

Behavioural economics

A review of the literature and proposals for further research in the context of workplace health and safety

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Historically, economists can be accused of having ignored behavioural issues. However, recent times have seen an upsurge in interest generated by the failure of conventional economics to adequately address recent economic reality. As a consequence, research was commissioned by the Economics Analysis Unit of the Health and Safety Executive, with three main aims: to provide a detailed review of the current and emerging literature on the use of behavioural economics; to provide initial proposals relating to the sorts of policies that could be both feasible and effective in changing favourably the health and safety behaviour of both employers and employees; and to offer recommendations on priorities for further research.

Several theories have been identified that could be relevant in health and safety policy making, including: that there is a skewed perception of risk; there is a cost of processing information; that compliance with health and safety might be affected by the level of stakeholder involvement and/or employees' perceptions of fairness; that the act of publicly committing to standards affects health and safety performance; and that the monetising of non-compliance through fines can affect health and safety outcomes. The decision as to whether and how any of these theories might be further researched by HSE is subject to a wider consultation across HSE.

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1. INTRODUCTION AND CONTEXT

According to one of the most widely cited definitions of the subject:

‘Economics is the science which studies *human behaviour* as a relationship between ends and scarce means which have alternative uses.’ (italics added)

(Lionel Robbins, *An Essay on the Nature and Significance of Economic Science* (1932))

Although put forward some three-quarters of a century ago, this definition captures the essential elements of economics as we now know it: scarcity, opportunity cost and choice. However, it might be argued that an unwelcome by-product of the quest for ever increasing mathematical and/or statistical formalisation of economic relationships which has occurred over the last four decades or so is the insufficient attention which has been directed to the other element emphasised in Robbins’s definition: namely the study of *human behaviour*. Two examples will illustrate: firstly, the fact that even today the vast majority of studies of individuals and households assume rationality in the form of utility maximising behaviour and secondly, the fact that the overwhelming majority of studies of the firm likewise assume rationality in the form of straightforward profit maximisation³.

Some analysts, most notably in the theory of the firm, sought to address this problem by either proposing a more realistic maximand than (current) profits and/or assuming some form of behaviour other than maximisation (*satisficing* being one example). Although such approaches – which became variously known as managerial and behavioural models of the firm – were especially popular in the 1960s and 1970s they have remained in the clear minority. This state of affairs was clearly illustrated in the recent *International Benchmarking Review of UK Economics*, undertaken jointly by the Royal Economic Society and the United Kingdom’s Economic and Social Research Council, where behavioural (including experimental) economics was highlighted as an area which has

³ A parallel state of affairs occurred in the labour economics and industrial relations literatures where Dunlop’s famous pronouncement that an ‘economic theory of a trade union requires that the organisation be assumed to maximise (or minimise) something’ (1944, p. 4) sparked the sometimes heated Ross-Dunlop debate on trade union objectives and behaviour. See Sapsford and Tzannatos (1993, pp. 261-283) for full details.

‘gained greater prominence and greater visibility in recent years...’. This same report also went on to comment that there is, as yet, ‘...no professional consensus on how to incorporate the findings of this research into mainstream economics’. (2008, p. 17)⁴.

However, there has been a marked upsurge in interest in behavioural ideas in economics over recent months: no doubt spurred on by the failure of ‘conventional’ economic analysis to predict, let alone avert, the onset of the global credit crunch and ensuing downturn.⁵ This upsurge of interest by both producers and users of economic research led to *Behavioral Economics* achieving its own *Journal of Economic Literature* (JEL) classification in December 2008.⁶ Broadly speaking, behavioural economics may be defined as the application of behavioural analysis (typically from psychology) to micro-economic decision making. As such, this approach differs from the dominant Neo-classical approach according to which each economic agent or group seeks to maximise their utility or ‘gain’ from any situation. Underlying this approach is the notion that decision making agents are homo-economicus – ultra rational human beings in possession of all relevant information, with the ability to compute all possible maximisation calculations.

Terms of Reference

Set against this backdrop of relative historical neglect by economists of behavioural issues, accompanied by a very recent upsurge in interest generated by the failure of conventional economics to adequately address recent economic reality, the present study has the following terms of reference:

1. To provide a detailed review of the current and emerging literature on the use of behavioural economics, including that by other Government Departments. The review will include coverage of applications to a range of alternative policy

⁴ *International Benchmarking Review of UK Economics* (London: Economic and Social Research Council and Royal Economic Society, 2008) ISBN 978-0-86226-201-3.

⁵ An accessible review of some of the major issues here is provided by Fraser (2009): see his essay ‘Do economists know any more than us?’ (*The Independent*, 11th April, 2009, pp. 34-35.) In particular, Fraser observes that the ‘smallish (global) tribe’ of 30,000 economists with PhDs seems to have inherited an over-rational view of life and cites evidence to suggest that the majority of young economists in top US universities place overwhelming trust in mathematics, to the exclusion of a ‘broad knowledge of the economy’!

⁶ See *Journal of Economic Literature*, Vol. 46, Issue 4 (December 2008).

- issues, with a view to revealing the extent to which the relevant concepts and methodologies might be adapted to the analysis of workplace health and safety.
2. To provide initial proposals relating to the sorts of policies that could be both feasible and effective in changing favourably the behaviour of both employers and employees in the workplace health and safety context.
 3. To offer recommendations on priorities for further research, including potentially beneficial pilot studies.

The remainder of this report is structured as follows: Section 2 provides a brief overview of the origins of behavioural economics. Section 3 focuses on a number of broad strands in the literature that are seen as relevant to health and safety issues in the context of the workplace and identifies four themes of particular importance. Section 4 provides discussion of the content and conclusions of some fifty-four papers highlighted as being especially significant in the context of the present study, whilst providing suggestions regarding the potential applicability of each paper. Section 5 concludes.

