behavioural insights into global policies and the transformative potential of technology are poised to shape a more nuanced and sustainable world.

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CHAPTER 11: FAIRNESS AND SOCIAL PREFERENCES AND HAPPINESS

On the day that the world respects rationality and believe that everything can be explained, the word **'happiness'** cannot escape definition. Even though it seems like a metaphysical word and can be interpreted in many ways. But **happiness** is one of the **most researched and examined words**. **Happiness** is found in every science, including philosophy, psychology, science, and even economics. **Economics of happiness** becomes an interesting science when two words that are both similar and different come together in an amazing way. If the goal of economics is wealth and making use of limited resources for maximum benefit. **Happiness** is like a bird that flies away from a cage of rules. Because it is so fragile and uncertain. **How do we measure happiness? Is happiness universal? Where does the cost of happiness come from?** So, what can we spend on **happiness**? is a question that the economics of happiness may have the answer to. All of which is layered on top of **behavioural economics**, which studies **human decision-making** — incredibly **irrational humans.** There are many theories in psychology and economics that raises the question of whether we **have accumulated happiness** since birth. There is a theory that says "yes". In that we **accumulate factors of happiness** called **Hedonic Capital**, like financial capital. But how much is the capital that makes us happy, such as a good environment? Good education, if we have a lot of it, we may be highly **happy.** And if things happen in life that make us sad? We can pull resources from **"Hedonic Capital"** to increase our happiness as before. The 'Behavioural economics' is a part of the second stream of economics that has a different focus from the traditional educational approach. This concept is therefore a **combination of knowledge of psychology and principles of economics**. It is based on the belief that **humans do not make all rational and appropriate optimal decisions** in the way that mainstream economics thinks. But there are other things. That comes from **personal beliefs and social influences** that come into play in making many decisions, such as **bias, emotion, and overconfidence, overconfident or bandwagon effects, etc.**

All of this is not a conclusion drawn from **personal beliefs.** But it is a scientific analysis that divides the functioning of the human brain into two areas. It is the **emotional side** that is often used in making quick decisions and the reasoning aspect that is often used in making deeply thought-out decisions. Make it slower than the first type. If viewed according to the way of thinking of mainstream economics, it may be assumed that we make all our **decisions based on logic only**. But we use our **emotions to make decisions**. Simply put, **'behavioural economics'** sees humans as not perfect. Control yourself well or hold on to the goal with such strength? We are just one type of sensitive creature which will understand humanity more in economics. We must include more factors in **unpredictable human behaviour**. To design government policy or business decisions of private companies will be made correctly as well. However, behavioural economics will never fully understand the human mind. Because it is hard to know exactly what's in our heads. And how does it work? All it can do is collect data from various social experiments over time. In the future, if more advanced technology becomes available, maybe we will be able to understand human beings more fully than at present.

11.1. Behavioural Economics of Fairness and Social Preferences

There have been **behavioural economic experiments** that have interestingly proven the existence of a **human sense of justice and fairness**. This experiment will involve two people dividing money, for example, setting a limit of 200 Euro. The dividing party can divide in any way. Suppose you divide 20 Euro between the receiver, and you get 180 Euro. If the receiver accepts, both will receive the same amount. But if the receiving party does not accept. No one will receive any money. This experiment found that at a certain point, one who the receiving party feels unduly taken advantage of. Most of the sample will choose not to receive the money to prevent the other party from getting

money as well, even though if you judge only by the criteria of benefits, you only get 20 Euro, is not that worth more than not getting a Euro at all. That is because we **humans have a sense and sense of justice.** Being taken advantage of to the point of disturbing this feeling is therefore unacceptable and makes one feel devalued. **Decisions** are made from this realization by crossing the threshold of benefits. This is true even in animals whose intelligence is inferior to humans. There has also been an experiment where two monkeys were rewarded for performing a task. Before that, both monkeys received the same prize of cucumbers and had no problems. If the experimenter later gave one of the monkeys the same cucumber, but the other one got grapes. It turned out that the monkey that got the cucumber refused the prize and became angry. It shows the signs of aggression. Or anyone who raises many dogs, probably had a similar experience. Experimenting like this too. So, it is not just humans. All beings that have wisdom and feelings and are aware of their "self" all want fairness. So, what is **"justice" or "fairness"?** Why are we willing to die for it? Why are we willing to give up our benefits in exchange for them? This is one of humanity's most important questions. Until there are many researchers and philosophers trying to find popular words. The code can be briefly summarized as "**a condition in which a person or thing receives what it deserves under the assumption that things that perform or have the same properties, you should receive the same thing"**.

Justice, therefore, does not mean the way things are treated the same. But it is about that a person who receives something or is treated in a certain way, he must be a person who reasonably deserves it. To the extent that even though we may not be like him, but it is reasonable at a level that we can accept without being offended. For example, seeing people who work hard and be successful. Although we may naturally be envious of his success. But I do not feel like I have been treated unfairly. But that is the feeling "Who deserves what" is different. For example, when we see the children of rich people or those with advantages due to birth who do not put in much effort. But received a higher return than many people from that handicap. There are people who feel that it is fair and unfair. Because there will be people who think that this is an unfair inequality because the starting points are not equal. The offspring of rich people do not deserve that wealth just because they were born into their mother's womb. With the other party, it is seen that this is also fair. It is because their parents and ancestors worked hard to build and accumulate status for generations to come. Even the descendants will receive those fruits as well. Or think in the way that it is a blessing. Boat racing, rowing competition, enough to compete whatever you say. But we can also see that people may be more accepting of physical handicaps than social factors. Just like we accept a co-worker who is smart but not as hardworking as us for a promotion more than people who are as diligent as us but go faster. Because they are relatives of someone who has the power to evaluate and make decisions. Therefore, leading to the observation that If inequality comes from "people" as well, or comes from things with intent that are likely to be controlled, such as social mechanisms or state power. Getting different results or being treated differently starts to become a problem. Because it will make those who have a sense of identity feel compared devalued the effects on the mind will vary widely. Some were angry and demanding. Some are depressed and blame themselves. Or there are also those who can accept it and then diligently go and make merit so that they will be reborn well in the next life. This "justice" or "fairness" is ultimately a matter of the individual. Therefore, the normative rules that are considered the "average values" that the state has set to resolve disputes, namely "law", may not be the best answer for fairness or justice. Because "fairness" or "justice" depends on one's point of view.

11.1.1. The Definitions

Fairness involves equitable and just treatment where there is a balance between what is deserved and what is received. **The concept of fairness** is a governing principle in economic decision making and plays a larger role than rational calculations described in traditional economic theory. In economics, **the concept of fairness involves ideas of equity and justice in relation to resource distribution.** From the perspective of economics, fairness should involve achieving equitable outcomes in economic exchanges, contracts, and monetary transactions. Economists can utilize this perspective to analyse how people allocate resources and navigate economic transactions in relation to principles of fairness. **The concept of fairness extends beyond traditional economic models** in the realm of behavioural economies and has deeper connections within psychology. In behavioural economics,

fairness is studied through the perspective of real-world human behaviour rather than through the predictions of economic models. The behavioural economics concept acknowledges that considerations of fairness are deeply **embedded in human decision-making and are often separate from purely rational calculations** (Fehr & Gächter, 2000; Bolton & Ockenfels, 2005; Smith, 2005)**.** Social preferences involve how people navigate and respond to the social aspects of them interactions. It includes consideration for others' well-being, the motivation for cooperation, and establishing balance between individual and collective outcomes. Understanding this definition helps us to navigate the complex nature of social preferences in economic decision making. In economics, social preferences involve how individuals' decisions are influenced by factors beyond self-interest. The economic definition of **social preferences** explains how individuals weigh others' welfare, the processes of collective decision-making the impact of cooperation or competition, and the dynamics of collective decision-making. Traditional economic models are enhanced by the recognition of the social dimensions involved in economic transactions by providing a definition of social preferences in relation to real human behaviour. Here, social preferences are not abstract concepts but are explored through observing how individuals behave in various social and economic contexts. **This definition acknowledges the complexity of human interactions, recognizing that social preferences often deviate from strict rationality and are shaped by psychological and emotional factors** (Fehr & Schmidt, 1999; Lisciandra, 2018)**.**

Happiness can be understood as a subjective and multifaceted concept that captures individual life satisfaction and well-being. It is a **holistic evaluation** of personal **fulfilment, relationships, and experiences.** In economic terms, happiness is often equated with the satisfaction and well-being resulting from the consumption of goods or services. The economic definition of happiness centres **around the utility function, a mathematical representation of an individual's preferences and choices.** Economists study how people allocate resources to maximize their utility, viewing happiness because of rational decision-making within resource constraints (Bruni, & Porta, 2005; Helliwell, Layard, Sachs, & De Neve, 2020). **Simply put, 'behavioural economics' sees humans as not perfect.** Control yourself well or hold on to the goal with such strength? We are just one type of sensitive creature which will understand humanity more in economics. We must include more factors in unpredictable human behaviour to design government policy or business decisions of private companies which will be made correctly as well. However, behavioural economics will never fully understand the human mind. Because it is hard to know exactly what is in our heads. And how does it work? All it can do is collect data from various social experiments over time. In the future, if more advanced technology becomes available, maybe we will be able to understand human beings more fully than at present.

