Behavioural Economics: a summary of the field's main areas of focus

A Working Paper

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1 Introduction

What is Behavioural Economics?

To a biologist, psychologist and evolutionary psychologist, behavioural economics (BE) is a relatively new field that is attempting to bring economics into the real world. In a recent BBC (2004) documentary on the topic, Professor Camerer of the Californian Institute of Technology explained the ideology behind BE by likening economic theory conceived during the 1930's through to the 50's to the discipline of physics, whereby, neo-classical economists built theories the economy or of markets based on 'particles' that interacted. In order to do that mathematically, the models and their interacting 'particles' were made very simple, ie: they behaved according to some very simple, rational rules. As he said: *these particles were really not like us, so behavioural economics is an attempt to make these particles have emotions – they care about what other people are buying or wearing, they may get jealous, they succumb to temptation and so on… and it starts to look a lot more like - say biology than physics.* The presenter of the documentary summarised: *Behavioural research is injecting psychological realism back into mainstream economics.*

Homo economicus is commonly used as a descriptor for these 'particles' that economists created theories around. *H.economicus* is a rational animal, with great analytical powers, a degree of surety about what outcomes he wants from life and willpower enough to achieve all his desires. This animal works to maximise his gains (utility) and takes decisions based on self interest. The simplicity of this model of human behaviour has been very influential with policy makers and business thinkers, even though the evidence of how people behave has thrown-up many criticisms and reasons to question the validity of the ideology. Behavioural economists, therefore, are attempting to accommodate *Homo sapiens sapiens* with some of his irrational attributes into economic thinking.

For example, in the same BBC documentary, Professor Camerer cited his study of cab drivers in New York (Camerer et al, 1997), research he had conducted to test ideas about labour supply and how many hours people work depending on how high the wage is. New York cabbies were excellent research fodder since they hire a cab for 12 hours a day, but they are free to quit early if they want to. When asked how many hours a day the cabbies choose to work, many had a heuristic, eg: *I set a daily target and when I hit that, I go home.* Camerer explained that this was contrary to what economic theory would predict. On a high wage day, for example when it was raining, the target sum would be reached very soon, compared with a low wage day – when it was sunny and people preferred to walk or NY was empty – cabbies take a lot longer to reach their target. So a cab driver using this rule of thumb, drives a lot of hours on a low wage day and very few on a high wage day, which is exactly the opposite of what the theory of labour supply would predict: if someone offers you a high wage, you work harder than if you are offered a much lower wage. The cabbies' behaviour is irrational because if they worked harder on the high wage days, they could meet their target for two or three days in one and spend the same number of following days not working at all (see page 8).

Another example cited in the documentary described consumers' irrational shopping habits, for anything from everyday groceries to large purchases such as cars. Shoppers do not make choices from the entire list of options with the intent of maximising what they can buy for their budget. They actually choose from a limited repertoire of trusted brands and might buy at a lower price point one day, higher the next depending on something other than utility maximisation. As marketers know, consumers buy items that have symbolic meaning and price is a part of the calculation but not the whole (or sometimes even the dominant) determinant of behaviour.

Camerer (2004) argues, however, that the introduction of psychology into economics does not mean having to reject the traditional approach. He asserts that psychology mostly modifies one or two assumptions in standard theory and that this results in departures which are not radical – given that the assumptions needing modification are often not central to the neoclassic approach. For example (he states): *there is nothing in core neoclassical theory that specifies that people should not care about fairness, that they should weight risky outcomes in a linear fashion, or that they must discount the future exponentially at a constant rate. Other assumptions simply acknowledge human limits on computational power, will power and self-interest. These assumptions can be considered 'procedurally rational' because they posit functional heuristics for solving problems that are often so complex that they cannot be solved exactly by even modern computer algorithms.*

By comparison, Khaneman (2003) concludes: *Incorporating a common sense psychology of the intuitive agent into economic models will present difficult challenges, especially for formal theorists. It is encouraging to note, however, that the challenge of incorporating the first wave of psychological findings into economics appeared even more daunting 20 years ago, and that challenge has been met with considerable success.*

2. Background

Economics and Biology Finding Common Ground – (i) Game Theory

There has been a 50 year tradition of economists using experiments (games) – usually conducted on compliant students in 'laboratory' settings - as the means to test people's behaviour when they are in groups and where the decisions of one player depend on the decisions of another. The settings these games are played under are simplified beyond real life. Kay (1993) describes them as '*extended metaphors - never to be taken literally, or implemented directly, but capable of focusing attention on different aspects of why strategic interactions so often produce results that were no one's intention.'*

Ridley (1997) describes them less favourably and adds some history: *[Game theory] – born, in 1944, in the fertile but inhuman brain of the great Hungarian genius Johnny von Neumann, it is a branch of mathematics that especially suits the needs of the 'dismal science' of economics. This is because game theory is concerned with that province of the world where the right thing to do depends on what other people do. The right way to add two and two does not depend on the circumstances, but the decision whether to buy or sell an investment does depend totally on the circumstances, and in particular on what other people decide. Even in that case, though, there may be a foolproof way to behave, a strategy that works whatever other people do. To find it in a real situation, like making an investment decision, is probably as close to impossible as makes no difference, but that does not mean the perfect strategy does not exist. The point of game theory is to find it in simplified versions of the world – to find the universal prescription. This became known in the trade as the Nash equilibrium, after the Princeton mathematician John Nash. The definition of a Nash equilibrium is when each player's strategy is an optimal response to the strategies adopted by other players, and nobody has the incentive to deviate from their chosen strategy.*