2. BEHAVIOURAL ECONOMICS: ORIGINS

Behavioural economics means different things to different people. In one sense it is a very young subject in that it has only recently achieved, within the last six months, its own *Journal of Economic Literature* (JEL) classification. This provides a demonstration of both the newness and dynamism of this field of study. However, its origins can be traced back to writings spread over many previous decades. In one authoritative overview of the literature Earl (2005) sees its origins as arising in the 1890s, in the writings of Alfred Marshall (1890), those of the French economist Tarde (1892) and the US economist Veblen (1899). While Marshall drew attention to the role of learning processes within the firm, both Tarde and Veblen explored the impact of imitation and social interaction upon choice – giving rise to the latter’s well known concept of status seeking ‘conspicuous consumption’. It is also relevant to note the extremely wide diversity of sources in which behavioural economics studies are published. Notice in particular that, at the time of writing, there are only 17 source journals cited under the newly awarded JEL classification – but these are extremely diverse: ranging from the *Journal of Ecological Economics* to the published papers of the *Melbourne – Australian*

Productivity Commission. This diversity illustrates the broadness of interest in this new and rapidly emerging area of economics.⁷

In broad terms, the need for a behavioural approach in economics arises whenever what is ‘rationally’ expected of a utility maximising agent is not borne out in observed behaviour. Faced with this not uncommon situation, behavioural economists seek to employ behavioural theories (typically derived from psychology) to explain such discrepancies: often by highlighting how and why certain factors seem to limit or bound rationality.⁸ The current literature within the academic community is extremely broad. A potential problem with identifying literature of relevance is the embryonic state of research, accompanied the lack of any unifying theory of reference. ‘Behavioural Economics’ has become something of an umbrella term which is sometimes used interchangeably with ‘experimental economics’. ‘Behavioural Economics’ is also subject to several permutations of potential theoretical pinpointing within the existing literature. For example, some pioneering researchers, including Loewenstein (1991), rejected classical utility preference theory, in favour of models characterising human behaviour as reflecting such factors as the existence of ‘exotic preferences’, or anomalies in choice, or biases in projecting own future utility, or the utility surrounding risk. Other popular conceptions of behavioural economics focus on limiting or constraining factors upon choice, giving rise to the concept of ‘bounded rationality’.

It is important to recognise that much work within the field of behavioural economics lies in the cross-disciplinary intersection zone of Economic Psychology (Rabin, 2008), a discipline which is in itself well established and has its own dedicated journal (*Journal Economic Psychology*). In a detailed review entitled *Psychology and Economics* Rabin (1998) argued that

‘While standard economics assumes that each person maximizes stable and coherent preferences given rationally-formed probabilistic beliefs, psychological research teaches us about ways to describe preferences more realistically, about biases in belief-formation, and about ways it is misleading to conceptualize people as attempting to maximize stable, coherent, and accurately perceived preferences’. (1998, p. 11)

⁷ In order to assist subsequent reviewers who may wish to replicate our literature search Appendix 1 provides details of the search terms that we used to interrogate relevant databases.

⁸ In the minds of some analysts this is seen as a form of ‘extra’, rather than limited or bounded, rationality.

Rabin highlights three themes which are seen as being of particular relevance:

- 1) the dislike of losses outweighs the liking of gains
- 2) that departure from pure self interest can arise due to issues of fairness, reciprocal altruism (mutual benefit) and even revenge
- 3) that under uncertainty, biases in judgement (including those created by too much or too little information) can lead to errors

Regardless of leanings in theoretical underpinnings, notions of behaviourally modified economic choices have been largely supported by empirical findings generated by the application of the techniques developed by experimental economists. Such procedures typically involve the control of an environment (as in a laboratory experiment) and the subsequent observation of the behaviour of the agents involved. The weight of evidence yielded by the application of such techniques (often taking the form of classroom experiments) has yielded an encouraging degree of support for the fundamental notion that aberrations of behaviour away from that predicted by pure economic theory do routinely occur in the real-world (Coughlin 2008).

Behavioural economic science has gained a popular audience, particularly in the last year, with some notable economists and behavioural scientists publishing books revealing the mysteries of seemingly ‘irrational’ economic behaviour in a manner accessible to the interested ‘person in the street’. While their intent is dissemination amongst the general populous the studies and the scientific thinking on which they are based – as well as the work of the scholars themselves – deserves to be taken seriously. Indeed, the everyday behaviours to which the theories have been applied have in some instances provided an excellent means to collate otherwise disparate knowledge and apply it coherently. Indeed, books such as *Nudge* by US academics Thaler and Sunstein (2008) and *Happiness: Lessons from a New Science* by British economist Richard Layard (2005) appear to have been especially influential in policy making circles.

Research Within the Government Economic Service

As one element of our terms of reference we undertook a search for reports and reviews undertaken by or sponsored by the UK Government Economic Service.⁹ This search revealed a small number of highly diverse projects, summarised in Appendix 2. While a number of these studies focus on issues relating to risk and reward our review revealed little of direct relevance to workplace health and safety.¹⁰

3. BEHAVIOURAL ECONOMICS AND WORKPLACE HEALTH AND SAFETY

In 2005 the *New Economics Foundation* published a review of behavioural economics as an emerging discipline and highlighted seven key principles which it saw as of relevance to policy formulation and implementation.

- **Principle 1:** The behaviour of other people matters.
- **Principle 2:** Habits are important.
- **Principle 3:** People are motivated to ‘do the right thing’.
- **Principle 4:** People’s self-expectations influence how they behave.
- **Principle 5:** People are loss-averse.
- **Principle 6:** People are bad at computation.
- **Principle 7:** People need to feel involved and effective to make a change.

Proposed Themes

Our review of the literature suggests a number of ‘themes’ around which clusters of research of relevance to workplace health and safety have crystallised. These are as follows:

⁹ Special thanks are due to Anna Richardson-Owen for her assistance with this particular search.

¹⁰ As part of our remit we also reviewed a range of ongoing work currently being undertaken by UK and overseas researchers. Given that publication lags in economics are currently to the order of two years, the potential importance of material currently available as working and discussion papers was recognised as a useful indicator of ‘tomorrow’s thinking’ on behavioural economics. While a range of such material finds its way into the set of studies put forward in Section 5, future reviewers might wish to pay particular attention to work emerging under the auspices of the US National Bureau of Economic Research (NBER) in New York.