11.1.2. Fairness, Altruism, Reciprocity, and the Behavioural Economics

Fairness transcends logical calculations and includes the behavioural foundations that shape economic decisions. In behavioural economics, we explore how a desire for fair outcomes motivates individuals beyond self-interest. The inclusion of fairness principles within an economic context helps us understand the relationship between behavioural inclinations and the pursuit of equitable results. This section explores the dynamics of **altruism and reciprocity**, shedding light on how these social preferences impact economic decision-making. Individuals often engage in acts of altruism beyond simple rational self-interest. **Reciprocity, characterized by a give-and-take dynamic, shapes economic exchanges not solely based on individual interests but also through the cultivation and maintenance of social connection.** Behavioural economics captures the multifaceted processes and intentions that impact decision making, recognizing the influence of emotions, social norms, and cognitive biases in shaping economic choices. According to Regarding **Altruism, A Theory of Selflessness, altruism is rooted in selflessness and a concern for others**. This challenges traditional economic models that assume individuals act solely on self-interest. Behavioural economics acknowledges individuals' capacity for altruistic acts, influenced by empathy, compassion, and a sense of moral duty (Baumeister, Vohs, & Tice, 2007; Batson, 2010).

Reciprocity introduces a dynamic element to economic exchanges, where individuals respond to others' actions through mutual giving or taking. Gächter & Herrmann (2009) explored

reciprocity through economic experiments, showing individuals are willing to reward cooperative behaviour and punish non-cooperative actions. This extends beyond immediate gains, emphasizing the importance of reputation and social connections in shaping economic decisions. In the context of behavioural economics, Thaler and Sunstein (2009) demonstrated how altruism and reciprocity interact within economic decision-making. This recognizes that **individuals' choices are influenced not only by rational calculations but also by emotions, social norms, and cognitive biases**. Recognizing the significance of social preferences in shaping economic behaviour provides a deeper understanding of human decision-making. When we talk about justice, we usually think about the law. But is there another dimension beyond that? If looking at it in its historical role What role does justice play? **Social justice is almost always the first goal of the emergence of human communities since ancient times**. It is just that in ancient times, justice might be called differently, such as calling it with another ancient belief. But the goal is the same. How to make every member of that community no matter how big or small must live in peace. And that peace must not come by force. But you must come voluntarily. Because I believe that the community and the people with authority enforce it. It is something they accept, and they want. It can be said that justice is the distribution of benefits obtained through various practices, productions, and exchanges. The fairly about the benefits of the people who will receive is not an abstract matter like goodness or external matters. But it is a concrete matter such as people's lives and linked together as a society. If there is no society, there is no single political community. There will be no issue of justice being raised as an issue and there is no way to find justice that is acceptable to all people (Bolton & Ockenfels, 2005).

11.1.3. Experimental Insights into Behavioural Fairness from Game Theory to Real-world Applications

The problem that everyone must face is that the knowledge and experience that we have is often incomplete, that is, we do not know everything, or we only know part of it. **Then when the situation changed, and it was no longer the same.** Decision making based on previous experience must change accordingly. And what's even worse is that the people around us have the same goals as us. **So, everyone must compete to win**. There may be direct fighting or relying on collusion with friends. to defeat the enemy in politics, in the workplace, or even in sports. **Game theory** is a strategy that can help players predict the different outcomes that might occur and to help making the decisions and find the "right" option to get the result you want such as win, tie, or just to increase your happiness. In 1944, when the textbook "**Theory of Games and Economic Behaviour"** by Von Neumann and Oskar Morgenstern appeared, this work was used to predict various events, including the Cold War between two superpowers. (Namely America and Russia) in anthropology social psychology, politics, economics, business and philosophy as well as evolutionary biology. Because even RNA viruses know how to play games for survival and reproduction. The understanding of fairness and social preferences is enhanced by experimental evidence that offers empirical insights into how individuals behave in scenarios involving these concepts. Researchers employ various games, such as **ultimatum games and dictator games**, to observe real-world responses that deviate from the predictions of traditional economic models. These experiments demonstrate the **many behavioural factors that influence decisions related to fairness, providing a deeper understanding of how individuals utilize social considerations when navigating economic landscapes**. The concept of fairness has been included in **game theory and utilized in real-world scenarios**. This evolution reflects a profound transformation in our understanding of how individuals make economic decisions. With the rise of behavioural economics, scholars began challenging the strict rationality assumptions of traditional game theory. Through experimental games like the **Ultimatum Game and the Dictator Game**, it became evident that individuals were willing to sacrifice economic gains to achieve fair outcomes, highlighting the significant role of fairness considerations in decision-making. The understanding of fairness goes beyond theoretical models and can be seen in real-world applications. In experimental economics, researchers design scenarios that mimic daily interactions, giving participants the chance to make decisions influenced by fairness notions. The insights gained from

these experiments bridge the gap between theoretical ideas and the intricacies of human behaviour, emphasizing the importance of fairness considerations in various economic and social situations.

In the evolving understanding of **fairness**, the **Ultimatum Game** model demonstrates how theoretical predictions collide with **experimental realities**, providing insight into the intricate realities of human decision-making. Here is an example of the ultimatum game. Consider a scenario where Player A is given $100 and proposes to share $30 with Player B, leaving $70 for themselves. Player B, however, has the option to accept or reject this offer. In the theoretical expectation, Player B should accept any positive amount, but experiments consistently show that individuals often reject low offers, opting for a more equitable distribution. According to this example, researchers like Güth, Schmittberger, and Schwarze (1982) conducted pioneering experiments on the **Ultimatum Game,** revealing that offers below 20-30% of the total amount are often rejected, highlighting a willingness to sacrifice personal gain to penalize perceived unfairness. **The Ultimatum Game** includes one participant (the proposer) endowed with a sum of money proposing a division with another participant (the responder). Faced with the proposal, the responder has the binary choice of accepting or rejecting it. According to **game theory**, rooted in rational self-interest, the proposer is expected to aim for the smallest possible offer. Simultaneously, the responder, through rational self-interest, should accept any positive offer, recognizing that receiving something is better than nothing. However, contrary to the predictions **of rational self-interest, experiments reveal a significant departure from theoretical expectations.** Proposers often make substantial offers, understanding that responders are inclined to reject offers considered unfair. Responders, in turn, demonstrate a willingness to forgo potential gains to penalize perceived unfairness. These results underscore the importance of fairness considerations, suggesting that individuals are motivated by more than pure self-interest when making economic decisions (Fehr & Gächter, 2000; Fehr & Schmidt, 1999). The **Ultimatum Game** serves as a fascinating example of **how experimental outcomes can differ from theoretical predictions**. The willingness of individuals to reject unfair offers challenges the assumption of **purely rational decision-making and underscores the importance of social preferences, fairness considerations, and reciprocity in shaping economic interactions**. The role of fairness also impacts public policy and societal dynamics. Policymakers, **influenced by behavioural insights**, recognize the importance of incorporating fairness considerations into decision-making. Whether addressing income inequality, healthcare access, or educational opportunities, understanding the evolution of fairness enhances the effectiveness of policies aimed at creating more equitable outcomes. In 2001 was the year Hollywood released the film “A Beautiful Mind,” which centres on the life of John F. Nash Jr. (1928–2015) and explores Nash's equilibrium which plays a large role in playing general games not a quantum game consisting of several players. There are rules to play and in playing, there is a pay-off as a reward, which if using this or that strategy that is different. The prize will change accordingly. Rewards here may be monetary or feelings. For example, you can be happier. And people who play games aim to get the highest returns when everyone has the same goal. So, the question is: Who should play the game? To make everyone feel the least sorry. In coming up with this strategy, Nash proved to the world that every game has at least one balance point. **The tactics used will please both people. Even if one person changes tactics and the other still uses the same tactics**. Examples of applications of game theory in classical physics that is, not quantum physics means assuming a system consisting of 2 electrons and 1 nucleus, and the system is stable. If there is the least amount of energy by having each electron try to stay as close to the nucleus as possible. But at the same time, electrons do not want to be near each other. Because there is a coulomb repulsive interaction. Suppose that the first electron chooses to go into orbit B near the nucleus and at the same time the second electron chooses to go to an orbit outside A. The first electron is strongly attracted to the nucleus and is gently repelled by the second electron. Because the two electrons are in different orbits. Therefore, the first electron receives a large reward. Let's say it is equal to 3. The second electron is very far from the nucleus and is obscured by the first electron for some time by not allowing it to interact with the nucleus 100% of the time. The reward for this electron is very small, equal to 0. The result of this situation can be written as (3,0), the first and second numbers in parentheses show the rewards of the first and second electrons respectively. In the same way, the reward for the case (0,3), which is the opposite, is that the second electron is in the near orbit B and the first electron is in the outer

orbit A. But if both electrons choose to enter the orbit same orbit the force of attraction between the electron and the nucleus is very strong. But the force of repulsion between them will also be great. The reward for the situation is therefore (1,1) or if both electrons choose to be in the outer orbit. The force of attraction between the electron and the nucleus and the repulsive force between the electrons will be small. Because the orbit is large, and the electrons are very far apart. This situation is rewarded with (2,2). The Nash equilibrium occurs at (1,1). Physics therefore predicts the situation (1,1) which is the situation where the electrons will be, and quantum mechanics thinks the same way. This is because the wave functions of two electrons in the same orbit are entangled.

