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A Case for Behavioural Game Theory

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Abstract When applied correctly, game theory can present a strategic tool for decision making that offers perspectives on how players may act under various circumstances. However, the practical application of game theory has been lagging behind its potential. While standard equilibrium analysis assumes that all agents act rationally, behavioural game theory has extended the theoretic framework of game theory to account for human behaviour in real-world settings. This paper examines how behavioural game theory offers valuable alternatives as predictions assuming bounded rationality have consistently been found to be more accurate than traditional models over a broad variety of application. At the core of game theory is the concept that players reason what other players will do, usually by going through iterations of players guessing what other players will do. Building on aspects and concepts from behavioural decision theory, behavioural game theory combines theory and experimental evidence to provide a better understanding of strategic behaviour in economic, political and social interactions.

Keywords Behavioural game theory, Cognitive hierarchy, Quantal Response Equilibrium, Experience Weighted Attraction, Sophistication, Social Preferences

"Wouldn't economics make a lot more sense if it were based on how people actually behave, instead of how they should behave?"

Dan Ariely

1. Introduction

Game theory has been developed as a general framework for decision making in uncertainty when payoffs depend on the actions taken by other players. As a method, game theory helps individuals and firms to study rational behaviour in interactive decision problems. More accurate predictions help in designing more effective mechanisms and policies which ultimately should make the coordination of efforts and the allocation of resources more efficient [1].

While standard equilibrium analysis assumes that all agents act rationally, behavioural game theory has extended the theoretic framework of game theory to account for human behaviour in real life settings. Experimental evidence has shown that many players engage in altruistic cooperation or altruistic punishment, and show some inequality aversion even at a net cost, instead of acting purely as a homo economicus. To take these findings into account, behavioural game theory has developed models that predict behaviour in games in real life terms, moving away from the assumption of the economically rationally acting agent. In practice, the homo economicus has been found to be geared to some form of bounded rationality, in which assumptions are simplified and heuristics are deployed due to psychological predispositions, computational deficiencies and time constraints, which lead to solutions that are satisfactory rather than optimal.

This outline demonstrates the fundamental concepts of traditional game theory and illustrates through examples of practical applications where the limitations of traditional game theory are. Then the basic concepts of behavioural game theory are outlined using a selection of the most common models.

2. Literature Review

2.1. Traditional Game Theory

The origins of game theory lay in classical economic models which assume rational behaviour by individuals and firms, the *homo economicus*, when interacting in decision making. Mathematical systems have been developed to analyse and predict the behaviour of humans in strategic situations [2]. As Camerer, Ho, and Chong [3] outlined, these systems are based on three principal assumptions: a) players form their beliefs from the analysis of what the other agents are likely to do (strategic thinking), b) players make the decision that best fits given those beliefs (optimisation), c) all players adjust their decisions and beliefs until they are mutually consistent (equilibrium). As such, game theory has been applied for more than sixty years.

Classical game theory can be divided into two different

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branches: cooperative game theory, and non-cooperative game theory (see [4] for a review). Cooperative game theory exemplifies how agents cooperate in coalitions to create a benefit and gains in unstructured interactions [5]. In cooperative games, agents cooperate and join coalitions to create value, or compete to capture value [5]. The added value of a player is equal to the value lost by the coalition if the agent is not included. Non-cooperative games illustrate the actions of players that maximise their own benefit in a defined process while using information on the choices and moves of other players available to them for making a decision [5].

The key elements of a game are to understand who the players are and what their added values are; what the specific rules or industry regulations are that influence the limitations of the game; what kind of tactics and moves to influence how the game is perceived by other players are available; and what the scope and the boundaries of the game are [6]. Based on these components, Brandenburger and Nalebuff have developed the value net to allow to look forward and reason backward, and to be able to understand not just what the other players can benefit to one's own gain but also how one can benefit the other agents [6]. The value net as a schematic map helps to understand all the players in the game and the interdependencies among them [6].

To anticipate the behaviour of other players in the game, the agent needs to consider what are the alternative strategies and options, what are their incentives and payoffs, what kind of information do they know and how do they think. To gain advantage in the game, players have the option to change the roles of the players, for example by adding a new bidder or competitor; to change their added value, either by raising your own value added or by lowering the value of others; to change the rules of the game; to utilise tactics that change the other player’s perceptions; or to change the scope of the game. Further, agents can increase their commitment, leverage the player’s limited rationality, or exploit incomplete information for their own benefit.