- **THEME 1:** Bounded rationality and/or complex ('exotic') preferences in processing information and/or understanding one's own utility in cases of risk and reward uncertainty, especially in the inter-temporal context.
- **THEME 2:** Bounded rationality and/or complex ('exotic') preferences where motivation and choice are influenced by prior biases and cultural factors (including prejudices, heuristics and instincts, group thinking and social conformity).
- **THEME 3:** Strategic behaviour (including learning) and game theoretic applications in everyday decision making.
- **THEME 4:** Bounded rationality and/or complex ('exotic') preferences concerning human interactive choices. In some cases this over-laps with the theme of strategic behaviour highlighted above, but in others research under this theme analyses co-operative behaviour and/or economic behaviour based on inter-personal relationships and cultures, such as herd behaviour, group-think, inequity aversions and reciprocity.

A number of issues raised under this thematic taxonomy are worthy of further discussion.

Computational issues and bounded rationality

There are a number of ways in which computational issues and constraints arise during decision making. As already noted, some have argued that humans are not always good at making the sort of computations implied by models of 'rational-choice', especially in real-world situations characterised by a high degree of uncertainty coupled with either a shortage or a plethora of information. Further, as Rabin (1998) has argued, humans often display 'loss-aversion' in the sense that dislike of losses outweighs the like of gains, giving rise to what might appear to be non-objective evaluations of losses relative to gains. Additionally, the psychological evidence relating to framing, seems to imply that individuals can be strongly influenced by the way(s) in which choices and uncertainties are presented to them, with some evidence seeming to suggest that individuals may place undue weight upon recent and/or high profile events regardless of actual probabilities.

Prior biases

Given the sometimes substantial costs of processing information it is not surprising that humans have developed a number of ways of managing choice situations. These include the interrogation of the existing stock of knowledge and beliefs to handle new choice situations. If previous decisions have involved biases and/or beliefs the forward propagation of these through sets of subsequent decisions may exert a disproportionate influence on current behaviour and choices made. The concept of rational addiction provides a clear illustration.

Learning by playing

Many everyday choice situations can be meaningfully seen as games, where individuals are confronted with a set of rules generating various alternative possible moves or strategies, each of which attracts a particular outcome or pay-off: the value of which is either given or may be estimated, typically according to some expected value calculation. At the simplest level, the game-theoretic approach proves useful in highlighting the strategic behaviour of players, including second-guessing the behaviour of one's opponent. Indeed such notions of strategic behaviour have given rise to the well known equilibria associated with the names of Cournot and Nash. However, when one recognises that many game-theoretic situations in practice are intrinsically multi-period in character and involve rules which are changing between successive iterations (perhaps through clarification as much reformulation) the situation becomes all the more complex. If, as in some wars perhaps, all that really matters to players is the outcome of the end-game then the decisions made by players in any single iteration seen in isolation can appear to be far from rational!

4. STUDIES WITH POTENTIAL APPLICATIONS TO WORKPLACE HEALTH AND SAFETY

In this section we discuss a set of 54 articles that were selected from the total number reviewed during our literature search. These were selected on the basis of their potential applicability to workplace health and safety issues and outcomes. Each article is classified according to the four-themes proposed above and in each case a brief overview of content and hypotheses considered is given and some suggestions are offered as to potential applicability.

Highlighted Literature and suggested topics of application to the Health and Safety Executive

Reference texts and / or example experimental studies	Summary & Findings	Element of applicability	Potential applicability (including an example)
THEME 1: Computational Issues (Bounded Rationality)			
<p>Taleb, N.N. (2008) <i>'The Black Swan: The Impact of the Highly Improbable'</i> Penguin, USA</p> <p>Sapsford, D. & Turnbull, P. (1993) <i>'Organized and 'Unorganized' Conflict in the British Coal-mining Industry, 1947-83'</i>, International Journal of Manpower, Vol. 14, Issue 9, pp56-63</p> <p>Sapsford, D. & Turnbull, P. (1994) <i>'Strikes and industrial conflict in Britain's docks: balloons or icebergs?'</i>, Oxford Bulletin of Economics and Statistics, Vol. 56, No. 3, pp249-265, Blackwell Publishing Ltd</p>	<p>In his 2008 book the mathematician and behavioural economist Nicholas Taleb describes the pay-offs associated with behaviour which risk catastrophic costs in favour of accumulating every day small payoffs. He uses the example of a 'rural local' driving on a country road which he knows very well. He will cut the corner around a blind bend despite the potential catastrophic costs if another vehicle (perhaps a bigger one) was coming in the opposite direction. This is because, the small, everyday payoffs from such behaviour reinforce the behaviour and the perception that the risk of a head-on (cataclysmic) confrontation is negligible. In short he is taking a very small risk of a huge cataclysmic cost against small, everyday gains. This is basically a long-tailed perception of risk.</p> <p>Sapsford and Turnbull's (1993 & 1994) papers highlight the problem of piece-rate payment in dangerous occupations and union objections to these. Objections being the incentives for workers in these industries to take everyday risks within working practices to maximise productivity when potentially they do not comprehend the full costs of those risks (and in an economic rationale are therefore not adequately compensated for these).</p>	<p>Long-tailed perception of risk</p>	<p>See Section 5 for more detailed breakdown as this is one of the selected studies.</p>
<p>Laibson, D. (1997) <i>"Golden Eggs and Hyperbolic Discounting"</i>, The Quarterly Journal of Economics, MIT Press, vol. 112(2), pages 443-77, May</p>	<p>Hyperbolic discounting explains the discrepancy of perceived discounted value of future income streams – or indeed utility over those currently experienced – that may not be in line with true costs. (much like long-tailed perception of risk). Laibson explains that this leads people to prefer smaller payments now than larger ones in the future disproportionately to the actual discount rate.</p> <p>Failure to understand true costs because of hyperbolic discounting causes a bias in the judgement of utility maximising decisions in the current time period.</p> <p>Hyperbolic discounting may be an explanatory reasoning for rational addiction to 'bads' such as tobacco smoking.</p>	<p>Discounting & hyperbolic discounting</p>	<p>Research in Behavioural economics concerned with hyperbolic discounting suggests that in order for individual agents or organisations (firms) to make optimally rationalising decisions, information must be conveyed and interpreted regarding the 'actual' costs. This includes some mitigation of the tendency to discount potential costs to health etc in the long run hyperbolically.</p>
<p>Hoffrage, U. "Overconfidence" in Pohl, R (2004) <i>'Cognitive Illusions: a handbook on fallacies and biases in thinking, judgement and memory'</i>. Psychology Press.</p> <p>Barber, B. & Odean, T. (2001) <i>'Boys Will be Boys: Gender, Overconfidence, and Common Stock Investment'</i>, Quarterly Journal of Economics, Vol. 116, No. 1, Pp.261-292</p>	<p>There have been numerous studies on the phenomenon of over-confidence Hoffrage provides an excellent review. These range from empirical tests of confidence in answering general knowledge questions to review of 'certainty' assurances. Generically results show a significant over-confidence, for example - 20% error rates where 100% confidence expressed and low-high ranges for 90% confidence intervals. It is particularly a significant effecter in what are classed as 'unusual' or 'difficult' challenges.</p> <p>The Barber and Odean (2001) study also found a gender significance in their study of day traders, which found male day traders traded more often than female traders. Thought to be culturally influenced (i.e. correlation between masculinity and action), more trading was nevertheless detrimental to overall returns. Men perceived more returns from more risk even where there were less. This is the phenomenon known as 'over-confidence' and comes about from human inability to comprehend and process information about risk properly.</p>	<p>Over-confidence</p>	<p>Over-confidence is difficult to measure in an applied setting, despite the importance when dealing with both catastrophic risk but also (perhaps especially) mundane everyday risk, where behaviours are repeated.</p> <p>Also, more controversially, Industries with a male dominated workforce and ethos of action or 'learn by doing' may be more effected by this phenomenon, especially when the 'pay-offs' associated with those behaviours are repeated. If there is found to be a correlation, specific health & safety guidance could be issued to be tailored to counteract over-confidence.</p>