Another example of the application of game theory in analysing human behaviour is the use of the ultimatum game by John Harsanyi (1920–2000), who won the 1994 Nobel Economic Prize for devising the game. In the year 1961, with contents and rules as follows: Suppose we are a member of a village. And someone brought a sum of money and gave it to us. Then tell them to divide this money by giving it to another member that we do not know. Under the condition that if the person who will receive the money splits, if you refuse to receive it, both you and that person will receive nothing at all. But if they accept, both you and that person will receive the money that we divided. Furthermore, in proposing this division must be done only once. There is no negotiation, and every decision is secret. The interesting question is if everyone knew the total amount that would be divided. So how do the two people involved in this division decide to divide the money such as let's say 10,000 baht so that it is "**fair**"? In testing the views of social justice among peoples around the world, **experimental game theory** economists have discovered several interesting facts about the ultimate game: if common sense were used, a normal person who splits money should give the least amount of money to another person such as 10 baht, which that person should accept because suddenly they have an extra baht. But when they know that the person who splits the money will get 9,999 baht, he may feel offended and immediately refused that 10 baht, which would have the effect of causing people to receive nothing at all, just like him. This is therefore to teach the divided people to know some "fairness". Experiments on this matter with groups of people with various occupations in many countries around the world confirmed that we humans tend to hate cheaters and is often generous to other people. Even if that person is not your own relative and sometimes may respond violently. Even if they do not receive any benefit, so that the "cheating" person will know that an injustice has occurred. In the journal “Journal of Theoretical Biology” in the year 2000 H. Gintis (1940-2021) of Amherst College at the University Massachusetts in the United States, they used university students as guinea pigs for testing. And found that most people will share 50% of the total money, some people will give more or less. But on average it is 40% and in cases where the share is less than 20% the recipient will always refuse to receive it. In fact, this ultimatum game was first introduced by Joseph Henrich (1968-present), an evolutionary biologist. Economist and psychologist of Harvard University in the United States who is interested in how people's economic behaviour depends on the culture of society.

11.2. Happiness in Behavioural Economics

‘What is happiness?’ is a question that is easy to answer and difficult at the same time. It is easy to answer if you define it in your own way. It is difficult to explain what it is in the meaning of the whole world. And each person gave a different answer, which was strange, even though everyone was trying to find it. But there is no science or knowledge of any kind. In a world where the principles about it are clearly explained the more paths or **methods to happiness**, the greater. The mainstream economics, there is an assumption that humans are economic animals (Homo Economicus) that have enough reason to choose what to do or not to do and be able to manage limited resources for maximum efficiency. While **behavioural economics and happiness economics** are secondary economics that bring theories from other fields such as psychology and behavioural science. Become a factor in the analysis as well. These approaches assume that humans are not perfect and that every decision is always based on logic because of sensitive by nature.

Marketing can make customers happy and come back to create happiness for ourselves as well. Change your thinking to make your life happy with the concept of **"Behavioural Economics"** Marketing theory, **behavioural economics** that can be applied in real life. The goal of development will

be to maximize gross **happiness as the final goal.** This has a wider meaning than development that aims to maximize national income growth (that is, increasing income is only one part that supports achieving the happiness goal). **By achieving the happiness goal, emphasis will be placed on the people.** Able to satisfy basic needs primarily through material factors or 4 factors, because it is believed that uncontrolled material development will destroy the main structural factors that have supported society all along, namely the traditional and cultural identity of the nation. Mental value and the environment, etc., without being able to restore it. This makes development unbalanced, unsustainable, and the development process cannot be reversed any longer. Bhutan has also restricted the receipt of economic assistance from other countries. It will mainly focus on receiving assistance from India. To avoid being used as a tool for profit by powerful countries such as the United States and Russia. In another perspective We may interpret the increase in income and material wealth as (Both in absolute and relative terms) that it is the consumption of goods that increases economic status. In the case where income is still low Increasing income may have the effect of supporting social relationships and friendships between individuals in society as mutually reinforcing and complementary goods, but at a high level of material wealth. An increase in the consumption of status-building products will have the effect of destroying the ability to consume products that enhance interpersonal relationships, which has a negative effect on happiness.

11.2.1. Happiness in Behavioural Economics

Psychologist Wienhoven (1997) defined "**happiness" as an individual's evaluation of how much he/she likes his or her overall life**. When we say we are happy, so it means that we feel like or satisfied with our life that happy person. He is a person who hardly feels worried about his own life. Likes to have fun with friends and likes new experiences, has a stable mood, does not change easily up and down and often hope that they will encounter good things in the future. **As for people who are not happy often feel that your life is bad, not caring about other people's feelings or even thinking about committing suicide**. Therefore, happiness is like the nourishment of our life. The first personality characteristic of **happy people is that they have high self-esteem**. This means that someone likes themselves. View yourself in a positive light, such as seeing yourself as attractive. smarter than others, get along well with others. Physical health is stronger than other people's, which sometimes is just one's own thoughts. The second important characteristic of happy people is feeling in control of their lives. I am a person who believes that life belongs to us. Good or bad, will it be successful or not? It depends on ourselves, not waiting for fate, believing that we can control the things that happen in our own lives. Psychologists found that people who believe this way will do well in school. Work is successful and better able to solve their own stress problems So I'm a happy person. Being optimistic whatever you do, look for aspects that give you encouragement. Successful work is seen as because you are good at it. It is not because of luck. If I must face a new job or a new school, I think I will do well. It will go well just by thinking positively like this. You have a better chance of being successful, healthy, and happy than anyone else.

However, b**ehavioural economics challenges the assumptions of pure rationality within utility function theory**. Prospect theory, introduced by Kahneman and Tversky (1979), explores how individuals deviate from rational **decision-making due to cognitive biases and emotional factors.** The endowment effect, as explored by Thaler, challenges the traditional assumption that individuals value items solely based on utility, showing that ownership influences perceived value. While the utility function theory has been influential, it is important to acknowledge its limitations. Insights from behavioural economics, experimental studies, and alternative theories contribute to a more comprehensive approach to modelling human behaviour. Until more than ten years ago, there is a group of people who have begun to seriously research happiness. Starting from defining what happiness is. To find the next important answer: **What makes people happy? So, what can the government sector do to return happiness to the whole country?** until it became a body of knowledge called 'Happiness Economics'. If you look at the name, you might feel that it is difficult to understand making it impossible to imagine that economics is the subject of economic systems and resource management. It is how to connect or answer questions about happiness that is difficult to capture?

But it is our luck that Nattawut Paothawee, Thailand's first happiness economist, and Professor of Behavioural Science at Warwick Business School, author of books such as THE HAPPINESS MANUAL, Happiness Behaviour by Salmon Publishing House. Economics is the principle that we must find a way to use resources in the most cost-effective manner. Nowadays, people have more access to resources. But the question is why are we still not very happy? Does that mean that most people make choices that do not have the greatest impact on their happiness? Therefore, conducting research in the economics of happiness is to understand people's decisions and look for other factors that greatly affects happiness. But people cannot imagine it. Including that some factors that affect happiness are directly related to economics, such as money, unemployment, and inflation. But personally, it is broad and covers the economics of happiness again. Therefore, it is necessary to combine many things. Let's use science together. For example, when deciding on small matters of people, psychology must be used to help. As for economic principles, they answer questions at the macro level. Its definition does not specify happiness derived from anything. But we measure people's happiness by asking: One—How satisfying is your life right now? Two—How much meaning do you feel your life has? And third—how would you rate your day-to-day life? On a scale of 0-10, how would you rate it? Then let's see what factors variables are. And how does it affect happiness in all three dimensions?

The Economic Measurement of Happiness

It probably is not even a fixed formula. It is more of a formula that we see from statistics. Statistically, we find that having good interactions with others having someone who supports your life and the amount of time spent with those around you is the most important factor in the equation. Second is physical and mental health. As for the money part, this is something that people often give great importance to. Instead, it is a factor that ranks lower in many rankings. Now that we know that happiness has three dimensions knowing which factors have a greater or lesser effect. We will be able to **make better decisions and choose rationally**. It is not that I choose a job that pays a lot of money. But daily life requires traveling long distances and being stuck in traffic for 2-3 hours, which most people choose that way even though the data tells us that their salary is in the tens of thousands and the suffering of going through traffic to work cannot be compared. For Bangkok people should get a salary of millions. Even if it is worth it. Information from these studies can help people realign their priorities. What you think is important may not be what you think. Even people who already feel happy You will also be able to answer that why are you happy? So, is it possible to be happier? Or you can be happy at a lower price.