2.1.1. Types of Games

a) Non-cooperative: Zero-sum Games

In traditional game theory, Zero-sum game describes a game in which one player’s win comes at another player’s loss, making the net change in wealth or benefit zero. The number of players is not limited. In real life application, zero-sum games are less common than non-zero-sum games. Examples would be gambling or sports like chess, or even more serious, financial transactions like options and futures, disregarding transaction costs [7]. Simplified, options and futures trading replicate bets on future stock prices, while gains are made when the market prices develop against expectations.

The solution to the zero-sum game as illustrated by Nash [8] finds that two or more players in the game will not deviate from their choice when they have knowledge of the other player’s choices and know that there will be no benefit in changing their choices. Hence the Nash equilibrium as a set of decision strategies shows that players cannot improve their gain by unilaterally changing the strategy. However, in actually real life scenarios, gains and losses are not always as clear cut and easily quantifiable.

b) Positive-sum Game

In academic game theory, the prisoner’s dilemma is one of the most famous examples of non-zero-sum games. Positive-sum games result in a “win-win” situation where no one takes a gain at the expense of another player, so that the sum of the wins and losses in total is greater than zero [9]. Hence a player acting rational can benefit another player as well as themselves by choosing an option that benefits the other player. A positive-sum solution is more likely to occur when there are more different interests involved in the negotiation.

c) Negative-sum Game

In negative-sum games, the scenario holds potential for all players to lose, to create a “lose-lose” situation, where the total sum of the gains and losses is negative. In real life terms, situations that appear to be zero-sum games can quickly turn out to be negative-sum games. Investing or strategic marketing management can be seen as examples of situations that can turn into negative-sum games [10].

d) Cooperative Game, Bargaining

Bargaining theory and cooperative game theory has been linked to social contract theory and been used to formulate it. Following bargaining theory, rational agents would agree on a unique distribution of benefits of the cooperation, and what this distribution would look like, that what is fair is determined by the distribution, and that the agents will comply with the bargain [11].

e) Games with incomplete information

In real life, most games are characterised in a way that all players do not have every piece of information, for example, an agent hardly knows the preferences of the other players as well as they do themselves. Such games are therefore called games with incomplete information or asymmetric information [12].

An example of a static game with incomplete information would be the hiring process of a firm, where each player has a type, namely his or her ability, of which neither other players nor the firm has complete information on. The firm chooses some players, then each player observes his or her own type, but not the type of the other players, and eventually all players simultaneously decide on their action, only knowing his or her own type [12]. As a result, the payoff of a player now depends on the players’ actions and types. Such a game is called Bayesian Game, following Harsanyi’s framework [13]. In Bayesian games, the Nash Equilibrium has the additional characteristic that each type plays a best reply, and that for each player with each possible type, the action is chosen that is optimal based on the conditional beliefs of this particular type against the optimal strategies of all other players of the game [12].

Following this example, however, in a Bayesian Nash Equilibrium, the worker would shirk regardless of whether his type is high ability or low, and as the firm would anticipate this behaviour the worker would not be hired. To solve this conflict, a sequential equilibrium would be required, where players best reply in sequence at every information set, creating subgame-perfect equilibria to maximise their payoff [12].

2.1.2. Application of Traditional Game Theory

For managers, game theory presents a strategic tool that offers perspectives on how players may act under various circumstances and other information that is valuable for decision making.

However, the practical application of game theory has been lagging behind its potential in strategic decision making. One point of criticism is that game theory would only present one possible outcome, when in practical terms managers would prefer to be presented with different scenarios when faced with unprecedented, complex situations to decide on [14].

Real world scenarios and situations that require decision making and strategy building are often messier, more dynamic and less easy to control than the assumptions of classical models like the prisoner's dilemma. Here decision makers face the challenge that the right balance has to be found between simplifying the problem enough to make it manageable, and retaining enough detail and complexity to keep it relevant [14]. Additionally, in order to evaluate the proposed scenario and its outcome properly, the assumptions that went into the formulation of the model need to be understood.

Traditional game theory produces the best answers and equilibriums, potentially differing for each scenario, and then predicts which scenario and outcome is the most likely. However, uncertainty cannot be entirely eradicated, and this approach comes up with various snapshots rather than a fuller picture [14].