<p>Nunes, J.C & Boatwright, P (2004) '<i>Incidental Prices and Their Effect on Willingness to Pay</i>', Journal of Marketing Research, Vol 41, Issue 4, pp457-466</p> <p>Tversky, A. & Kahneman, D. (1981) '<i>The framing of decisions and the psychology of choice</i>', Science, Volume 211, pp453-458</p>	<p>Framing effects are the way in which the presentation of information affects the agent's choice. One of the most well known of these is Nunes & Boatwright's (2004) randomised study on wine (and other goods), where MBA students were given a bottle of wine to sample and then asked to value it. The question was framed in such a way as to take the last two digits of their social security number (truly random) and ask them if they were willing to pay that amount. There was a huge discrepancy between the bottom 50% (those with social security numbers under 50) of \$11.62 and the top (i.e. those with 50-99) of \$19.95, indicating a correlation between the perceived 'value' and suggested value, even though they were all asked to objectively value the wine.</p> <p>Framing effects are found to be particularly significant in choices involving uncertainty. Tversky and Kahneman (1981) used a hypothetical medical treatment which was framed in two ways positively 'lives saved' versus negatively 'lives lost'. The empirical findings showed a significant discrepancy in the choices towards positive framing, even when the probabilities and payoffs were the same. Particularly surprising was the fact that both the general public and 'experts' were equally susceptible to this phenomenon.</p>	<p>Framing</p>	<p>Framing is of importance in consideration of the other elements explored in this table. An understanding of these elements of behavioural economics implies a way of 'framing' information to both individual agent and firm which emphasises the true potential cost and relevant time period of that cost for non-compliance.</p> <p>In the H&S context, this could suggest alternative ways, or highlight potential problems in current information dissemination, concerning H&S compliance or risk assessment.</p>
<p>Hanemann, W.M. (1991) '<i>Willingness to pay and willingness to accept: How much can they differ?</i>', American Economic Review, Vol 81, pp635-647</p> <p>Kahneman D and Tversky A (1979) '<i>Prospect theory: An analysis of decisions under risk</i>', Econometrica, 47, pp. 313–327.</p> <p>Tversky, A. & Kahneman, D. (1971) '<i>Belief in the law of small numbers</i>', Psychology Bulletin, Aug 1971, 76(2) pp. 105-110</p> <p>Thaler, R. (1980) '<i>Toward a Positive Theory of Consumer Choice</i>', Journal of Economic Behaviour and Organization, March 1980, 1(1) pp. 39-60</p> <p>Knetsch, J.L. & Sinden, J.A. (1984) '<i>Willingness to pay and compensation demanded: experimental evidence of an unexpected disparity in measures of value</i>', Quarterly Journal of Economics, August 1984, 99(3), pp. 507-21</p>	<p>Discrepancy between Willingness to Pay (WTP) to maintain a resource and Willingness to accept (WTA) in lieu of a resource theoretically should be the same, but in experimental studies – particularly contingent valuations of environmentally related amenities, levels of compensation demanded (willingness to accept) were substantially higher than willingness to pay to keep amenities. This is known as the 'endowment effect'. In Hanemann's (1991) paper – he finds that WTP exceeds WTA (that is people value a loss greater than a gain) when:</p> <p>A) demand for that good increases with income or B) there are fewer substitutes for that good (i.e. it's uniqueness)</p> <p>This difference is explained by Kahneman and Tversky's (1979) revolutionary theory of behaviour under uncertainty. Their research effectively challenged standard utility theory (which expected the agent to rationally calculate expected outcomes under risk) with their own empirically based model - prospect theory essentially showing that in actual situations agents predictably undervalued rewards and over-valued potential losses – because they were loss averse.</p> <p>In relation to non rational pre-dispositions and loss aversion, Tversky & Kahneman's(1971) article presents how individuals place more value on modest monetary losses versus equal sized gains</p> <p>Further illustrated by "The Endowment Effect" - where an individual values a good that they possess more than before they possessed it</p>	<p>Loss aversion – discrepancy of value and prospect theory</p>	<p>Interestingly, in the H&S context, this might suggest an area of research in the comprehension of the costs of risk of injury for the individual agent and liability for the firm.</p> <p>It would suggest that compliance with H&S guidelines may be affected the way in which the risks of the behaviour are perceived – that is whether the agent or firm is weighing the benefits of compliance or whether they are considering the costs of an actual violation / accident or libellous event.</p>
<p>Locke, P.R. & Mann, S.C. (2000) '<i>Do Professional Traders Exhibit Loss Realization Aversion?</i>' Working paper, Texas Christian University.</p> <p>Gensove, D. & Mayer, C. (2001) '<i>Loss aversion and seller behaviour: Evidence from the housing market</i>', Quarterly Journal of Economics, Volume 116, pp1233-1260</p>	<p>Locke & Mann's (2000) paper describes the phenomenon in trading in company shares – of holding on to falling shares longer than rising ones.</p> <p>Economic models predict that this is a non-optimal (therefore none-rational) behaviour that results in lower gains or higher losses than possible. However, this is borne out by the experimental evidence that showed traders that exhibited greater loss aversion, were financially less successful than those who exhibited less.</p> <p>Another study in the housing market by Gensove & Mayer (2001) verified this. Whereas in classical economics a sunk cost is one that is not recoverable so future</p>	<p>Loss aversion - Realisation of loss and the 'Sunk Cost' fallacy</p>	<p>In layman's terms we could call this 'In for a penny – in for a pound' mentality. Such commitment to avoiding the realisation of loss could have effect within the H&S context in terms of the realisation of loss of both control (cataclysmic events) and of loss through regulatory non compliance in one area compounded by general avoidance. That is - if an institution has already embarked upon a particular course of action with regards to compliance or procedure concerning an HSE</p>