Measuring happiness presents a significant challenge for both utility function models and prospect theory within the field of behavioural economics. Traditional economic metrics struggle to fully grasp the complex and subjective **nature of well-being**. While prospect theory offers a more nuanced understanding of decision-making, it faces difficulties in translating psychological insights into measurable indicators. Addressing these challenges is essential for constructing a comprehensive understanding of how individuals experience and pursue happiness. It is important to integrate insights from utility function models and **prospect theory to have a more holistic perspective** on the factor of **happiness in behavioural economics**. By acknowledging both rational and behavioural dimensions in decision-making, we can develop models that better capture the dynamics of individual choices, consumption patterns, and overall life satisfaction. This integrated approach provides a better way of understanding happiness that aligns with the complexities of human behaviour. Understanding **happiness in behavioural economics** involves the utilization of subjective well-being (SWB)—a comprehensive measure encompassing an individual's emotional experiences, life satisfaction, and overall contentment. In contrast to traditional economic metrics, SWB recognizes the subjective nature of happiness, emphasizing the role of individual perceptions in shaping economic decisions. The challenge of quantifying subjective well-being is a focal point in the study of happiness within behavioural economics. **Traditional economic measures often fall short in capturing the complexity of individual experiences**. Tools such as surveys, self-reported measures, and psychological assessments are used to measure subjective well-being, acknowledging the inherently personal and subjective nature of happiness. Understanding the behavioural dynamics influencing economic choices and contributing to individual happiness requires a deep understanding of the of the measurement.

Subjective well-being (SWB) involves an individual's self-reported assessment of their overall life satisfaction, happiness, and emotional well-being. To measure SWB effectively, various methodologies are employed, as summarized below. Surveys and Questionnaires: Surveys and questionnaires prompt respondents to rate life satisfaction, happiness, and emotional experiences on a scale. Well-known scales include the Cantril Ladder and the **Satisfaction with Life Scale** (SWLS) (Diener et al., 1985). **Experience Sampling Method** (ESM): ESM collects real-time data on individuals' well-being by prompting them to report current feelings and experiences multiple times a day. This method provides a deeper understanding of daily fluctuations in well-being (Csikszentmihalyi & Larson, 1987). **Hedonic Treadmill Approach**: The hedonic treadmill concept suggests that individuals adapt to life events, returning to a baseline level of happiness. Measuring SWB through this lens involves examining how individuals' happiness responds to changes and challenges over time (Brickman, 1971). **Objective Indicators**: Some researchers incorporate objective indicators, such as income, health, and social relationships, as proxies for well-being. These indicators, used alongside subjective assessments, provide a comprehensive view of individuals' overall well-being (Easterlin, 1974). With differences in personality traits, such as introverts: they may not be happy from socializing. Got to meet friends equal to people who are extroverts. Introverts may be happier reading at home. Therefore, it is possible that the three happiness factors mentioned above may have different effects on different people. Because those data are the average of most people.

11.3. Interconnection of Fairness, Social Preferences, and Happiness

One secret to being happy is to laugh. Researchers in both psychology and medicine, everyone agrees that laughter has many benefits for everyone. Laughter releases substances that increase creativity in the body and can cure some illnesses. And that's more important than anything is when laughing. We will feel good. Whether it is a giggle or a hearty laugh. But many people may ask: What to do to laugh? Since we laugh only when something funny happens. We cannot force ourselves to laugh when we do not feel funny. Which is said to be true. But only some. Because we can tickle ourselves in many ways. and take advantage of the benefits to be gained from laughter. Humour is not just reserved for jokes. Only movies or comedians but let us think of humour as a matter of attitude. Opening your mind to nonsense. Do not just give yourself a funny story. But we must be open to the weirdness of every situation, whether we are dealing with stress at work or are breaking up with your boyfriend. If you see it in a funny way, it will help us see the issues more clearly. And may help release anger, heartbreak, disappointment, or regret. But be careful not to laugh at the wrong entrance. Instead of bad things becoming good. It may become a problem for yourself. Always remind yourself that don't take life too seriously. Laugh at the things around you and happiness will be in our hands.

How to increase happiness in our life that is, build faith in religion to anchor the mind. Research has shown that **people who believe in any religion are better at adapting to the adversities in life. Feel that our life has meaning like to help others. And of course, there is more happiness in life.**

We found that people who are very rich but not insanely rich. Most of the time is spent each day working. Travel to negotiate business and then ask if these activities make him feel good about his life, they do not. But the picture that everyone thinks is that rich people should spend their time playing golf, watching movies, traveling. **So, people give weight to doing whatever they can to get rich.** And research also says that if people get richer, but other people also got richer. The satisfaction that comes from becoming richer is fleeting. Because people always compare their own status with others. **The connection of fairness, social preferences, and happiness impact how individuals make economic decisions, engage in social interactions, and experience overall well-being**. This section explores how these elements intersect, providing insights from literature to study human behaviour within economic and social contexts. By understanding the connections among fairness, social preferences, and happiness, we gain a deeper understanding of the many factors influencing human decision-making. **Fairness acts as an important factor in these connections, forming a solid foundation for the development of social preferences**. How individuals perceive and respond to **fairness influences how they interact with others.** Social preferences, rooted in principles of equity, altruism, and reciprocity,

become closely linked with the pursuit of fair outcomes in economic exchanges. This interaction emphasizes the impact of fairness on shaping social dynamics. According to the work of Fehr and Schmidt (1999), fairness considerations go beyond self-interest, impacting economic decision-making through principles of reciprocity and cooperation. Individuals usually prefer fair outcomes, reflecting a broader societal concern for justice in economic interactions. **The relationship between social preferences and happiness is complex, where one influences the other.** Social preferences, involving actions like helping others or cooperating, have a significant impact on human overall well-being. Altruistic actions positively impact our sense of happiness. The feeling of community and supportive networks, which are fostered by these social preferences, contributes to human happiness. Altruism, characterized by selfless actions that contribute to others' well-being, plays a crucial role in this dynamic. Batson's (2010) hypothesis, delving into the relationship between empathy, altruism, and happiness, helps us comprehend how social preferences drive altruistic behaviours. Happiness, often measured by our satisfaction and contentment, goes beyond personal achievements. It is intricately tied to our perception of fairness and our social connections. The World Happiness Report 2020 (Helliwell, Layard, & Sachs, 2020) **emphasizes fairness and social preferences as fundamental components in leading a fulfilling and meaningful life**. The following empirical studies demonstrate how fairness considerations and social preferences impact happiness in real-world scenarios. For instance, a study by Bolton and Ockenfels (2005) conducted economic experiments to demonstrate the influence of social preferences on economic decisions. Their research showed that individuals often forego personal gain to maintain fairness, highlighting the practical implications of social preferences in economic contexts. The study of Bolton and Ockenfels (2005) helped us understand how fairness and social preferences impact economic decisions. Their research, titled "**ERC: A Theory of Equity, Reciprocity, and Competition,"** used experiments to explore how people's motivations for fairness influence the choices they make in economic situations. The study involved economic experiments where participants made decisions involving money. They questioned the idea that people are solely driven by self-interest and introduced the ERC model, suggesting that individuals also care about fairness and reciprocity alongside their more competitive instincts. A crucial part of the ERC model is reciprocity. The experiments showed that people often reciprocate based on the actions of others. If someone is seen as fair and cooperative, others are more likely to respond to them with fairness and cooperation. This discovery challenged traditional economic models that assumed people always act only in their self-interest. Equity considerations were also significant in Bolton and Ockenfels' study. Participants preferred fair outcomes, even if it meant giving up personal gain. This highlighted how important fairness is in economic decision-making. **The researchers demonstrated that individuals are willing to sacrifice potential economic benefits to maintain a sense of fairness and justice**. Additionally, the ERC model acknowledges the competitive side of human behaviour. While participants were willing to compete, this drive was balanced by concerns for equity and reciprocity. This understanding provided a more complete view of how people make economic decisions. The impact of Bolton and Ockenfels' research goes beyond experimental settings. Their insights have practical applications in designing economic policies, incentives, and organizational structures. Policymakers and organizations now recognize that aligning incentives with people's natural motivations for fairness and reciprocity can lead to more cooperative and mutually beneficial social and economic outcomes. Bolton and Ockenfels (2005) changed how we think about behavioural economics. Their ERC model revealed the complex motivations behind economic decisions, challenging the idea that people only act in self-interest. The study's insights continue to be relevant, shaping both academic discussions and real-world economic policies and organizational practices.