Ridley is a zoologist by training, Kay is an economist. Both agree that the point of playing these games is to simplify life and, by experimentation, see if anything can be discovered that is surprising. Then, return to the real world to see if this insight sheds light on what really happens. The best known game is the Prisoners' Dilemma – first formalised as a game in 1950 by Merril Flood and Melvin Dresher of the RAND corporation and first rephrased as an anecdote about prisoners by Albert Tucker of Princeton University a few months later. In this game, both prisoners have choices of : confessing to a joint crime, or saying nothing. If neither confess, they will both get a 1 year sentence for a trivial offence – the optimum outcome for both. But, if one confesses and the other doesn't, the confessor goes free and his partner-in-crime goes to jail for 10 years. If both confess, both get 7 years. In the game, the two criminals are not allowed to decide a strategy before being thrown into separate cells and hence the only logical strategy for

both is to confess (the Nash equilibrium). That way, neither risks being the 'loser' who ends up with ten years in jail while the other goes free. Hence, the 'dismal' outcome of this game is that both criminals serve seven years, cooperation is not logical under these conditions. Even if the game is repeated, ie: the same players serve 7 years and on release go into partnership on a second crime and get caught again, even then the lessons of the first experience do not change the logical outcome. If one player commits to stay silent, it is in the other's interest to defect and go free, hence the only rational strategy is for both to defect. Since this is the Nash equilibrium in this game, it demonstrates that the best outcome is not necessarily at the equilibrium. In fact, often, the Nash equilibrium lies with two strategies that deliver one or both players into misery, yet neither can do better by doing differently.

It was the biologist John-Maynard Smith who first saw the potential of game theory in biology. He proposed that evolutionary pressures would design in animals instinctive behaviour that would allow them to arrive at the optimum strategy, given the strategies of others. The argument was that it made evolutionary sense for animals to behave *intuitively* in this way. From this insight, Maynard Smith called an evolved instinct that met a Nash equilibrium an 'evolutionary stable strategy'.

According to the grim, *rational* logic of these games, people do not cooperate for public good when there is more to be gained by pursuing self interest. But, as Maynard Smith began to introduce the ideas of the game back into the real world (his famous Hawk and Dove anecdote), he observed that a 'nice', cooperative strategy (ie: that of the Dove) was possible and could be successful – especially when the game was repeated and when the 'Dove' could retaliate.

- *(ii) Tit-for-tat, Cooperation and Selfishness*

In the late 1970's the prisoner's dilemma game was programmed to run on computers and in repeated games a dominant pattern of cooperation began to emerge. This rather surprising fact led a political scientist - Axelrod - to set-up a huge 'tournament' whereby he broadcast an open invitation for computer programmes to 'play' against each other and score outcomes against a random programme. The winning programme was the least complex – it was written by Anatol Rapoport – and was called 'Tit-for-tat'. When Tit-for-tat was pitted against a second round of 64 programmes – it continued to beat the competition. The key ingredients of Tit-for-tat are described by both Kay and Ridley as predominately – *nice* – and are the same as those proposed by Maynard Smith for his Dove that could retaliate. In Ridley's words: *What accounts for Tit-for-tat's robust success is its combination of being nice, retaliatory, forgiving and clear.*

The rules of Tit-for-tat are: both players start the game expecting that the other will cooperate, not that she will cheat. But, both players respond to bad behaviour and retaliate with a punishment. Yet, they are forgiving. 'Niceness' prevents the players from getting into unnecessary trouble. Retaliation discourages the other side from persisting whenever defection is tried. Forgiveness helps restore mutual cooperation. Tit-for-tat is a winning strategy in long-term relationships between two players. The existence of a past and a future implies that it makes sense to behave in ways that are not the best strategy for either player in the short run.

Axelrod continued to test the power of Tit-for-tat and included it as a programme in an 'artificial life' computer programme, which simulates evolution. In these programmes, space on the computer screen is competed-for in a survival-of-the-fittest game. Axelrod (1984) pitted various strategies against each other and included Tit-for-tat. As the game progressed, 'nasty' strategies thrived at the expense of nicer, naïve ones, only Tit-for-tat kept pace. Over time, the nasty strategies ran-out of easy targets and kept meeting other 'nasties' so that they too began to dwindle in numbers. Finally, Tit-for-tat came into its own and eventually stood alone on the screen.

The term 'reciprocal altruism' was coined a decade before Axelrod held his computer contests by a biologist – Robert Trivers (1971). He argued that cooperation might be driven by reciprocity – a situation of: 'I'll scratch your back, if you scratch mine'. The logic he used was that it would be in

the interests of each to cooperate if a favour done by one animal could be repaid by a reverse favour in the future so long as the cost of doing the favour was smaller than the benefit of receiving it. Hence, animals cooperate for selfish reasons. When Axelrod's findings and Trivers' theorising were put together, economics and biology became reconciled!

The implication is that reciprocity is part of human nature – an instinct that does not need to be reasoned out or learnt. It is an ineradicable predisposition, motivated by selfishness, which enables us to survive as social animals. From this basic understanding that cooperation is a 'natural' human inclination, Leda Cosmides started to test her hypothesis that to survive as clan dwellers, human beings needed a mechanism for detecting cheaters (see EP paper).

Altruistic behaviour can also be explained by the theory of kin selection. This theory holds that an individual is willing to give (apparently) selflessly to blood relatives who carry part of the altruists' genotype. The evolutionary argument in support of this is that the primary purpose of life is to secure the passing of your genes into the next generation. Hence, it is advantageous (and adaptive) to be kind to relatives – again explaining that altruistic behaviour can be motivated by selfishness.