	behaviour should not be affected by it, an agent should maximise based on current market conditions, however, field observations show that this is not the case, people do care about how much they paid for something. This was found to be of particular relevance in the housing market. This research showed this using the listing prices for houses in Boston which was found to be significantly highly correlated to the buying price.		mandate, it may be unwilling to change (and comply) if that meant realising a previous loss (i.e. finable infraction). In areas where control is maintained through incentive (punishment or reward), none compliance in a small way, may lead to withholding of compliance in general, as previous losses (or none compliance) would not wish to be realised.
<p>Stigler, G.J. (1961) 'The economics of information', Journal of Political Economy, Vol 69, June, pp.213-225</p> <p>Iyengar, S. & Lepper, M.R. (2000) 'When choice is demotivating: can one desire too much of a good thing?', Journal of Personality and social psychology, Vol 79, No 6, pp 995-1006</p>	<p>Conventional theory assumes that more choice is better. However, this does not take into account the costs of processing that information, or even the endowment of skills required to adequately process that information. Stigler's (1961) Nobel winning theory on the costs of information overturned this idea.</p> <p>In Iyengar and Lepper's (2000) experiment, consumers were presented with alternative stalls, one with six varieties of jam and one with 24 varieties. A significant difference was found in the quantity of jam actually purchased, where although the larger stall attracted significantly more browsers, the smaller stall sold significantly more jam. In their case, too much choice was detrimental.</p> <p>This effect is somewhat overlapped with the phenomenon of heuristics and the formation of habits, which aid in the reduction of cognitive dissonance from decision making (see later section).</p>	Costs of processing Information (Cognitive dissonance)	See Section 5 for more detailed breakdown as this is one of the selected studies.
<p>Azar, O.H. (2007) 'Relative Thinking Theory', Journal of Socio-Economics 36(1) (2007), pp. 1-14</p> <p>Earl, P. (2005) 'Behavioural Economics and the Economics of Regulation', Briefing Paper for the New Zealand Ministry of Economic Development</p> <p>Conlisk, J. (1996) 'Why Bounded Rationality?', Journal of Economic Literature, June 1996, 34(2), pp. 669-700</p>	<p>Azar (2007) presents the theory of "Relative Thinking". It is where people consider relative differences and not only absolute differences when making various economic decisions. Relative thinking affects the optimal choice of incentive schemes. For example, increasing the fixed payment to a worker reduces the perceived magnitude of the pay-for-performance component, because it becomes a smaller % of total compensation and this might reduce the worker's effort. Conversely, increasing the pay-for-performance component might encourage workers to take increased risk in order to achieve greater reward. Also, workers may respond differently to % increases versus absolute monetary increases.</p> <p>Earl's (2005) briefing paper discusses the nature of behavioural economics and where its implications can affect the design of regulatory policy. Specifically, it offers a distinction between individuals who make optimising choices subject to clearly defined preferences and those who, in reality, struggle with information overload and changing preferences in different circumstances. The author suggests that if organisations are aware of such shortcomings in the decision making process, they may be able to manipulate the choices individuals make. For example, in the framing of information (how information is presented to them). In addition, he advises that individuals who only consider the short term impact of a decision should take time to reflect on the longer term implications of their decision before they make it. Policy makers could do more to promote careful reflection by the individual by erecting hurdles to delay such choice.</p> <p>Conlisk (1996) Specific examples of bounded rationality are presented such as ignoring relevant information, using irrelevant information, overconfidence in one's own judgement relative to the evidence.</p> <p>Through experiments, it is shown that any clear cut reasoning error can be made to</p>	Bounded rationality through the processing of information 'Relative thinking'	<p>This particular sub-branch of the bounded rationality literature draws attention to potential deviations in behaviour between individuals confronted with a given level of 'remuneration', according to its composition as between fixed and variable components. As such, this issue relates directly to the first issue set out in this table: namely that individual risk-taking behaviour in the workplace may be influenced by the prevailing payment structure. In an important sense, any policy that is designed to influence workplace risk-taking behaviour via re-engineering of the payment system needs to be seen in terms of its effect upon the 'median worker', with potential deviations about this behaviour being determined by differing attitudes to the given ratio between fixed and variable components embodied in the selected remuneration scheme.</p> <p>Relatively little is known regarding the magnitudes of such effects on individual worker workplace behaviour and it is felt that an experimental study designed to shed light on this is desirable, especially in the context of policy formulation designed to influence workplace health and safety outcomes via the structure of remuneration schemes. Such an experimental study could also shed useful light upon such informational issues as framing and the optimal</p>