As a result, different models have been developed to address the problems and shortcomings of traditional game theory models. Lindstädt and Müller [14] developed a model for game theory that would account for uncertainty, different possible outcomes, and dynamic changes to the situation that was the basis for the assumptions. The model breaks down the complex dynamics into several sequential games, with the challenge of creating a list that is both exhaustive and manageable. Testing shows that the results of the predictions are highly dependent on the assumptions, and slight changes to one aspect of the underlying assumptions can change the results significantly.

2.2. Behavioural Game Theory

Behavioural Game Theory determines through experimental settings how people actually behave in strategic situations, hence linking cognitive details and mechanisms to game theory [15]. Traditional game theory works on the basis of the h*omo economicus*, the human being that always strives to maximise his or her profit without considering others, in an entirely selfish manner. This behavioural assumption, which forms the basis for standard economic mechanisms, is known to be unrealistic [11, 15, 16]. In practice, the homo economicus is geared to some form of bounded rationality, in which assumptions are simplified and heuristics are deployed due to psychological predispositions, computational deficiencies and time constraints (see [16]), which lead to solutions that are satisfactory rather than optimal [17]. Experimental evidence shows that many players engage in altruistic cooperation or altruistic punishment [18], and show some inequality aversion even at a net cost, instead of acting purely as a homo economicus [19, 17].

As such, behavioural game theory combines theory and experimental evidence to provide a model for better understanding strategic behaviour in economic, political and social interactions, building on aspects and concepts from behavioural decision theory [20]. To analyse problems from a behavioural perspective, the decisions of other players can be predicted either by thinking or learning. When there is a lack of prior experience with analogous games to learn the likely behaviour of the other players, the analysis has to rely on strategic thinking [20]. Empirical studies looking at strategic behaviour often rely on laboratory experiments, and are useful for predictions of behaviour in real life scenarios as laboratory decisions are real choices [21].

At the core of game theory is the concept that players reason what other players will do, usually by going through iterations of players guessing what other players will do by guessing what the other players guess about other players behaviour and so forth, to get ahead of the game like the Hare and the Hedgehog, until an equilibrium is reached. However, in games that are new, the number of iterations to guess the behaviour of other players is likely to be limited.

If given the time and experience, players can however learn to predict approximate equilibriums surprisingly well, with two different theories on why that is: belief learning assumes that players use the historic behaviour of other players to form a belief on how they are going to behave in the current game; and reinforcement which theorises that players would repeat only those strategies that yielded a success in the past, making learning slower when reinforcement varies [22]. A further complication is added in games when considering that the informed player realises that other players who are playing against each other are also learning and adjust their behaviour accordingly [22].

The basis for the analysis of behavioural game theory are three stylistic principles: Precision, which is to include deviations to form an alternative theory that is widely applicable; Generality, in that the behavioural game models are general enough so that they can be applied to many different games without extensive customisation; and Empirical discipline, as behavioural game theory models are data driven by relying heavily on experiments and lab control to identify which theories work best [23].

2.2.1. Cognitive Hierarchy Model

Cognitive Hierarchy models capture players beliefs about steps of thinking and are designed to predict the early stages of repeated games or one-shot games [23]. According to cognitive hierarchy theories, each participant in a game believes that he or she has a better understanding of the game than the other players [3]. The number of steps of thinking to take a decision in the game, usually as a result of reasoning strategically, is limited. Working memory is strained by those steps of thinking and constitutes a hard constraint [3]. The number of steps of thinking that can be remembered is limited though individual differences exist related to reasoning ability. Camerer and colleagues [24] have identified a Poisson distribution of thinking steps, and conclude based a number of experimental data sets that the mean amount of thinking steps would be between one and two.

Another limitation to reasoning can stem from uncertainty about the payoffs of other agents, or their degree of rationality. Experiments have shown that player's strategic thinking is limited, however, in that while they should look ahead and then induct backwards, most players actually did not try to compute the equilibrium [22]. Further, players have been found not to look at other player's payoffs even if this would have helped them to predict the other players' behaviour in the future, and that players' mental model would often underrepresent other players' potential gain [22].