1. Fairness

An Economist article (2002), reported the work of Fehr and Gächter who accepted that altruism within families was satisfactorily explained by kin selection theory, and that unrelated individuals might show kindness to each other due to reciprocal altruism but, argued that this did not account for all of the cooperative human activity they could observe. People, for example, give to charities, do voluntary work and leave tips for waiters in restaurants they have no intention of returning to. Fehr and Gächter (2000) were also interested in the spiteful behaviour they observed. They turned back to playing games as a means of helping them learn more. They conducted a series of 'public good' games. In the first series, sets of 4 individuals were invited to invest up to $20 with other anonymous people, all making sole decisions of how much to invest, simultaneously. The incentive to invest was a return of $1.60 for every $1 contributed to the collective pot. But, the pot would be shared among all the players. Thus, if everyone invested $20 all would gain the maximum return of $32 and the public good would have been served. But, if only one player invested he would take home a mere $8 along with the rest who would also retain their original $20. At the end of each investment round, each player was told how the others behaved before playing the next round. By round 6, all investment had dwindled to nothing.

In a second version, a punishment was added as an option to the game. At a cost of $1, a group member could anonymously fine another $3. Of the 240 participants in the experiment, 84% punished at least once and around 9% punished more than 10 times. Most punishment was imposed by above-average contributors (deemed co-operators) on below-average contributors (deemed free-riders). Punishment was related to notions of fairness and how much free-riders' contributions fell short of the group's investment average. Punishment had an effect. It substantially increased the amount that was invested in the public good: more than 90% of the participants contributed more money when punishment was a possibility. Players were swapped at the end of each investment round so that they would never invest with the same group twice, meaning that the acts of punishment were altruistic. Hence, in this game, people valued fairness over personal gain.

In the same Economist article, this work was tied to that of Joseph Henrich (2001), an anthropologist who conducted (in collaboration with other researchers) a series of ultimatum games. In an ultimatum game, a participant is given what is for him the equivalent of a day's wages and asked to give a portion to a second, anonymous person whom he will never meet again. The recipient can accept or reject the offer, if he rejects, neither player receives any money. The logic behind an ultimatum game is that, if people aim to maximise their resources, as

economics assumes, a recipient will accept any offer made by a donor. Also, a donor will always make a minimum offer. This, however, was not what researchers found. Offers ranged from 22% to 58% and offers higher than 50% were rejected sometimes. Researchers concluded that acceptance and rejection were strongly linked to feelings of fairness and reciprocity in addition to material benefits. People reward those who act co-operatively and punish those who do not – even if this comes at a cost to themselves.

In a subsequent paper by Fehr and Gächter (2002), this behaviour was named: 'strong reciprocity' to distinguish it from reciprocal altruism. According to Fehr and Gächter, a person is a strong reciprocator if she is willing to sacrifice resources to those who are being kind, and to punish those who are being unkind. Significantly, strong reciprocators will behave in this way even if doing so provides no prospect of material rewards in the future. The biological explanation for why this behaviour might have evolved is provided at the group level. The authors argue that if a whole community could be eliminated by a single cause, such as war, famine or environmental catastrophe and, that collective action might avert total wipe-out, groups with strong reciprocators would survive over those that did not have these genes in the population.

The idea of strong reciprocity explains previously inexplicable altruistic acts and the existence of spite. Bowles and Ginitis (2002) also suggest that understanding the behaviour of strong reciprocators has practical relevance. They argue that strong reciprocators should be given the opportunity to punish free-riders in society – something that works in certain small communities very effectively – allowing the better side of human nature to correct against the negative, making things better for everyone.

Unlike the majority of game research which is carried out with the cooperation of economics students attending the classes of economics researchers in mainly American and Western universities, Henrich et al's study (2001) was conducted across 16 different societies. These included the usual group of university students from developed societies, but also stretched across a diverse range of other nations, including some of the most remote and traditional cultures in the world. The data from these studies showed that while individuals from all of the cultures gave more than was economically rational, there were significant differences in terms of how much individuals were prepared to give and accept. Hence a significant finding was that different societies had different notions of fairness. Explaining why this happened, however, proved less than easy. The only trend that emerged was that groups of people from the most basic societies varied most in their attitude to fairness. Conversely, students from industrial societies showed remarkable homogeneity even when separated by thousands of miles. One hypothesis formulated from the results was that society was the main modifier of behaviour and that where collaboration was the norm, individuals were more used to trusting and punishing. Hence, in industrialised societies, people have learnt a standard set of heuristics for dealing with anonymous people – explaining the students' results. Compared with traditional societies, where such dealings are rare, there are no equivalent rules and hence responses by individuals vary widely.

2. Fairness, the Nash equilibrium and 'behavioural game theory'!

Kurzban and Houser's (2005) work investigated the proportions of cooperative types in the population. They set-up and run a 'public good' game between four players who were observed with the objective of finding out which strategy each would choose: (i) cooperate, (ii) free-ride or (iii) reciprocate (cooperate with other cooperators but not with free-riders). The researchers were also interested to find out if players changed strategy and whether the different strategies achieved the same average pay-offs. This last point is crucial to the theory of evolutionary stable strategies. Individual strategies are not expected to be equally represented in a population. Instead, they should appear in proportions that equalise the payoffs to those that play them. The proportions in the population, when all strategies are equally advantageous, represent the equilibrium.

And the theory was validated. The research showed that of the 84 participants, 81 fell clearly into one of the three cooperative types and that once categorised and subject to further simulations, they continued to behave according to that type, ie: players did not change strategy. Also, the strategies did have the same average payoffs to the individuals that played even though only 13% were cooperators, 20% free-riders and 63% reciprocators. This finding implies that cooperative behaviour is hard-wired into individuals and that despite rational self interest, individuals will not change their strategy. This work calls into question the economists notion of Nash equilibria as logical outcomes to such games. If people behave rationally in response to others' actions, they would need to switch strategy to match the other!

The descriptive accuracy of game theory is being questioned because equilibrium predictions often assume sophisticated strategic reasoning - which is unrealistic. As a result, something tagged 'Behavioural Game Theory' is being cautiously explored (see Camerer *et al* 2004).