11.4. Behavioural Economic Applications and Policy Implications

Behavioural economics has been around since the 1950s, when academics questioned the classical economic theory based on the principle of "cause and effect" that had been studied for hundreds of years. Can it describe the real world? Because humans like us often use “Emotions and feelings” are not “**cause and effect”** in decision making. A group of economists therefore chose to

study really human behaviour to find the causes of decision making. After that, these economists began to understand more about the factors that affect people's behaviour. Until such knowledge can be used to "control" certain decisions. causing some experts to refer to this science as tangible "magic". Is it true that happiness lies in the heart? It is. If you can always tell yourself that happiness lies in the heart. No matter how much suffering, happiness is in the heart. If you can do that, that is OK. But we are economists. We know that not everyone can think like that. **Most people have emotions and desires. It must be lasting happiness**. It is not like you have consumed all that stuff and it is over. And it is cost effective, meaning you invest a little but get a lot. There is one study that says If you have 10,000 baht, how to spend this money to get the most happiness? It means booking tickets or accommodation to go out with friends next week. Because once you reserve, you will be looking forward to it. But if you go out with friends today It is happy. Because as said, social interaction or meeting friends is a factor that greatly affects happiness. And traveling can still create happiness in the long run. Because when returning from the trip you and your friend will still have things to talk about. Just the time to indulge in the image in your head of how fun this trip will be short-lived. Most of the time, choices that give you immediate satisfaction tend to be bad for the future. Let's say you are hungry. Choose between crispy pork rice and salad. Most people will choose crispy pork rice. Because it is delicious and creates instant gratification. But it is not good for your health in the future. Empirical Data collection by happiness economists requires careful design of questionnaires. It is often necessary to place questions about happiness at the beginning of the questionnaire to reduce bias from question order. And it is often found that economic measures obtained from questionnaires are biased like normal economic measures. This is the result of various factors such as unobservable events that are unique to an individual including personal behaviour that cannot be observed and measurement errors that are systematically related. Living life, sometimes we forget that how happy were you on the day you received something you never had before for the first time? But when I got it, we increase our expectations in our hearts. When it's not the same, it feels sad and distressed. Looking back, I think of the day that I did not have and then I got it. How happy are we? Even if today, we get less benefit from that. I do not see any problem. Then we will be happier and have more encouragement to live our lives. Bhutan's measure of **Gross Happiness**. Using the **GNH Index** is designed to cover many criteria related to Buddhist happiness. Without relying on a single psychological question, such as asking, “When considering all factors, do you feel very happy? Quite happy very unhappy or not at all happy” but uses questions that cover a wider range of social issues beyond just financial indicators. The GNH Index is designed to consist of nine key domains that are believed to be elements of happiness. Happiness in Bhutanese society has been selected using both normative criteria and statistical principles. Each main issue is given equal weight. And each main issue will consist of approximately 2-4 indicators that are expected to provide sufficient information in the long term. There is a high response rate. And there is not much relationship between them. Quality of life is the level of satisfaction with living conditions, satisfaction with livelihood. Number of people to rely on when sick, number of people to rely on in times of financial problems, mental wellbeing, self-assessed stress level, self-reported stress level, experience of anger, experience of selfishness, experience of jealousy, experience of calmness, experience of self-satisfaction of contentment, experience of generosity and average happiness level.

Understanding behavioural economics from scratch, you should start by studying what people have. What is the thought process for making decisions? We can divide cognitive systems into two: automatic systems and reflective systems. Automatic systems rely on intuition. That is, we decide or do anything with speed. There is no deliberation, so this system is characterized as difficult to control (uncontrolled) without effort (effortless) emphasizes connection with surroundings (associative) fast not conscious that you are thinking (unconscious) and skilful (skilled). The reflective system emphasizes analytical thinking. That is, we must be intentional in order to be able to make the right decision. This system therefore has the characteristics that we can control it, use effort, use inference (deductive), act slowly and be aware that we are thinking (self-aware) and follow rules or principles (rule-following). In addition, people also have limitations in their thinking processes, that is, we have limited ability to process data number of decisions made decision, making in limited time includes memories. The more

and more complex the information involved; the number of decisions is huge. There is little time for decision-making and having a very poor memory. This will drive us to use more rough decision principles (rules of thumbs) or randomness (randomness), making many people's decisions often rely on automation. More than a reflective system There is a chance that there will be errors in decision making. Leading to negative effects on both the welfare of the referee himself or society is made easier.

Community Interventions

We can consider the decision-making process according to the behavioural economics concept from 3 important factors related to decision-making: **(1) perception (2) satisfaction (preference) and (3) institutions (institution).**

Perception consists of 3 important points: **Providing news and information, illusion, and framing.** In terms of policy, we can change the provision of news, information, and framing of information. or even an illusion to enable people to have desired behaviour, such as using solid lines across the road with progressively narrower distances at dangerous curves to reduce driving speed, etc. Satisfaction (preference) consists of 4 important points: Decision making using rough criteria (rules of thumbs), fear of loss (loss aversion), being overconfident and state of mind: Decision making based on crude criteria leads to biased decisions towards certain options that are often based on too much guesswork or intuition, fear of loss Leads to attachment to the original choice (status quo bias), overconfidence and a state of mind that is stimulated by stimuli. causing people to engage in risky behaviour. Lack of caution and making decisions without consideration, causing people to often make wrong decisions. This can be detrimental to oneself and society. As a matter of policy, we should warn and try to avoid the possibility that people will have to use their four preferences. Institution consists of organizations and rules of the game, which means rules, regulations, norms, cultures or traditions that the people involved held together. **In this sense, institutions inevitably influence people's behaviour.** The patterns of relationships between individuals and institutions in behavioural economics can be divided into two types: market norms and social norms. Market norms It is a clear interaction between people in terms of exchange, such as labour hours and wages. Products and prices. Room for rent and rent costs and benefits, that is, the relationship is self-reliant. It is a matter of personal interest and frankly simply put, we get what we pay for. **The social norm, it is an interdependent interaction between people.** There is usually no immediate exchange. Or many times we may not care about getting anything in return, such as helping a neighbour carry thing. Helping old people cross the road, helping strangers who have been in an accident, etc. In terms of policy, using social motivation such as helping each other. Praising and acknowledging good deeds rather than economic incentives. It may give better results. Because social relationships satisfy the social animal side of humans who want to be part of a society or community. The design of urban policy should consider designing a choice architecture that motivates people to make choices that are most beneficial to them or society and avoid decisions that are harmful or cause negative externalities while maintaining freedom of choice (**libertarian paternalism**), which is different from command and control that lack flexibility to the context. It may violate a person's freedom of choice. Policy design should begin by considering what the problem needs to be solved. It is caused by what behaviour of people. Then design measures to solve the problem using perception or satisfaction modification or change institutional factors or is it a combination of measures? Then conduct an experiment to see the results of the measures. Then it will be used to analyse the value of project with appropriate techniques such as **cost-benefit analysis.** (CBA) of a policy by measuring all economic benefits and costs relative to each other. Then see which policy or method is likely to provide the greatest net benefit. **Moreover, the concept of behavioural economics varies according to the context, situation, and social and cultural factors of each area**. The application of the concept is therefore very diverse. Make application in one area successful it may not have an effect in another area. In addition, trials of designed measures may not always be possible. In many cases it may not be possible. Trial and error can result in wasting too many resources. In fact, there are measures to try to fix it. The behaviour of many people has failed. Therefore, policy design should focus on designing low-cost policy or is it a supplementary measure that may not replace the usual incentive measures?

In many countries, there is increasing awareness of the concept of happiness economics. Even though it may be expressed through organizing academic seminars. Exchanging opinions through online media ranking the happiness of different countries based on different definitions of happiness according to what the ranker deems appropriate from his point of view or even increasing the importance of factors other than economic prosperity in the national economic and social development plans of some countries. **The country that has applied the concept of happiness economics most clearly and systematically is Bhutan, which may be considered a model for other countries that will apply the concept of happiness economics from Mahayana Buddhism**. There is something called a misery index or an index of suffering. In the past, unemployment and inflation are set to have the same value Once the government knows this, they will come up with a policy. But when I really research It was found that unemployment affects people's aggregate happiness approximately 1.4 times more than inflation. Therefore, the government should use this information in making policy. and giving more weight to solving the problem of unemployment than the problem of inflation. Some study results found that within country High wealth individuals are happier on average than poor individuals. If studying cases in many countries using cross-sectional data. **Some studies have found a significant positive relationship between income and happiness levels. Some studies have found only a slight relationship**. If analysed as a group of countries. High wealth countries are found to be happier on average than poor countries. But the increase in happiness with income levels usually ends once income levels reach a certain level. **Therefore, although poverty is a factor that has a negative impact on happiness, but when incomes reach a certain level, people can receive adequate necessities for living.** Other factors will begin to gain more importance in happiness levels, such as expectations of a better life in the future. Differences in comparative income levels, health, family, job security Equality between gender and race environmental quality and having safety in life and property, etc. The work studies the relationship between income and happiness levels across time. Using time series data, it is often found that there is little or no relationship between increases in per capita income and average levels of happiness.

Bhutan is a small country that is economically, politically, and militarily fragile due to a lack of natural resources needed to develop many industries. There are only water and forests as main resources and lack of access to the sea because it is flanked by two powerful countries in Asia, namely India and China (Tibet), causing transactions with foreign countries to be conducted primarily through India. There are also significant climatic and geographic differences in the country, with the lowlands in the south. valley in the middle and snow-capped mountains in the north the country is divided into sections by rivers, dense forests, and mountains, resulting in low efficiency in communications and transportation. More than 90 percent of the population is engaged in agriculture. As for new businesses that are quite promising, such as the business of producing energy with water for sale to India, etc. Since the late 1980s, King Jigme Singye Wangchuck (1955-present) has been a proponent of using GNH as a key tool in development planning aimed at achieving individual humanity. That's happiness. Under the maintenance of economic and social balance between material development into a modern economy and maintaining the uniqueness of national tradition and culture mental values in Mahayana Buddhism and the environment. GNH's principles are dynamic in that they adapt to the basic needs of people in society and the value system or psychological expectations of society.