Players that are using zero steps of thinking are not reasoning strategically, and are likely to use simple low-effort heuristics like salience or randomising among all possible strategies [25, 23]. When one step of thinking is used, it can be assumed that the agent believes to play against agents who employ the zero-step thinking strategy. Hence players who follow k steps of thinking believe that all other players in the game utilise anything from zero to k-1 steps of thinking to make a decision [23]. It should be noted when looking at the number of steps of thinking chosen by a player that in the cognitive hierarchy model, players are defined not by their own cognitive capabilities but by their beliefs about the other players [23].

Intriguingly, individual differences in players have been found to affect behaviour, so as players with high IQ would do more steps of thinking than others [24, 26, 22]. Apart from cognitive capability and the strain on working memory, another explanation why players choose to limit their strategic thinking is that agents endogenously choose whether to think harder [23]. Players compute the payoff of an additional step of thinking. The challenge in modelling the game lies in identifying the frequency of players using different numbers of thinking steps [23].

The P-beauty contest game has shown that when stakes are higher, players tend to use more steps of reasoning, and assume that other agents will do so as well, and substantial regularity has been found across very diverse subject pools and payoff steps [23]. The question how persistent a player's thinking steps are across games has been found to be fairly stable within an agent when games had a similar structure [27], although for predictions it should normally not be of significance whether an agent maintains the same step type across games [23].

Another example of games for which the cognitive hierarchy model provides useful insights are market entry games. Experiments have shown that in this type of game, players succeed in coordinating market entry reasonably well even when playing the game for the first time [28, 23]. Cognitive hierarchy models not only fulfil the purpose of explaining non-equilibrium behaviour, they also help explain the lack of non-equilibrium behaviour, when there has been no learning, experience, or communication [23]. As such, cognitive hierarchy models have found experimental and practical application in a variety of settings, such as “hide and seek” games [29], Swedish lottery [30] or movie reviews [31], see Crawford, Costa-Gomes and Iriberri [32] for a review.

So cognitive hierarchy models can explain both deviations from equilibrium as well as equilibration without previous learning or communication. The level equilibration has been found to depend on the strategic setup of the type of game - games with strategic complementarity will foster irrational decisions, whereas games with strategic substitutes will mitigate irrationality [23]. Hence overall, the basis for cognitive hierarchy models is the inaccuracy in beliefs on how the other players are going to act caused by bounded rationality in strategic thinking.

2.2.2. Quantal Response Equilibrium (QRE)

In contrast with the cognitive hierarchy model, the quantal response equilibrium is a noisy optimisation model under which players are allowed to make minor mistakes but their beliefs about what other players will do are always accurate [33]. The model takes into account that agents are more likely to decide for behaviour that brings a higher expected payoff [23]. As such, individuals have been found to be more likely to chose better choices than worse ones, but not necessarily do they chose the very best choice [34]. In games with no pure Nash-equilibrium strategy, but a mixed-strategy Nash equilibrium where players play a probabilistic mixture of two strategies such as the ‘hide-and-seek’ game, the quantal response equilibrium can predict players’ behaviour when they actually deviate from the Nash equilibrium [23].

Quantal response equilibrium has been found to successfully explain deviations from Nash equilibrium in many different game applications, as it takes into consideration that a small mistake by one agent can have a large impact on another player which can lead to a result far from the Nash equilibrium [23]. Further application of quantal response equilibrium is to predict how behaviour can be changed by structural changes or to check robustness when institutions are designed [23].

Goeree and colleagues [34] have summarised that quantal response equilibria have found application in a variety of games such as two-stage bargaining and overbidding in auctions, as well as in political science experiments explaining voter turnover or jury voting. Camerer and Ho [23] have found that typically, the results of quantal response equilibrium and cognitive hierarchy models are equally accurate. Wright and Leyton-Brown [35] found in a meta-analysis that Poisson-Cognitive Hierarchy models fit slightly better generally, and that limited-thinking approaches in general are better for predicting behaviour than equilibrium models.

In a comparison of cognitive hierarchy model, level-k and quantal response equilibrium model, Wright [1] came to the conclusion that the best model to predict out-of-sample human play of normal-form games would be a quantal level-k model, that would perform best on across datasets [36], which Wright later developed further into a three-parameter model [35]. In his latest work, Wright included aspects of deep learning into the model, which is characterised by endogenous levels in that the properties of the game determine the distribution agents playing a specific level, as well as theoretical implications for mechanism design in that how agents respond to incentives is incorporated according to accurate models of behaviour [1].