	<p>disappear through provision of adequate incentives or punishment of the error.</p> <p>Specifically, when stronger incentives are provided or individuals are armed with more initial expertise and better opportunities to learn or the error is punished, the reasoning errors dissipate.</p>		<p>presentation of information relating to outcomes, <i>both</i> short and long-term,</p>
THEME 2: Prior Biases and beliefs affect rationality			
<p>Duesenberry, J. (1949) <i>'Income, Saving, and the Theory of Consumer Behavior'</i>, Harvard University Press, Cambridge</p> <p>Guth, W. & Neufeind, W. (2001) <i>'Heuristics as Decision Rules - Part I: The Single Consumer'</i>, Papers 176, Flinders of South Australia - Economics</p> <p>Tversky, A. & Kahneman, D. (1974) <i>'Judgement under uncertainty: Heuristics and biases'</i>, Journal of Science, Volume 185, pp1124-1131</p>	<p>Whereas traditional economic theory assumes that individuals make rational, maximising decisions based on all information available at the time, the study of Heuristics (the act of choice without conscious application of a maximising 'rationale') and habits (where past consumption elevates the utility of future consumption – i.e. an agent 'gets used to' something [see Duesenberry 1949]) have consistently shown that in reality, these fallback behaviours radically affect decision making.</p> <p>It is suggested that rather than being an irrational act of the agent, application of these heuristics increases utility by reducing cognitive burden – i.e. they are behaving entirely rationally by taking into account the utility cost of processing the information with which to make their choice. In everyday areas where consequences to eventual purchase utility are minimal – for instance choosing between brands of toothpaste – the effect of heuristics on maximal utility can actually be positive. (see Guth & Neufeind (2001)).</p> <p>However, habits and heuristics can also lead to a negative effect in maximal utility when for example an opportunity to substantially increase purchase (or realised) utility is not taken – for example, not changing your electricity, telephone or internet supplier regularly can lead to a poorer service at a higher rate as plans and rates change for new contracts; or when a change of potential utility cost is not recognised and the cost borne out by consumption.</p> <p>What is also surprising is that Tversky and Kahneman's research (1974) found that Heuristics and habit effects are – rather than over-turned – actually exacerbated by uncertainty – that is – the old adage 'when in doubt stick to what you know' appears to bear true in empirical studies.</p>	<p>Heuristics, Habits</p>	<p>Habits and inertia are not necessarily detrimental to behaviours, for instance the habit of putting on a seatbelt when driving is one such beneficial habit. However, habits are barriers to change and these become particularly relevant when change would be beneficial. It was not always universally complied with - and is indeed only habit that we put on a seatbelt because it is the law, we have complied and therefore it has become habit.</p> <p>In the case of HSE applications, an understanding of the utility choices in a work (heuristic) environment, where uncertainty is introduced could be applied in incidences which are of sufficiently low probability – to be 'unusual' or 'uncertain' circumstances, but have sufficient consequences warrant concern (for example industries using high risk substances or processes within a low-risk environment).</p>
<p>Becker, G. & K. Murphy (1988) <i>'A theory of rational addiction'</i>. Journal of Political Economy, 96, 675-700.</p> <p>Logue, A.W. (1995) <i>'Self-Control: Waiting Until Tomorrow For What You Want Today'</i>, Englewood Cliffs, NJ: Prentice Hall</p> <p>O'Donoghue, T. & Rabin, M. (2000) <i>'The economics of immediate gratification'</i> in <i>Journal of Behavioral Decision Making</i>, 13(2), 233-250 (2000).</p>	<p>Further to the research into habits and heuristics, some work has been conducted on the persistence of behaviours which are detrimental to the consumer – for example smoking, excessive drinking or other risk taking behaviour.</p> <p>Becker and Murphy (1988) showed that although this behaviour appeared irrational, it was in fact entirely rational when consideration of the timeliness of the costs of the negative impacts as well as the utility derived from satisfying immediate consumption were considered.</p> <p>Later papers describe this as arising through a form of hyperbolic discounting (see separate section above).</p> <p>O'Donoghue and Rabin (2000) postulate on the policy implications of decisions of long term benefit which are over-ridden by the need for immediate gratification (e.g. obesity or savings).</p>	<p>Self control (or self regulation) and 'Rational Addiction'</p>	<p>Issues of self control and of rational addiction may be relevant in the H&S context within the formation of regulation and control, for example proximity to a no-smoking area where this is designated as such because of potential catastrophic failure – but of that catastrophic failure being perceived as a low risk, versus the convenience of an area for smoking – especially where this is already a clandestine act.</p> <p>There are many areas where simple reliance on agents to 'comply' because it is within the regulations need to be assessed in terms of risk and rewards of compliance – or none – with those regulations where the rewards (versus perceived risks) of unwanted behaviour may yield higher notional utility.</p>
<p>Kahneman, D.; Knetsch, J.L. & Thaler, R.H. (1991) <i>'Anomalies: The Endowment Effect, Loss</i></p>	<p>In their 1991 study, pioneering researchers Thaler, Hahneman and Knetsch (1991) investigated several barriers to choice – the endowment effect, loss aversion (both</p>	<p>Inertia ('status quo' bias) and default</p>	<p>Behavioural research has shown that in cases of ambiguity humans are more reluctant to make</p>