3. Consumers' Perceptions of Fairness

Khaneman, Knetsch and Thaler (1986) studied consumer perceptions of fairness. They asked people (using telephone surveys) how fair they considered different types of behaviour by firms to be. Typically they would ask whether a hardware store that raised the price of a snow shovel after a snowstorm was behaving fairly or not. People thought the store was unfair. Khaneman *et al* concluded that consumers establish a reference level for price which includes a 'fair' division of the consumer surplus and producer profit – both parties being 'entitled' to these levels of profit – and that price changes which threaten the entitlement are considered unfair.

So that, raising the price of snow-shovels just because demand increased was seen by consumers as a reduction in consumer surplus – with no corresponding decrease in producer profit. But, when the cost of producing the snow-shovel could be shown to have increased, consumers said that it was fair to raise the selling price because *not* raising prices would mean producer profit would decrease. Camerer (in Camerer *et al* 2004) argues that this finding has not been used widely by practitioners – despite the everyday observation that firms do not change prices as often as standard theory suggests. He cites the example of the Harry Potter books: *For example, when the fourth Harry Potter book was released in summer 2000, most stores were allocated a small number of books that were pre-sold in advance. Why not raise prices, or auction the books off? Everyday folks, like the subjects in the KKT surveys, find actions which exploit excess demand to be outrageous. Concerned about customer goodwill, firms limit such price increases.*

Camerer went on to question if consumers really would boycott or campaign loudly if they felt unfairly treated. He supposed that they would find a way to punish the offending firm, either by raising their issue with the media or consumer organisations that could campaign for a fair deal or influence the government to change legislation in favour of 'fairness'.

4. Bounded Rationality

If the first myth of the standard economic model is that people are unboundedly selfish, the second is that they are unboundedly rational with an almost limitlessly ability to compute accurately. It was Herbert Simon (1955) who challenged this notion and suggested the term 'bounded rationality' to describe a more realistic conception of human problem solving capabilities. Since we have only so much brainpower and only so much time, we cannot solve difficult problems optimally. Therefore, we adopt rules of thumb as a way to economise on cognitive faculties. Yet the standard model ignores our use of these heuristics, instead assuming we are making decisions using computation.

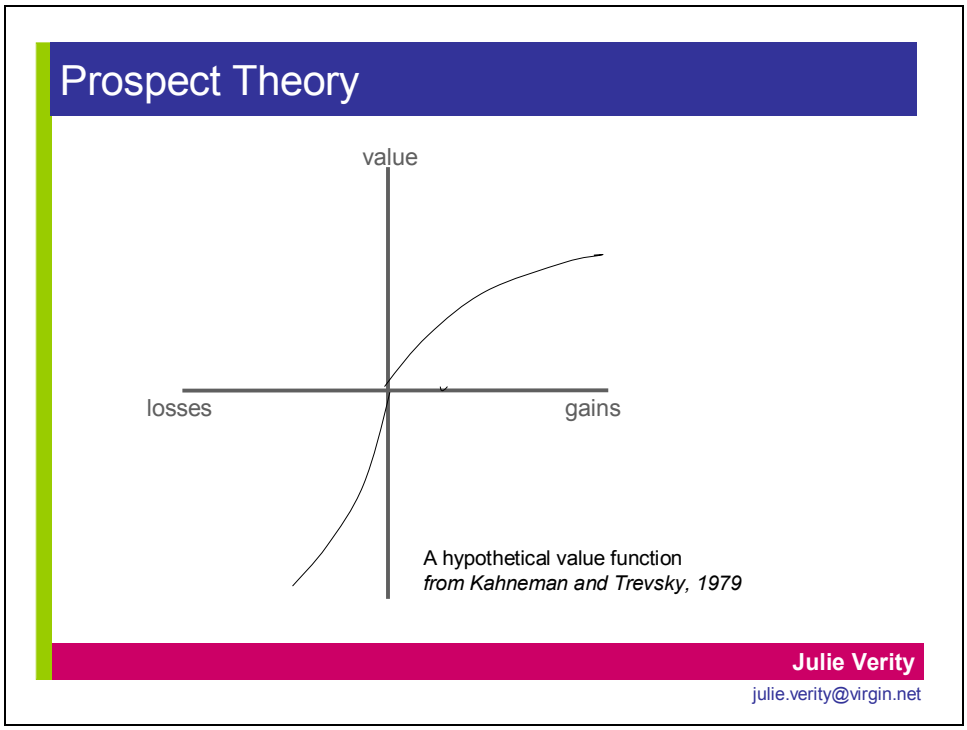
Departures from rationality emerge both in judgements (beliefs) and choice. The list of digressions of judgement from rationality is long (Kahneman, Slovic and Tversky, 1982). Some illustrative examples include overconfidence and optimism (see EP paper), anchoring, extrapolation, and making judgements of frequency or likelihood based on salience (the availability heuristic) or similarity (the representativeness heuristic)[1]. From the perspective of *Homo economicus,* these rules of thumb are faults in our decision-making processes (!), in fact they are subconscious responses to certain environmental stimuli. The HBR paper by Hammond, Keeney and Raiffa (1998) explains many of these 'pitfalls' and proffers advice about to avoid them. Anchoring, for example, is the bias (heuristics are rules of thumb that are habitual in our thinking, bias is the observed result) we give to the first information we receive. The example Hammond *et al* give is the common management practice of basing next year's turnover on current sales performance.

Hammond *et al* also explain:
(i) our preference for the status quo, which is mirrored in EP by our attitudes to risk
(ii) our predisposition to seek 'confirming evidence', ie: selecting *only* the information, from the total available, that supports a decision made earlier – while ignoring any which does not support the decision
(iii) the framing trap, where how a question is asked or how a decision is framed influences the choices we make.
(iv) estimating and forecasting errors, whilst we can be quite accurate estimating the time it will take to make the daily journey to work and back, people are not very good at estimating uncertainty. In the face of the unknown we tend to be over-confident (see EP paper) or, in the face of big decisions or high-stakes, we tend to adjust our estimates or forecasts 'to be on the safe-side'. The third problem with decision-making and uncertainty is the power past experience can have. Any strong past experience which distorts the accuracy of interpretations of how things happened in the past can distort probability assessments about the future.