2.2.3. Experience Weighted Attraction Learning (EWA)

Experience Weighted Attraction Learning is a learning model that computes the path to the equilibrium, with an algorithm that considers both reinforcement and fictitious play models [23]. As such, experience weighted attraction learning shows that reinforcement and belief-learning, although often considered to be fundamentally different from each other, can actually be combined to form a meaningful relation.

Changes in unobserved probabilities of choosing different strategies due to experience characterise Experience Weighted Attraction learning, while it is the aim of the model to predict every choice by every player at any time [23]. The basis for the model are foregone payoffs, and imitation of the behaviour of a successful player based on his or her foregone payoffs can be seen as a strategy to move towards higher payoffs [23].

Shu-Heng and Ye-Rong [37] have analysed Experience Weighted Attraction learning and its relationship with cognitive ability, and identified that particularly the capability to do counterfactual reasoning or imagination is significantly higher with high cognitive able individuals. Camerer and Ho [23] have found that in most cases a hybrid experience weighted attraction model provides more accurate predictions than reinforcement and weighted fictitious, except in mixed-strategy equilibrium games in which reinforcement predicts equally well as the hybrid EWA. Overall, learning models are adaptive over time and backward-looking, as agents respond to their own previous payoffs and those of other players.

2.2.4. Models Including Sophistication

To account for the fact that sophisticated players utilise strategic thinking in addition to learning, adaptive models of learning need to be extended. Sophisticated players, if they are self-aware, understand and consider that other players will go through a learning process with repeated games as well, and will, therefore, change their decisions and behaviour. These changes are anticipated and predicted by sophisticated players. In this sense, players will have to look ahead and use strategic foresight to change their behaviour depending on payoffs and how players are matched. As such, models that include sophistication will be able to account for effects of matching and information that adaptive models do not consider [23].

Camerer and Ho [23] found the proportion of sophisticated players to be around a quarter in inexperienced subjects, and would rise to three-quarters when a ten-period game is played the second time as players learn about learning. Carpenter, Graham and Wolf [38] broader cognitive skills determine strategic sophistication, as cognitive ability has been found to be strongly associated with sophistication in a game of iterative dominance. Further testing through imposing a cognitive load on player's working memory has shown that these players' game performance has been significantly negatively affected, which further proved that sophistication is determined causally by cognitive ability [38].

By adding two behavioural parameters (the fraction of teachers, and the peripheral vision of learners), the model including sophistication has been found to predict substantially better than quantal response equilibrium [23].

2.2.5. Models Including Social Preferences

Behavioural game theory can be used to study social preferences that play a role in strategic interactions such as reciprocity, altruism, and fairness [22]. Developing models that predict how these forces work is an important part of behavioural theory. Cooperation in games has been found to be conditional, in that players cooperate with the expectation that other players cooperate in reciprocity [22]. Cooperation also increased when players were able to talk with each other about what they are planning to do [22].

Ultimatum bargaining has been found to show social motives, as in an ultimatum the proposer makes a one-time offer to the responder, and the game ends after the responder either accepts or rejects the offer. Selfish, homo economicus would offer the least they can to others and take anything they are offered, assuming that other players would do the same. Contrary to this concept, players usually offer 30 to 50 percent, and offers below 20 percent are rejected half of the time, showing negative reciprocity [22].

Further, the concept of trust and social capital is interesting to social scientists as it has been linked to a productive society and economic growth [22]. The trust game is used as a model to measure trust and trustworthiness: an investor can invest as little or as much of a given sum as he likes, the amount invested is tripled as a representation of return on social investment, and given to a trustee, who can keep or pay back to the investor as much of the tripled sum as she likes [22]. Measuring fMRI imaging shows that cooperative behaviour has an impact on the limbic system and the prefrontal cortex. Players are typically very trusting and trustworthy in early periods when games are repeated [22].

The mathematical theories underlying social preferences are threefold: the inequality-aversion theory says that players prefer both higher gain and equal distribution, hence they would sacrifice gains in order to have allocations more equal; the me-min-un theory stipulates that players would be concerned with their own payoff, the minimum payoff, and the overall total of all payoffs; and the reciprocity theory according to which agents assess other players' kindness to reciprocate helping or harming behaviour [22].