<p><i>Aversion, and Status Quo Bias</i> in <i>Journal of Economic Perspectives</i>, Vol. 5, No. 1 (Winter 1991), pp. 193–206.</p> <p>Samuelson, W. & Zeckhauser, R. (1988) '<i>Status quo bias in decision making</i>', <i>Journal of Risk Uncertainty</i>, March 1988, 1(1), pp. 7-59.</p> <p>Choi, J; Laibson, D; Madrian, B & Metrick, A (2001) '<i>For better or for worse: Default effects and 401(k) savings behaviour</i>', NBER working paper, W8651</p>	<p>mentioned elsewhere in this table) and 'status quo' bias. They found these to have a significant effect on choices made within a laboratory experiment.</p> <p>Samuelson & Zeckhauser (1988) also illustrate the "Status Quo" bias. This is where individuals tend to prefer the status quo to changes that involve losses of some goods, even when such losses are offset by gains of another good</p> <p>The 2001 study on pension investment elections proved that inertia and default had a detrimental effect on the choices (or rather lack of) people made about their retirement savings, where high proportions of people took no action when given information and choice as to more complex – but ultimately higher remunerated than the 'default' low risk low-return option. A simple re-design of the pension option system eliminated the 'default' option and the numbers of people choosing what had been the default option went down rapidly.</p>		<p>changes even when that results in high probability of potential loss later on.</p> <p>This is of particular importance when considering attitudes towards risks and the tendency to 'ignore' elements which would require change. Emphasis on compliance with regulation and identification and elimination of 'Default' options in H&S protocols and review procedures – especially where those default options are 'no action' options.</p> <p>The implications of the later articles In the context of HSE, would also suggest care would have to be taken when making any changes to an existing remuneration scheme – for example, when reducing basic salary but incorporating a bonus scheme linked to HSE compliance. Despite the fact that total remuneration could actually increase, individuals would dislike the change because -</p> <ul style="list-style-type: none"> • <input type="checkbox"/> It upsets the status quo • <input type="checkbox"/> Individuals tend to prefer the status quo over changes that involve losses of some goods, even when such losses are offset by gains of other goods (changes to remuneration packages in this case) • <input type="checkbox"/> Once a fixed remuneration package is possessed, they will attach more value to it should it be lost/changed in any way
<p>Begg, N.; Ramsay, M.; White, J. & Bozoky, Z (1998) '<i>Media dents confidence in MMR vaccine</i>', <i>British Medical Journal</i>, volume 316, No. 7130, pp561, British Medical Association, UK</p> <p>Schkade, D. A., & Kahneman, D. (1998) '<i>Does living in California make people happy? A focusing illusion in judgments of life satisfaction</i>', <i>Psychological Science</i>, 9, 340-346.</p> <p>Kahneman, D; Krueger, A,B; Schkade, D; Schwarz, N & Stone, A.A. (2006) '<i>Would you be happier if you were richer? A focusing illusion</i>', <i>Science</i> 312 (5782): 1908-10</p>	<p>Humans do not always process information rationally or dispassionately. They have a tendency to anchor on a small number of things. These can be affected by proximity – i.e. things that have just happened or about to happen are more important or things that are more high profile – e.g. have been given more attention.</p> <p>Recent research regarding the risks and uptake of the MMR vaccination is a good illustration of this.</p> <p>There have also been numerous 'health scares' throughout recent history (too numerous for this table) that illustrate difficulties in the perception of risk – and that the interpretation of new information can often become stuck in anchors which are not objectively optimal – proximity things happening soon, or frightening and exciting things like dying in a terrorist attack, or winning the lottery will tend to be perceived as more likely because of the personal reaction they invoke.</p> <p>Focusing tends to create anchors around aspects such as, the personal (which is interpreted as more likely – an unlikely event which has been personalised – i.e. happened to someone we know – or think we know seems more likely despite statistics that may say otherwise) and salient differences – such as obvious things like objects which signify wealth status (focusing illusions)</p>	<p>Risk Perception and Anchoring</p>	<p>Anchoring and other distorters of risk perception suggest that understanding or compliance issues or H&S risks are affected by human interpretation, which are also affected by knowledge of and reaction to the outcomes. For example, in areas where there is low H&S risk, but high profile litigation, importance may be skewed perceptually, whereas in other areas conversely so due to lack of exposure. This would again highlight the need to understand the message received (rather than perceived to be given) by the HSE in it's activities, which could be researched using focus-group or focus-case research.</p>
<p>Cooper, M.H. & Culyer, A.J. (1968) '<i>The Price of Blood</i>' Hobart Paper No. 41. The Institute of Economic Affairs, London.</p>	<p>The Institute of Economic Affairs was famously commissioned in 1960 to undertake a comparison study of donating blood in the UK and selling blood in the USA, under the auspices of increasing blood supply in the UK market.</p>	<p>Monetary de-motivators</p>	<p>In the H&S at work context, schemes using – or considering use of – positive financial incentives for compliance should be considered against</p>