Some of Hammond *et al's* heuristics are drawn-from and captured-in Prospect Theory, the classic work of Kahneman and Tversky (1979). This is a descriptive theory of how people make choices under uncertainty and is an excellent example of how psychology is incorporated into traditional ideas of economics. Hastie and Dawes (2001) explain why this theory is 'superior' to the standard economic model:

1. *An individual views monetary consequences in terms of changes from a **reference level,** which is usually the individual's status quo. The values of the outcomes for both positive and negative consequences of the choice then have the diminishing returns characteristic.*
2. *The resulting value function is steeper for losses than for gains. This implies **loss aversion**; equal-magnitude gains and losses do not have symmetric impacts on the decision. Losses hurt more than gains satisfy; most empirical estimates conclude that losses are about twice as painful as gains are pleasurable*
3. *The curve is concave for gains and convex for losses, implying that decision makers will be risk averse when choosing between gains and risk seeking when choosing between losses.*

[1] For explanation see D Kahneman – Maps of Bounded Rationality: Psychology for Behavioural Economics, The American Economic Review, Dec 2003, 93 (5) pp 1449-1475. And, for conclusions – p9 of this paper.



Hence, people behave in seemingly irrational ways because of their human predispositions. They are observed as being inconsistent in that a shirt normally priced at £20, is perceived as a bargain if sold at 50% off. Whereas the same amount - £10 off a sofa priced at £749.00 is rejected as a worthless saving. People amass debt on their credit cards and will not pay it off from their savings – because of the loss they fear from their savings. New York cabbies work longer on days when the takings are hard to find because they will feel the loss from their self-imposed target harder than they appreciate the gains won from 'easy work' on good days. And in the face of the unknown, people actually *feel* fear – which has led behavioural economists into the realm of EP and the mechanisms in the brain, via a field they have labelled – Neuroeconomics.

7. Fear and the Importance of Emotions

Camerer, speaking during the same BBC documentary cited above, explained the fear of the economic unknown and the relevant (neuroeconomic) experiments he had conducted: *In some cases, the probability of an outcome is known. Insuring a car for drivers in different age brackets, for example, sample statistics are available. But, insuring a building in Los Angeles against terrorist attack – who knows? The probability is not zero, although it has never happened before, so really you can't use historical frequencies as a basis for the decision. We were interested in whether there was a separate brain area that was expressing a kind of fear of the economic unknown in these cases where probabilities really don't exist.*

To investigate this, we ask people to lie on their back in a scanner with a pair of goggles on. Inside the goggles is the computer screen exactly as you see your own computer screen, but this is inside the goggles. And in some of the trials, volunteers are shown bets where they don't know the probability of the outcome and they are asked whether they want to bet or take some certain amount of money instead. In other trials, people are shown a bet where they do know the probabilities of winning. We record the brain activity of both sets of people and subtract one from the other. In these studies, it looks like an emotional region of the brain called the insula is activated. We think that the insula is a kind of way-station for body discomfort – like body discomfort, squeamishness and pain, disgust, social phobia, etc..because this area is activated

by unpleasant experiences. Hence, we think that there is a real discomfort – an emotional response – when people don't know the odds, compared with when they do… that there is literally pain. When somebody says 'I really don't know what to do, it makes me nervous' they mean it and feel it in their body – they don't just say it metaphorically.

The findings from such experiments with brand scanners gives extra weight to Khaneman's earlier ideas of System 1 and System 2 thinking which equated the latter with rational thought as compared with the subconscious, emotional thinking which he called System 1. He theorised that the brain had two mechanisms for resolving decisions: intuition and reasoning. He described System 1 thinking as: fast, effortless, associative and often emotionally charged; also governed by habit, making these thoughts difficult to control or change. System 2 he described as: conscious, deliberate, slower, serial, takes effort and is deliberately controlled, but can follow rules. As far back as 1971 when he and his colleague Tversky first studied how people made computational decisions (Tversky and Kahneman, 1971) he noted how trained statisticians would base their arguments to simple questions on intuition rather than employing learnt tools of logical thinking.

Khaneman's long and fruitful working relationship with Tversky generated many other insights into human behaviour including something he called 'prototype heuristics' (which includes the concepts mentioned earlier on page 7: the availability and representative heuristics). This equates closely with the human predisposition of stereotyping explained in the EP paper, whereby we habitually categorise new information very quickly by judging it to have similar features to 'prototypes' that we have encountered before (hence the 'representativeness' heuristic). Kahneman (2003) argues that these 'prototypes' are easy for our brains to access (hence the 'availability' heuristic), easier than making calculations or doing analysis and hence we make intuitive judgements very quickly. The judgements that we express, the actions we take and the mistakes committed depend on the monitoring and corrective functions of System 2, as well as the impression and tendencies generated by System 1. He pursues this by summarising the influences on the corrective operation of System 2:

- System 2 functioning is impaired:
  - by time pressure
  - if people have their mind on other activities at the same time
  - in the morning for 'evening people' and in the evening for 'morning people'
  - when people are in a good mood (!)
- System 2 functioning is correlated positively with:
  - intelligence
  - with 'need for cognition' (people who find thinking is fun)
  - exposure to statistical thinking.