SUMMARY

Economics of happiness is a principle for measuring social welfare based on concepts and techniques of economists and psychologists. This usually focuses on improving the definition of utility to be more complete, often covering matters related to the mental state of individuals, society, and the economy, including matters of dependency (Interdependence) of the utility of various people in society (for example, the level of utility of Mr. A who is a millionaire depends on the level of utility of Mr. B who is a low-income earner, etc.), while the analysis of social welfare in economics generally gives much weight is given to the analysis of the impact of income on the well-being of the people. whether analysed through the concept of utility theory or through the concept of revealed preferences, which provide limited information about citizens' social welfare because they do not

adequately focus on the social and psychological dimensions of individuals. **The resurgence of happiness in economics is partly since material wealth alone does not guarantee that people will be happy.** This raises the issue of the implicit hypothesis of many analyses, that increases in material wealth do not decrease happiness. Therefore, **economists who study social welfare can no longer limit their analysis to wealth or material well-being**. The concept of happiness economics is not opposed to measuring social welfare by income-based indicators. But it is a complete addition to the indicators by using broader indicators to measure well-being. These well-being indicators are based on the results of numerous surveys in various countries over time. Of course, there must be income or financial wealth as one of the indicators. together with other indicators such as health, marital life, employment conditions and confidence in their community or society. A heuristic that might be appropriate to study happiness includes the concept of expressed preferences, which is more comprehensive than the concept of revealed preferences. This concept will help answer the question. It is about social welfare that the open satisfaction concept cannot provide complete information. Inequality is often found. Discrepancies are between expressed satisfaction and open satisfaction because public satisfaction cannot measure the impact on social welfare of certain policies or institutional arrangements that individuals in society must accept without being able to bring about concrete changes, such as the impact on social welfare of inequality. Together in society risk of environmental degradation and macroeconomic policies regarding inflation and employment, etc., where low-income people often lack the ability to make choices. As a result, focusing too much on choices to analyse behaviour and well-being fails to reflect the whole picture.

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CHAPTER 12: FINAL PROJECT

The objective of this chapter is to provide our guidance for the readers or users of this book to develop and further understanding of behavioural economics with the aspects of behavioural development interventions and how findings can be used as behavioural insights to develop public policy and administration. Economic behavioural interventions offer various benefits to enhance decision-making process, improve outcomes, and promote positive behavioural changes. As a final project, this chapter will go over will the background of the needs for identifying of behavioural economics problems, particularly those related to sustainable development in Thailand and Indonesia, followed by how to design behavioural interventions to address the problems. This chapter will end with suggestions on how to create a proposal and presentation for the presentation for the final project.

12.1 Identifying behavioural economics problems related to sustainability development in Thailand and Indonesia

To assist the readers of this book with the first step in Identifying behavioural economics problems of interest, the benefits of behavioural interventions are presented. The key benefits of behavioural development interventions include to improve decision making, create ideas for behavioural nudges, to explore cost-effectiveness and scalability, address behavioural biases, promote long-term behavioural change, develop evidence-based design, and complement the traditional and existing policies.

In **improving decision making**, developing behavioural economics interventions is a means to access individuals' insights into heuristics and the cognitive biases that have some impacts on their decisions. By gaining these insights and biases, we can understand how individuals make decisions leading to better rational choices and outcomes for any involved parties in the behavioural change efforts and policy development initiatives in various sectors such as finance, health, and education. With respect to **creating ideas for behavioural nudges**, behavioural economics interventions can result in nudging techniques that will help to guide individuals towards long-term solutions and goals without restricting their freedom of choice.

In case of behavioural economics interventions aimed **exploring cost-effective and scalable means**, findings from such interventions may offer information and implications for designing cost-effective ways to change individuals' decision and behaviors compared to traditional policy measures. At the same time, findings from generalizable studies can be applied to large populations with fewer resources. This scalability makes it possible to reach a wide audience and achieve meaningful impacts on behavior change and decision outcomes.

To **address behavioural biases**, behavioural interventions can be designed to study common cognitive biases and heuristics underlying the substandard decisions. By understanding that biases and heuristics, we can alleviate the sources of bias that may improve decision outcomes and effective problem-solving in various issues. For the goals related to **behavioural changes** which require long-term support and sustainable interventions, we can design behavioural economics interventions that target underlying psychological factors of individuals, recognize the behavioural changes over time, and offer continuing support for the sustainable changes of habits and behaviors of interest.

When developing behavioural economics interventions in specific contexts, the intervention-based technique can offer **a great adaptability**. We can tailor the behavioural economics interventions to fit the context, population, and behavioural goals in question. For example, interventions can be customized based on the uniqueness and preferences of individuals or groups of interest. As a result, this adaptability can increase the interventions' effectiveness and outcomes relevancy.

For the area of **evidence-based studies and projects**, behavioural economics interventions are a great approach in yielding empirical findings and experimental evidence. Behavioural economics interventions that are based on sound principles and reliable testing can increase the effectiveness and confidence in their ability to develop means to achieve the desired outcomes and goals. Behavioural economics interventions can be employed as traditional tools for producing insights and

implications to support and **complement traditional policy measures** in the events of complex behavioural problems. By integrating insights from behavioural science into policy design, governments and organizations can create more effective and impactful interventions.

Behavioural economics interventions have been employed to assist in various economic, scientific, and psychological-based challenges because of the aforementioned benefits, which are widely recognized by many organizations responsible for achieving the societal goals such the Behavioural Insights Teams (BITs) of the UK government or the Nudge Unit, and **the Behavioural Economics Team of the Australian Government, or BETA**. In the guidance note, "Guide to developing behavioural interventions for randomised controlled trials: Nine guiding questions" developed by BETA (Ames & Hiscox, 2016), there are nine guiding questions that we can follow in our final project.

As BETA's mission is to advance the wellbeing of Australians, they focus on the application and rigorous evaluation of behavioural insights to public policy and administration.

In attempting to begin the process of behavioural economics interventions development, BETA highlights nine guiding questions to create a context specific design of interventions to human behavior and gaps exist between what people intend to do and what they actually end up doing. The nine questions are the guiding approaches to every project in BETA that typically have four phases: Discovery, Diagnosis, Design, and Delivery (Ames & Hiscox, 2016).

In the **Discovery** phase, BETA aims to identify the policy problem and conduct initial discovery work to understand the context, target population and behaviors. This phase is very important as a starting point to draw the parameter of context in which we can begin our project within the area, agents, and factors involved in the specific context. The next phase is **Diagnosis**, in which some secondary research, data review, or fieldwork takes place to have information about the behavior problem for further identification of interventions needed. The following phase after we have defined the behavior problem and propose targeted interventions is **Design**, in which the intervention and its details are created and tested in a trial to measure the intervention's performance and efficacy. In the final phase of **Delivery**, we apply the intervention, analyze the data, and create a report on the trial (Ames & Hiscox, 2016).

For our final project, we are going to focus on the context of sustainability development in Thailand or Indonesia because this topic is a crucial aspect and challenges for both countries in achieving long-term economic growth due to some **behavioural economics problems** that inhibit the progress of sustainable development in both countries. To get started, we will adopt BETA's four phases and its nine guiding questions for our project development. In the Discovery phase, we need to start asking ourselves a crucial question about **(1) What is the outcome of interest?** in order to direct our focus on the behaviors driving specific and identified outcomes (Ames & Hiscox, 2016).

The instances of the behavioural economics problem in the context of sustainability development in Thailand or Indonesia may involve the following challenges:

- **The individuals in Thailand and Indonesia lack of awareness and understanding about what constitutes "Sustainability"** and the benefits and importance of sustainable behaviors and consumption practices (Rahmawati, Suryani, Wibowo, & Muklason, 2021). This lack of awareness often is a result of instant gratification and immediate indulgence that Thai and Indonesian people prefer for their own comfort and conveniences over the long-term consequences that their behaviors could have caused.
- The businesses in many countries, including Thailand and Indonesia, **lack of in-dept understanding about sustainability development toward the triple-bottom line of business: profit, planet, people**. This challenge may be a result of the focus of short-term gains, as well as the misunderstanding that sustainable practices only involve reducing the cost of production.
- Another problem is **the lack of support and incentives for sustainable practices, particularly in the business sector** (Sukirman, 2018). As some sustainability implementations can sometimes require more investment and high-cost changes in short-term, many businesses are hesitant to adopt the new measures toward sustainability development. However, the structures that can support and reward the desirable changes may guide the businesses and individuals to prioritize sustainable practices over more traditional and potentially harmful approaches.