Yamagishi, Mifune, Li and colleagues [39] found a strong consistency in social behaviour across five games, and also found that the player's own behaviour and the expectations of other players' behaviour to be consistent. The player's consistent behaviour across different experimental games can partially be explained with the player's social value orientation, while beyond of value orientation, prosocial behaviour has been found to be produced by individual perceptions and expectations of interdependent situations [39].

Overall, the challenge with prosocial behaviour is to find a minimal set of workable, psychologically plausible models to be used in applications of finance, business studies, politics and others [23].

3. Discussion

Traditional Game Theory has been widely criticised for not providing reliable results on how decisions are taken in real-world settings, where human behaviour deviates from predictions of traditional game theory. To address the shortcomings of game theory predictions, behavioural game theory models are better suited for predicting accurate results of agent's decisions. By adding correction for people's sensitivity to biases and heuristics, mispredictions can be eliminated or reduced. How people make their decisions deviates from game-theoretic predictions has been observed in laboratory experiments as well as outside the lab.

It can be argued, that the variety of options in which people can adjust their behaviour based on the situational framework is too broad to manage. The adjustments required would produce a model that is not generalisable. In their critical work on behavioural game theory, Lucas, McCubbins and Turner [19] argue that deviations to equilibrium strategies would not be consistent for most subjects even in similar tasks, and that between different subjects there would be a large variance in choices in any specific task. Further, individual's beliefs about game strategies would differ and could not be generalised for a variety of settings [19].

Cognitive Hierarchy Model in particular, however, provides a model that takes into consideration bounded rationality and heterogeneous thinking, while being as generally applicable as equilibrium models. More than a hundred experiments and various field studies of behavioural game theory models have shown that those models that take bounded rationality into consideration outperform the predictions of equilibrium strategies (see [40]). The broad spectrum of areas of application, from timber auctions [41] (Gillen, 2009) to managerial strategies [42], lead to infer that behavioural game theory models provide an advantage over traditional models.

4. Conclusions

This outline illustrated how game theory developed from traditional game theory models to include less rational human behaviour in behavioural game theory models.

First, a selection of different types of traditional game theory was outlined, which operate on the basic assumption of the homo economicus. Specifically, the non-cooperative zero-sum game, the positive-sum game with the example of the prisoner's dilemma, the negative-sum game, and cooperative bargaining theory have been defined as examples of games with complete information. Further, Bayesian games were illustrated using the example of the hiring of differently abled workers as a game with incomplete information.

Then the application of traditional game theory, with its implication for management and decision making, was described further. In particular, the challenges for managers that traditional game theory would only present one alternative as a solution to a problem, often without providing information on the underlying assumptions, has been addressed.

To take into account the fact that humans have been found to not act rationally in games, behavioural game theory has developed models that predict behaviour in games in real life terms, moving away from the assumption of the economically rationally acting agent.

Cognitive hierarchy model depicts that players use their beliefs in steps of thinking to take a decision, to be used for predictions specifically in early stages of repeated games or one-shot games. It can be concluded on cognitive hierarchy models that beliefs about how other players are going to behave are inaccurate due to bounded rationality in strategic thinking.

The quantal response equilibrium as a noisy optimisation model assumes that while players are allowed to make minor mistakes, their beliefs about the behaviour of other players is always accurate. As such, quantal response equilibrium has been found to successfully explain deviations from Nash equilibrium.

Experience weighted attraction learning has been introduced as another model which includes behavioural theories to predict decisions in games, specifically this algorithm considers reinforcement and belief-learning. As the bases for this model are foregone payoffs, the limitations of experience weighted attraction learning as a backward-looking model have been illustrated.

Models including sophistication have been introduced to account for strategic thinking of sophisticated players who will change their own behaviour based on the understanding that other players also go through learning processes with repetition of the game. It has been shown that in models including sophistication, players look ahead and use strategic foresight, eliminating the limitations of previous models.

An application of behavioural game theory has been presented as models with social preferences, which take social interactions such as reciprocity, fairness and altruism into consideration. While models that include social preferences in their predictions have been shown to provide accurate and real-life results, it has been found that the challenge lies in finding a set of psychologically plausible models which are both comprehensive and workable.

It became apparent through the discussion that behavioural game theory provides the more accurate predictions of human behaviour in decision making, which over a hundred different experiments have confirmed.

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