Through a compelling logic, Khaneman concludes that: *The central characteristic of agents is not that they reason poorly but that they often act intuitively. And the behaviour of these agents is not guided by what they are able to compute, but by what they happen to see at a given moment.* He argues that even when the stakes are raised and incentives are high to perform more rationally, System 2 thinking will struggle to dominate. He states: *… there are other situations in which skilled decision makers do better when they trust their intuitions than when they engage in detailed analysis.* And finally: [This present approach] *..has developed several themes: that intuition and reasoning are alternative ways to solve problems, that intuition resembles perception; that people sometimes answer a difficult question by answering an easier one instead, that the processing of information is often superficial, that categories are represented by prototypes. …… recent developments have restored the central role to emotion, which is incorporated in the view of intuition that is presented here. Findings about the role of optimism in risk taking, the effects of emotion on decision weights, the role of fear in predictions of harm and the role of liking and disliking factual predictions – all indicate that the traditional separation between belief and preference in analyses of decision making is psychologically unrealistic.*

Loewenstein et al ((2001) come very close to Pinker's (1997) *[described in EP paper]* position on the role emotions play in decision-making. Loewenstein and colleagues proposed a central role for feelings in determining people's choices in risky and uncertain situations. They suggested a risk-as-feelings hypothesis which states that emotional reactions are not only a part of, but most probably are *necessary* to guide responses and mediate the connection between cognitive evaluations of risk and risk-related behaviour.

They conclude that individuals respond to risk at two levels: (are these exactly the same as Khaneman's System 1 and 2?) they evaluate risk cognitively and react to risk emotionally. Although the two reactions are interrelated, with cognitive appraisals giving rise to emotions and emotions influencing appraisals, the two types of reactions have different determinants. Cognitive evaluations of risk are sensitive to the variables identified by decision theory, namely probabilities and outcome valences. Although emotions do respond to cognitive evaluations, they can also arise with minimal cognitive processing and people can experience fear reactions without even knowing what they are afraid of. In contrast to cognitive evaluations, emotional reactions are sensitive to the vividness of associated imagery, proximity in time, and a variety of other variables that play a minimal role in cognitive evaluations. As a result of these differences, people often experience a discrepancy between the fear they experience in connection with a particular risk and their cognitive evaluation of the threat posed by that risk.

1. Bounded Willpower

In terms of choice, the standard economic model assumes individuals have quality and quantities of information from which they make rational choices based on achieving maximum 'utility'. The reality, however, is different. We make choices for many different reasons and make apparently 'bad' choices even when we know what would be in our best interests. We are generally weak-willed in the face of immediate gratification and ignore advice about our interests for the longer-term. So, although we know that it is better to invest in pensions for our old age, left to the individual, we rarely invest sufficient, or sufficiently early [see below].

A second anomaly is the counter habit of postponing a pleasure so as to prolong the experience of anticipating it. For example, Loewenstein (1987) elicited money valuations of several outcomes which included a 'kiss from the movie start of your choice', and a 'non-lethal 110 volt electric shock' occurring at different points in time. The average person tested, paid the most to delay the kiss three days and was eager to get the shock over with as quickly as possible. Loewenstein showed that these results were due to positive time discounting in which people derive pleasure in anticipation of future events rather than the answer the standard economic theory would have predicted.

2. Applications of BE – traditional areas

There are three major areas where BE is acknowledged as making a contribution: Finance, Savings and Labour Economics.

i) Finance

A summary of Behavioural Finance is provided by Mullainathan and Thaler (2000), who (strangely enough) use the Shell group as one of their examples:

Two factors contributed to the surprising success of behavioural finance. First, financial economics in general, and the efficient market hypothesis in particular, generated sharp, testable predictions about observable phenomena. Second, there are great data readily available to test these sharp predictions. We briefly summarise some here:

The rational efficient markets hypothesis makes two classes of predictions about stock price behaviour. The first is that stock prices are 'correct' in the sense that asset prices reflect the true or rational value of the security. In many cases this tenet of the efficient market hypothesis is untestable because intrinsic values are not observable. However, in some special cases the hypothesis can be tested by comparing two assets whose relative intrinsic values are known. One class of these is called 'Siamese Twins': two versions of the same stock that trade in different places.

A specific well-known example is the case of Royal Dutch Shell as documented in Froot and Dabora (1999). The facts are that Royal Dutch Petroleum and Shell T&T are independently incorporated in the Netherlands and England respectively. The current firm emerged from a 1907 alliance between Royal Dutch and Shell T&T in which the two companies agreed to merge their interests on a 60:40 basis. Royal Dutch trades primarily in the US and the Netherlands and Shell trades primarily in London. According to any rational model, the shares of these two components (after adjusting for foreign exchange) should trade in ration of 60:40. They do not; the actual price ratio has deviated from the expected one by more than 35%. Simple explanations such as taxes and transactions costs can not explain the disparity. This example illustrates that prices can diverge from intrinsic value because of limits of arbitrage….. The Royal Dutch Shell anomaly is a violation of one of the most basic principles of economics: the law of one price.

The second principle of the efficient market hypothesis is 'unpredictability'. In an efficient market it is not possible to predict future stock price movements based on publicly available data. Many early violations of this had no explicit link to behaviour. Thus it was reported that small firms, firms with low price earnings ratios earned higher returns than other stocks with the same risk. Also, stocks in general, but especially stocks of small companies have done well in January and on Fridays (but poorly on Mondays).

An early study by De Bondt and Thaler (1985) was explicitly motivated by the psychological finding that individuals tend to over-react to new information. For example, experimental evidence suggest that people tended to underweight base rate data in incorporating new data. De Bondt and Thaler hypothesized that if Investors displayed this behaviour, then stocks that had performed quite well over a period of years will eventually have prices that are too high. Individuals overreacting to good news will drive the prices of these stocks too high. Similarly, poor performers will eventually have prices that are too low. This yields a prediction about future returns: past 'winners' ought to under-perform wile past 'losers' ought to outperform the market. Using data for stocks traded on the NY stock Exchange, De Bondt and Thaler found that the 35 stocks that had performed the worst over the past five years (the losers) outperformed the market over the next five years, while the 35 biggest winners over ht past five years subsequently underperformed. Follow-up studies have shown that these early results cannot be attributed to risk, and can be extended to other measures of over-reaction such as the ratio of market price to the book value of equity.