- The weakness or rather lack of law enforcement on the negative impacts on environment and social welfare of people as a result of irresponsible actions. For instance, when people or a company pollute the environment and carry along the same practices without punishments or bearing a cost of for their responsibility, it can lead to continuing and more unsustainable practices. **A need for stronger government policies and regulations that promote and enforce sustainable development practices** is an issue in Thailand and Indonesia. These policies should address issues such as waste management, renewable energy adoption, and sustainable resource extraction.
- In Thailand and Indonesia, another behavioural economics problem related to sustainability development is **the issue of poverty and inequality** (Sukirman, 2018). Poverty and inequality can hinder the adoption of sustainable practices, as individuals and communities prioritize meeting their immediate needs over long-term sustainability (Põlajeva, 2011). They may **lack the resources and financial stability to invest in sustainable technologies or practices** (Sukirman, 2018). Furthermore, there may be **a lack of access to education and information on sustainable practices**, which further exacerbates the problem.
- Another issue contributing to behavioural economics problems related to sustainability development in Thailand and Indonesia is the issue of **cultural values and norms**. For example, in some cultures, there may be a belief that economic prosperity is more important than environmental preservation, leading to unsustainable practices (Sukirman, 2018). Particularly, some traditional beliefs and customs may prioritize other aspects of life over environmental conservation.

Following these brief problems related to sustainability development in Thailand or
Indonesia, we can think about a specific outcome for our final project that meets these criteria according to BETA (Ames & Hiscox, 2016):

- The outcome should be specific (to a behaviour),
- measurable (quantified)
- assignable (to participation in the intervention or control group)
- realistic (given resources) and
- time-related (when they will be achieved).

Based on these recommended criteria, ideal outcomes should be aligned with the current circumstances and priorities of an organization, a community, or a government. In relation to the sustainability development in Thailand and Indonesia, taking the above suggestions into account, we can think about an outcome that may help to change one of measurable outcomes of individuals or companies such as awareness, change of attitude with the framing of cultural values, behavioural changes with incentives are presented with sustainable practice. Specify the timeframe and an intervention that that can be given to a group as a control or intervention group realistically in order to compare the outcome. This outcome might relate most directly to an individual (e.g. student, patient, taxpayer, etc.),
an organisation (e.g. a school, a hospital, a business) or an area (e.g. a household, street, suburb or region) (Ames & Hiscox, 2016).

Examples of well-defined outcomes are as follows:

- Improve differences in ratings between two Indonesian companies that use a different sourcing strategy (e.g., responsible sourcing from local suppliers vs. importing from overseas) by 10 percentage points in term 1, 2025.
- Reduce the use of single-use plastic cups by 50% within the three-month period of giving Thai and Indonesian students a credit toward their extra-curriculum activity grade.
- Increase local tourists' visit to the secondary tourist destinations by 15% by the end of 2025, by promoting local foods to the prospect tourists.

After identifying the outcome of interest based on a sustainability-related behavioural problem in Thailand or Indonesia for the final project, we have to ask ourselves the second question: **(2) Can we accurately, directly measure the outcome using existing data?**
This question aims to ensure that the need to collect new data is required. Focusing on those outcomes already measured will reduce the cost of a trial, increase the viability of delivering the trial, and allow resources to be focused on other elements of the project (Ames & Hiscox, 2016).

In using existing or secondary data for a final project, some considerations are recommended by Ames and Hiscox (2016):

- Do we have data on the outcome of interest in a single, existing dataset to which we have access?
    - If not, can we readily combine existing datasets to which we have access?
- Do we have access to accurate, existing data on the behaviour of interest as well?
- Do we have data on which individuals might receive an intervention? (noting that this depends on the ultimate intervention)
- Can we track specific individuals through the process? Can we link outcomes, behaviours and interventions to specific individuals directly?

Following these considerations will ensure the data's validity and reliability that we can draw implications for our desirable outcomes. If we have the data that lacks some of these requirements, we may consider new trails for new data. In the next section, we can proceed with how to design a behavioural intervention in order to address the problem based on the outcome we develop for the final project.

12.2 Designing a behavioural intervention to address the problem

At the center of developing behavioural interventions, randomized controlled trials are a crucial part of a behaviourally-informed project (Ames & Hiscox, 2016). To this end, two components of trials are needed, large population and channel for the intervention delivery. At this stage toward designing intervention, an important guiding question is follow: **(3) Can we deliver standardized interventions to a reasonably large randomized population?**

In reality where the outcome of interest involves policy-making or a nationally-recognized problem in a specific population, we do need **a large number of participants to be part of the randomized controlled trials (RCTs)**. For this final project purpose, although we may not have access to a large population, we do need to think about enough participants to be divided into multiple groups, a controlled group and intervention applied groups. Additionally, **the channel of intervention delivery** should be considered because it is important to select the means that can easily deliver an intervention along with the same conditions. The rationale for the channel of intervention delivery is related to the need for larger populations. According to Ames and Hiscox (2016), some channels for interventions namely webpages, SMSs, signs and posters, and some process that are able to be tailored and standardized more easily are more generally suited to RCTs. However, we need to take precautions with interventions delivered through people because we have to make sure that all participants receive the same intervention.

To design interventions for a final project, the need to create RTCs means that the designated intervention being tested will be given to other groups except a control group. At the same time, we must ensure that everybody in the intervention group receiving the same thing in the same condition as everybody in the control group except the intervention in question. Otherwise, it will not be possible to meaningfully interpret the results of the trial.
If interventions are not standardised in their delivery, including the channel of intervention delivery, the interpretation of results becomes much more speculative (Ames & Hiscox, 2016). In support of the RCTs, a process of randomly assigned a specific population into a treatment group to receive an intervention, or a control group to receive normal conditions. **Depending on the trial, it may be**

preferable to stratify a sample before randomising (divide into sections of shared significant common characteristics) (Ames & Hiscox, 2016). This can ensure that important sub-groups in the population are equally represented in intervention groups and the control group.

In the next step of designing interventions, it is important to consider feasibility or the possibility that specific interventions for trials have been designed with the following considerations suggested by BETA for the question of: **(4) Is an intervention in this space feasible?**

- Alignment with agency and government priorities
- Recent policy/programme history
- Agency capacity and capability
- Cross-agency and cross-jurisdictional opportunities and constraints
- Budget environment
- Opportunity for learning within the APS.

After the phase of discovery, it is important to learn more about the behaviors and interventions with respect to the outcome of interest. This phase is **Diagnostic**, where we learn about how people actually behave based on inputs directly from individuals in the target group of interest (Ames & Hiscox, 2016). The question stems from **(5) How can we better understand the behavior?** Similar to empirical research, a number of methods can be used to better understand the experience and behavior of those involved and to test emerging intervention designs:

- Interviews
- Observations
- Shadowing/Immersion
- Surveys
- Focus Groups
- Online panels to test effectiveness and response to new materials
- Data Science (to focus in on certain groups)
- Other human-centred design methodologies

As we explore this next question, **(6) What behaviour is leading to the outcome?**, we need to review existing behavioural evidence of typical individual who is making the critical
decisions that directly involve with the outcome in question. This process is beneficial to retrieve insights to cause-effect and any related factors to the outcome of interest. The tools that are available for gathering data, when combined, can provide different perspectives on the complexity of behavioural economics. However, each research tool has its own pros and cons in understanding the human behavior of your interest. In the next section, some of the popular methods often employed in behavioural studies will be discussed.

Interviews are often a direct contact with individuals in order to elicit information and discussion about a sensitive, confidential, or emotionally charged topic that should take place one-on-one. Interviews can provide more in-dept data than some other tools depending on the skills of a train interviewer in establishing rapport with individuals. Interviewers also need to observe and note any non-verbal communications that can be useful along with the transcript of their interviews. For example, an individual may fold arms as a sensitive question was asked. Consequently, the transcript and records of behaviors can be analyzed to identify patterns or themes that inform us how they are related to the outcome of interest.

Observations utilize the observers or researchers as a tool in observing human behavior to gain insights into observable behaviors and external factors that may have influenced. Observing people in their habitat or real-world settings is considered **shadowing and immersion** into their environment in order to their naturally situated behaviors.

Survey is a written instrument containing questions to collect information from a sample of individuals or target populations of interest. When the sample of individuals responding to the set of questions, we can draw qualitative conclusions about a target population. **Focus groups** are the tool that brings small groups of individuals to discuss an issue that experience together. Led by a trained

moderator, participants express their opinions about a given issue or topic, which can provide qualitative insight into ideas, causes, and possibly solutions to a behavioural problem.

When we try to understand behaviors that can be tracked quantitatively, we can employ **a panel of members** that represent the general population of interest. For example, we can ask the panel members to provide the cash register records to track their purchases and combine with their demographics in order to understand their economic decisions.