The standard model, therefore, does not appear to function well in this area of the efficient market hypothesis. Similarly, research evidence for the irrational behaviour of investors is also available. Odean (1998) found that investors (in his sample of customers of one brokerage firm) were more likely to sell stock that had increased in value compared with one that had decreased in value. This behaviour was attributed to investor reluctance to realise capital losses because they would have to declare the loss to themselves!

ii) Savings

A second area where availability of data has supported a significant stream of research is in the area of individual and household savings. According to the life-cycle model, if two people earn the majority of their wealth at different times in their lives, they should save more when they are earning more. Hence, if a footballer earns most of his life-long income when young, the life cycle model predicts that he should save his early income so that he can enjoy a richer old age. Whereas, someone who works their way up a typical corporate hierarchy, should borrow against

his future income to afford more while young. However, observations do not support the theory, which show instead that consumption is closely correlated with income and people rarely invest for their old age. It is suggested that lack of will-power is the primary reason explaining the fact that most people save very little for retirement.

iii) Labour Economics

A central puzzle in macroeconomics is involuntary unemployment – why can some people not find work (beyond frictions of switching jobs, or a natural rate of unemployment)? Camerer (2004) explains that this has been explained by the idea that wages are paid at rates deliberately higher than the market-clearing level, which has the effect of creating excess supply – and hence unemployment. This begs the question of why wages might be too high to which the common answer is that employers pay workers more than the job is worth to ensure that they work harder, knowing that they have a lot to lose if they get fired for poor performance. The rational economist argues that this reduces employers' supervision time. However, Akerlof and Yellen (1990) proposed that it is the human instinct for reciprocation that is transforming the employer/worker relationship into a 'gift-exchange', suggesting that employers pay more than they have to as a gift and workers repay by working harder than necessary.

A set of experiments mimicking behaviour in labour markets illustrate this reciprocity in practice. Reported by Fehr and Gächter (2000a), subjects took the part of workers or firms and were randomly and anonymously matched with each other (the participants in the experiment were students playing at computer terminals). Firms could choose to pay a minimum wage or a wage above the minimum; workers could choose to make a minimum investment (a monetary equivalent of 'effort') or a level above the minimum. After each turn participants were rematched, and none knew whether the partners with whom they were matched were partners with whom they had been matched before.

It became clear as the experiment proceeded that workers who had been treated generously by their employers were likely to make high levels of investment. This investment brought them no benefit, since any firm with which they were matched in the future would not know how they had behaved previously. So their behaviour must have been due to reciprocity and not to calculation. Nevertheless, firms in turn gradually learned to benefit from this, as the cost of paying high wages to workers was more than outweighed by the value of the extra investment they undertook as a result. So firms that paid high wages were more profitable than those that did not – not the conventional capitalist view. There remain unresolved questions about the wider applicability of results obtained under laboratory conditions, though the findings have since been replicated so many times by other researchers that there is no longer any serious doubt about their robustness. But these findings suggest not only that culture of cooperation may persist through reciprocity but also that groups in which cooperative habits have developed may be more economically successful than those in which more narrowly self-interested behaviour is the norm. Paradoxically, too narrow a nose for profit may be bad not only for the soul but also for the bottom-line.

Perhaps the simplest prediction of labour economics is that labour supply should increase with increases in wages. However, Gneezy and Rustichini (2004) report one experiment which did not produce this result. They hired students to perform a boring task and either paid: a very low rate, a moderately high rate or no piece-rate at all. The surprising finding was that individuals who were paid the low piece-rate performed most poorly. In this case, Gneezy and Rustichini argued, the very low pay caused subjects to think of themselves as working in exchange for money and, when the amount of money was small, they decided that it simply wasn't worth it.

Another example was provided by the same authors observing a natural experiment which produced similar interesting outcomes – outside the domain of wages. To discourage parents from collecting their children late, a day-care centre instituted a fine for each minute that parents arrived late at the centre. The fine had the perverse effect of increasing parental lateness. The authors postulated that the fine eliminated the moral obligation parents felt to honour the school's

closing hours. Imposing a payment effectively 'robbed the contract of its gift-giving quality' and replaced it with a simple monetary cost which some parents decided was worth incurring. Their results show that the effect of price changes can be quite different from that which economic theory would predict when behaviour has moral components which wages and prices can alter.

3. Applications of BE – consumer behaviour

Several instances have been mentioned already, but this area appears to have increasing potential and interest for academics and practitioners. A new book by Schwartz (2004) uses the underpinning ideas of prospect theory to explain why too much consumer choice is a bad thing (quite contrary to standard economic theory). For example, a Sony CD player is on offer at $99, a great price. Researchers cited by Schwartz found that 66% of the people they surveyed would buy it without searching any further and 34% would not buy. Yet offered a choice between the Sony at $99 and a top-of-the-line Aiwa at $169, 27% would buy the Sony, 27% would buy the Aiwa and 46% would wait. Faced with a trade-off between price and quality, nearly half of the potential customers would avoid purchase altogether. Schwartz uses this example and others to conclude that when consumers are presented with choices that involve trade-offs and create conflict, all choices begin to look unappealing.

Schwartz extends his argument to the well-being of consumers in rich nations and suggests that increasing choice does not make us happier. (*I have not read all of this book yet….but reviewers say that this leads into interesting questions about economics, capitalism and well-being, which would resonate with those thinking about the future of capitalism and those concerned for the environment.)*

4. Applications of BE – larger landscapes

Drawing directly from biology and EP theory, another economist – Seabright (2004) – uses the unique attribute of human nature (unique within the animal kingdom) – that we trade with strangers – as the central theme of his book to explore the fragility (and strength) of our social order. He argues that self-reinforcing institutions sustain prosperous societies and that these institutions originated during the transition from a hunter-gatherer existence to settled agriculture. Economic specialisation rests on trust and it is our ability to trust billions of strangers through institutions that produce symbols of trust (like money and contracts) that makes the global economy work. Quoting him: *Modern political institutions temper their appeals to the deep emotions, to family and clan loyalty, with just enough abstract reasoning to help Homo sapiens, the shy murderous ape, emerge from his family bands in the savanna woodland in order to live and work in a world largely populated by strangers.*

Seabright's ideas about trade are not original. Ridley (1996) summarises the discussion and stresses that institutions were not the helping hand needed to encourage our early ancestors to trade: *I have argued elsewhere that these divisions of labour, far more pronounced in human beings than other animals, go deep into our evolutionary past as a species – the sexual division of labour between hunting husband and gathering wife, for example, is probably millions of years old. But how old is the habit of trade between groups? Most primates live in competitive territorial troops and interact only in hostile ways. Our distant ancestors almost certainly shared this habit. But at some point, human groups became permeable. It became possible for cooperative trading relationships to emerge between groups – although inter-group hostility did not disappear. When did that first happen? Most economists assume it was fairly recent, arguing that trade followed on the heels of law, for it was not until stature law could protect merchants that they could safely venture abroad. This perspective sees trade as a medieval or classical invention rather than something that has been happening since pre-history.*

He goes on to provide the example of the Yanomamo tribe from the Venezuelian rain forest and the work of Changnon (1983) who concluded that these peoples lived in a chronic state of warfare between villages. The key to success for a Yanomamo village was an alliance with

another village and hence a network of intimate *ententes* bound together different villages into competing alliances. The glue of these alliances was trade and the divisions of labour that trading necessitated were engineered by the different villages as an excuse to trade.

This leads to the work of Shogren (2005) who hypothesised that the evolutionary success of *Homo sapiens* over other species like *Homo neanderthalensis* was the outcome of a superior economic system, ie: trade. He cites as evidence for his theory the fact that *H.neanderthalensis* showed no sign of having practiced trade, whereas there is evidence that *Homo sapiens* was trading as long as 40,000 years ago. To test this logic, Shogren and colleagues created a computer model of population growth that attempted to capture the relevant variables for each species. These included fertility, mortality rates, hunting efficiency and the number of skilled and unskilled hunters in each group, as well as levels of skill in making objects such as weapons and the ability to specialise and trade.

Researchers assumed that the one significant difference between the two species was their ability to trade and specialise and built this into the programme by allowing the most efficient human hunters to hunt while others made clothes and traded for each other's wares. According to the model, this arrangement resulted in all the humans getting more meat, which drove up fertility and thus increased the population. Since the supply of meat was finite, Neanderthals ate less and their numbers declined. What was surprising about the outcome of the experiment was the speed at which the Neanderthals declined, put at between 2,500 and 30,000 years, a period that closely resembled other data. Even when the model was reconfigured to give the Neanderthals a competitive edge in hunting, the species still became extinct.

Seabright ends his story questioning the fragility of the system we now live with and whether trust on an even greater scale than exists today can be created for the future. He poses the questions:

1. can states survive as monopolies of coercion within their own territorial frontiers? ie: can the state protect people from external threats better than any other institution?
2. can they combine the openness and flexibility needed by modern industrial societies with the trust in strangers that has been so laboriously established over previous centuries? ie: can states protect their citizens from each other?
3. can they find ways to create between themselves an analogous version of the trust in strangers that they seek to create among their citizens? ie: can states protect themselves from each other confidently enough to cooperate rather than live in fear.

He concludes that we have been living with the issues of globalisation for at least 10,000 years – all the time that we have been learning to live the alternative life to that on the savanna plain. But, he argues that the practical skills we have to live within this world remain those of our ancestral forebears, those of manipulating the natural environment and managing the interactions of small groups of individuals who see each other frequently and know each other well. Hence, he suggests, it is only in the last 10,000 years that human beings have had to come to terms on a significant scale with the impact of strangers and it is only in the last two hundred or so that this impact has become a dominant fact of everyday life. His final thought is that this experiment of cooperation, now on such a grand scale, is very young and needs all the help it can get!

5. End Piece

While this paper summarises the main areas of behavioural economics, it is not a comprehensive review of the literature in this field for two reasons. First, it is a large and burgeoning area of academic interest which is difficult to constrain within a definition. Second, my relatively limited knowledge of economics made it difficult to 'sift the wheat from the chaff', and work effectively and efficiently. Having experienced the more emotional route of learning while doing (which seems somehow highly appropriate) I now feel able to do an efficient job if I started at the beginning again! However, what is reassuring is that there is considerable overlap between

behavioural economics and evolutionary psychology, the major difference being their starting points. In fact, one of the glaringly obvious questions to the uninitiated in economics is why start from economics at all? The standard economic model seems so poorly equipped to deal with *Homo sapiens* that starting from biology must be a more logical approach? Pragmatically, however, the economist's skill is in building models and their advantage is that they (the economists and their models) already have significant legitimacy with business and policy makers, hence if a field which truly is representative of human behaviour can carry such a label of legitimacy it could gain acceptance into those worlds faster (than say, evolutionary psychology theory) and hence have greater and more timely impact.

The need for urgency in changing the underpinning thinking behind policy making or business strategising and decision-making must be dependent on the strength of support for the opinions of Camerer versus Khaneman quoted in the introduction to this paper. If, as Camerer asserts, the standard model is not broken, only in need of some 'tweaking', urgency is not required. Khaneman, however, implies that there is much to do but that a significant start has been made, which has demonstrated what is possible as well as created the momentum for much more.

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