In the next step of the Diagnostic phase, we will utilize the following questions as guiding principles for learning more about the outcome of interest while using one or more research tools for gathering the information (Ames & Hiscox, 2016):

- **What are the most important behavioural challenges that may be driving the behavior?**
- **Which is likely the most important barrier to preferred choices in this context?**
- **Who is involved in the decision?**
  - **Is there a group that makes the decision more than others?**
  - **Are people making decisions alone? In groups?**
  - **Is anybody making a decision on someone else's behalf?**
  - **Is someone able to exert significant influence over the decision-maker? Are peers influential?**
- **What is the context for the decision?**
  - **Does the decision receive much attention?**
  - **Does the decision require willpower or self control (e.g. ceasing smoking, dieting or exercising)?**
  - **Is there a difficult or complicated form?**
  - **Has the individual made this decision before?**
  - **Has the individual made any statements about the decision that they would make in this circumstance or a similar one?**
  - **Is something being considered which the individual already owns?**
  - **Is the individual primed to reciprocate a given action?**
- **When is the decision being made?**
  - **Are there immediate benefits of making a good decision? Or are they delayed?**
  - **Is there a moment or event motivating an individual to make a decision or act on a decision?**
  - **Do specific moments or events motivate an individual to act on the decision?**
  - **Are there likely to be subconscious influences priming certain decisions?**
  - **Is the individual fatigued when making the decision (either mentally or physically)?**
  - **Is the individual likely to be in a specific emotional state when making the decision?**
- **How are choices presented or viewed?**
  - **Are there a large number of options?**
  - **What is the default option (that will take effect if an individual decides to do nothing)?**
  - **Is one option more salient than another? More easily recognisable? Easier to choose or understand?**
  - **Is one category of money being treated differently to another category of money? (i.e. mental accounting)**
- **What information are they getting?**
  - **Is specific knowledge or expertise needed to make a decision?**
  - **Is information communicated in only one way (e.g. visually, verbally or in text)?**
  - **Is the information presented in the optimal sequence?**
  - **Are there numbers involved that may be more compelling if calculated differently? (e.g. total expected lifetime electricity cost**
  - **instead of unit cost in $/MwH)**
  - **Who is delivering messages to the individual? Who is giving advice or direction?**

- **Does the individual receive feedback? Immediately?**

- **Why is the decision being made?**
  - **Is there a short-term gain being advanced?**
  - **Is the short-term being disproportionately over-valued?**
  - **Is the individual overestimating the likelihood of low probability events?**
  - **Is the individual being unrealistically optimistic? Unrealistically overconfident?**
  - **Is the individual's positive self-image being threatened?**
  - **Are decisions being made that align with the individual's best intentions'?(i.e. that the individual thinks they 'should not' make?)**
  - **Is the individual being heavily influenced by the status quo or aversion to change?**
  - **Are there clear incentives? Are some more prominent than others?**
  - **Are there associated costs (e.g. financial or social)?**
  - **Is honesty being relied upon?**
  - **What are the social norms of the context? Could they be misidentified?**

Following the questions above, though not all questions will be relevant to your outcome of interest, the result will help you to have considered more fully the decisions being made. After gaining the data for an in-dept understanding of the behavior contributing to the outcome in question, we will summarize what the current behavior is and why it is happening in the proposal and presentation for the intervention in our final project.

12.3 Creating a proposal and presentation for the intervention

In this section, we will illustrate the last three guiding questions in the Diagnostic phase of the intervention development for the final project related to sustainability behavioural problems in Thailand or Indonesia. In the proposal of your final project, we will **start with the outcome of interest followed by the details of your discovery of the current behavior related to the outcome**. As a departure point to an in-dept understanding the behavior and intervention being proposed, the proposal will address the details to illustrate connections between the outcome and related behavioural changes. The next guiding question should be used in the discussion about the current findings in the proposal: **(7) What is our theory of the current behavior?**

The theory that explains the current behavior should be grounded on the findings and extensive reviews of available information related to behavioural outcome in question. An example of an intervention comes from a study to improve attendance in US schools conducted by Todd Rogers and Avi Feller (2016). Based on their findings, the theory of the existing behaviour was:

• There were preventable student absences occurring.

• These absences were in part driven by parents of those students holding up to two false beliefs:

1. That their child doesn't miss that much school. Many parents underestimated their child's total absences (on average by a factor of 2: estimated days absent were 9.6, compared with 17.8 actual).
2. That their child misses a relatively average amount of school. Many parents of high-absence students were unaware of their student's level of relative absence in comparison with classmates.

As a result, Rogers and Feller (2016) designed an intervention to specifically target these two false beliefs. By discussing the possible explanations or theory of the current behavior, this approach will encourage a more focussed intervention with greater likelihood of clear measurement and an effective intervention. Once the behavioural dimensions of the behavior of interest are better understood, the following questions can help identify behaviourally-informed interventions: **(8) What interventions**

might influence the behavior? followed by **(9) What is our theory of how and why that intervention will change the behavior**?

With respect to the intervention decision in the final project, **the key idea is to use the current behavior from your empirical findings to inform how to achieve the outcome of interest**. The insights from the empirical study should also guide your understanding of the internal or external factors, or behaviors that can be transformed into an intervention involving defaults or pre-set options, prompted choice, the number of options, choice framing, simplified options, norms and social influences, and so on. In the context of sustainability development issues, possible interventions could be how benefit of sustainable practices are presented to the participants or an incentive given to individuals when engaging with sustainable choice of behavior.

One of the widely used intervention is **default options as people are strongly inclined to opt in an option that helps them to streamline a decision**. Defaults are generally best used when the relevant group has substantially consistent preferences and circumstances (Ames & Hiscox, 2016). One downside of defaults is that people my lack of interest and effort to engage with the decision because the default option is already selected for them. In contrast to defaults, **an intervention with prompted choice requires an individual to make a decision in order to continue with a given process or service** (e.g. some retail stores ask customers if they need plastic bags for their purchases). A prompted choice merely asks individuals to choose while a required choice forces to consider differences among important choices.

Reducing the number of unsustainable options or limiting choices to include only sustainable practices being presented at once may help individuals to overcome instant gratifications, procrastination, avoidance, dissatisfaction and possibly mistakes with sustainability understandings. **Decision aids when a choice is complicated**, such as simplified language, deadline, or checklist, can be used as intervention to help them better find the best option. For example, provide people with pre-calculated savings comparing between turning off air-condition in the classroom and leaving it on to maintain the optimal temperature for all-day use can aid individuals' decision to engage in energy saving practice.

Framing a choice as a loss or gain can be helpful intervention to get an outcome of interest. People prefer to avoid losses, even if equal sized gains are offered. In addition, rewording a message to highlight how negative consequence can be avoided can result in a different choice. Therefore, how wording is framed or information is presented can be used an intervention. **Change the information** being provided can be sufficient to influence behavior. This is particularly useful intervention when the information targets and corrects people's false beliefs. If we can use personalized information as interventions, this technique can improve outcome compared to generic information because the information is perceived as more meaningful to the recipients.

For **the use of social norms and influences as interventions**, a variety of techniques can be used to achieve behavioural change and outcome. For example, a message about a desired behavior or a choice that most people perform can motivate them to behave accordingly toward an outcome. By emphasizing what most people do and its benefits, this approach can influence human behavior using norms. Using **a social or associated group's decision as an intervention** can have an influence of our decisions because we are more likely to be influenced by people we like. This might be a function of similarity to us, compliments, physical attractiveness, contact and cooperation, or conditioning and association.

With these aforementioned ideas for interventions, we do have to keep in mind whether the intervention designs are applicable to our outcome of interest, participants in our control and treatment groups, how to deliver the intervention via accessible channel, and how to measure the differences in outcome between groups of our percipients in our RCTs. As we design the research plan and proposal for our project, the time of the year and the timeframe to conduct interventions in this final project is also crucial. For example, we may still experience high energy use of air-conditions in Thailand and Indonesia regardless of any interventions because of the high temperature in the summer. Therefore, following the Nine Guiding Questions by BETA and other suggestions in this Chapter should be a departure point for the discovery and diagnostic phases of your proposal and presentation as a final project.

To actually proceed with the conduct of intervention in RCTs, it is recommended that at least one expert in the area of behavioural economics and RCTs should be advising the project to maintain integrity, reliability, and validity of the study. Ethical considerations including participants' confidentiality and rights are utmost important to maintain at all time throughout the project being concluded and the final report delivery to others privately or publicly. These suggestions are safeguards for the success and welfare of all parties involved in a final project aiming to understand behavioural economics and problems related to sustainability development.

SUMMARY

This chapter focuses on guidance to develop and further understanding of behavioural economics with the aspects of behavioural development interventions. The Behavioural Economics Team of the Australian Government, or **BETA's Guide to developing behavioural interventions for randomised controlled trials: Nine guiding questions** (Ames & Hiscox, 2016) are outlined to address the need for a final project that identifies behavioural economics problems, particularly those related to sustainable development in Thailand and Indonesia.

The nine guiding questions are summarized here as followed:

Phase 1: **Discovery**

(1) What is the outcome of interest?

(2) Can we accurately, directly measure the outcome using existing data?

(3) Can we deliver standardized interventions to a reasonably large randomized population?

(4) Is an intervention in this space feasible?

Phase 2: **Diagnosis**

(5) How can we better understand the behavior?

(6) What behaviour is leading to the outcome?

(7) What is our theory of the current behavior?

(8) What interventions might influence the behavior?

(9) What is our theory of how and why that intervention will change the behavior?

This chapter also offers some suggestions of behavioural economics problems in Thailand and Indonesia that can be focused as sustainable practices in the final project in the Discovery phase. The research tools available for the diagnostic phase are described in this chapter. The list includes interviews, observations, shadowing/immersion, surveys, focus groups, online panels, and so on. In the last section of this chapter, some of interventions that are often used or relatively ease to apply in different settings and contexts. With the guiding questions, proposed problems, available tools for data collection, and examples of intervention, the users of this chapter should be able to practice a hypothetical study in behavioural economics and apply ideas and process of RCTs development to the final project as a means to gain deeper understanding of behavioural economics in the current situation.

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