<p>Titmuss, R.M. (1970) <i>'The Gift Relationship'</i> Allen & Unwin, London.</p>	<p>The study (surprising to some classical economists) found that proportionately to the population, in the UK, incidence of blood provision and quality was actually higher in the UK, compared to the USA where a 'blood market' existed.</p> <p>Titmuss later explained this in his book 'the gift relationship' due to the voluntary nature of blood giving in the UK – where it was perceived as a civic act rather than an economic one. Campaigns since then have focused on this 'civic' act rather than attempting to emulate the USA blood market system.</p>		<p>those using other utility generating mechanisms such as those recognised in the blood study (e.g. civic pride). Similarity to the issues of compliance with Environmental legislation – and indeed principles of environmental sustainability - may be used here and some research could identify schemes used that have increased environmental compliance using such measures – for example environmental impact recognition awards.</p>
<p>Festinger, L. (1957) <i>'A Theory of Cognitive Dissonance'</i> (Stanford: University of California Press).</p> <p>Higgins, T. (1987) <i>'Self-discrepancy: a theory relating self to affect'</i>, Psychological Review 94, pp. 319–340.</p> <p>McKenzie-Mohr D. & Smith, W. (1999) <i>'Fostering Sustainable Behavior: An Introduction to Community-Based Social Marketing'</i>, New Society Publishers, USA</p>	<p>Festinger (1957) introduced the concept of cognitive dissonance – a feeling of discontent (negative utility) when a person is forced to hold two contrasting ideas or beliefs.</p> <p>Higgins expounded this in his 1987 paper on self-discrepancy, where he postulated that holding certain beliefs about yourself would effect your behaviour in line with those beliefs in order to avoid self-discrepancy or the feeling of cognitive dissonance.</p> <p>This was later identified by particularly environmental economic researchers as having a great effect in influencing compliance with environmental regulations and agreements.</p> <p>In short, they documented the superior power of commitment over coercion to encourage or amend behaviours – particularly with regards to compliance with environmental issues.</p>	<p>Self identity, discrepancy and cognitive dissonance.</p>	<p>See Section 5 for more detailed breakdown as this is one of the selected studies.</p>
<p>THEME 3: Strategic Behaviour and Learning</p>			
<p>Arrow, K. (1963) <i>'Uncertainty and the Welfare Economics of Medical Care'</i>. <i>American Economic Review</i> 53 (5): 941–973</p> <p>Seabury, S.; Reville, R.; Rhodes, H. & Boden, L.I. (2005) <i>'How Can Behavioral Economics Inform Research on Workplace Injuries?'</i> in Roberts, Karen (Author) Burton, John F. (Author) Bodah, Matthew M. (Author) (2005) <i>'Workplace Injuries and Diseases: Prevention and Compensation Essays in Honor of Terry Thomason'</i>, W. E. Upjohn Institute for Employment Research</p> <p>Foster, A. (1994) <i>'A Test for Moral Hazard in the Labor Market: Contractual Arrangements, Effort, and Health'</i>, <i>Review of Economics & Statistics</i>, Vol 76, pp213-227</p>	<p>The concept of remunerating workers for additional risk goes back to the fundamentals of Economics with Adam Smith and has been subsequently improved upon. In short the classical model seeks to remunerate the worker for the extra risk to the amount the risk 'costs' him (usually ascertained by willingness to pay not to bare the risk).</p> <p>Papers such as Arrow's (1963) introduced uncertainty into its consideration with asymmetry of information – or a moral hazard in the benefits of keeping beneficial information asymmetry.</p> <p>Seabury et al (2005), summarise the situation In the UK and USA, with regards to partial remuneration in the benefit structure, the rest being effectively regulated by tort law (i.e. suing for damages). They also summarise the findings of other scholars on why this is necessarily the case – finding a link between higher accident levels and higher benefits for both the individual agents and the firms. This concept is one of moral hazard, where adverse behaviour is essentially encouraged by the system of incentives.</p> <p>Foster's (1994) paper actually tests for the effects of moral hazard in the labour market and finds positively.</p>	<p>Moral hazard</p>	<p>Moral hazard is directly applicable in areas where risk is affected by human behaviour. In micro economics, diligence regarding fire prevention is often cited. That fire insurance and confidence in fire service, encourages complacency regarding fire prevention. This is directly applicable across different elements of risk, and as Foster's paper suggests moral hazard has been positively identified in the labour market in terms of contractual effort. This might reasonably suggest that the issue of health and safety practice in the workplace may be at risk from the effects of moral hazard. That is, the very act of having health and safety procedures, liability and compensation may increase complacency or risk taking behaviour.</p>
<p>Bandura A. (1977) <i>'Self-efficacy: Toward a unifying theory of behavioral change'</i> Psychological Review, Vol 84, pp.191–215.</p>	<p>Contra to standard economic theory and akin to the notion of self efficacy or efficacy of choice affects decision making. Bandura's (1977) study showed that agent's beliefs in the efficacy of their ability (this can include decision making) as</p>	<p>Self Efficacy & Efficacy of Choice</p>	<p>See Section 5 for more detailed breakdown as this is one of the selected studies.</p>

<p>Hepler T.J. & Chase, M.A. (2008) '<i>Relationship between decision-making self-efficacy, task self-efficacy, and the performance of a sport skill</i>', Journal of Sports Sciences, Volume 26, Issue 6, April 2008, pp603-610</p> <p>Kaplan S. (2000) '<i>Human nature and environmentally responsible behaviour</i>', <i>Journal of Social Issues</i>, 56(3), pp. 491–508.</p>	<p>well as their effect on the outcome significantly affected their behaviour in undertaking the task. For example agents who believed their behaviour made a difference persevered for longer with difficult tasks and applied more effort.</p> <p>More recently Hepler & Chase (2008) proved empirically a relationship between task self-efficacy belief and decision self-efficacy belief.</p> <p>Kaplan (2000) took this principle and applied it in his study of environmentally responsible behaviour and found that compliance with regulation was greater if the agents were part of the decision making process.</p>		
<p>Darley J. & Latane B. (1968) '<i>Bystander intervention in emergencies: Diffusion of responsibility</i>', <i>Journal of Personality and Social Psychology</i>, vol 8: pp. 377–383.</p>	<p>Another early experiment in the function of the social in decision making was the 'smoke in the room' experiment. Participants were asked to wait in a waiting room and smoke was poured into the room. Some of the participants were stooges, ie that knew the smoke was harmless (i.e. controlled and not a signifier of fire) and sat motionless looking comfortable. The experiment was repeated several times with different groups of people and differing numbers of stooges. In all cases the greater number of these stooges, the more likely the unknowing participant was to 'copy' their behaviour and continue to sit and wait unperturbed.</p>	Social Learning	<p>The area of social leaning and the acceptance of 'norms' is one in which the HSE may gain substantially from studying. Especially in the workplace, behaviours applicable to an 'everyday' job are not just learned in new starter training courses, but through on-the-job experiences and learning from those in senior positions.</p>
<p>Murphy, J.; Correia, C. & Barnett, N. (2007) '<i>Behavioural Economic Approaches to Reduce College Student Drinking</i>', <i>Addictive Behaviours</i>, Volume 32, Issue 11, November 2007, Pages 2,573-2,585</p>	<p>Behavioural economics has guided basic laboratory research on drug administration for over 30 years and has recently been applied to human substance use in naturalistic and clinical settings. This paper provides an introduction to behavioural economics, reviews applications of behavioural economics to college student drinking, and describes prevention and intervention strategies that are consistent with behavioural economic theory.</p> <p>Behavioural economic theory predicts that college students' decisions about drinking are related to the relative availability and price of alcohol, the relative availability and price of substance-free alternative activities, and the extent to which reinforcement from delayed substance-free outcomes is devalued relative to the immediate reinforcement associated with drinking. Measures of problem severity are based on resource allocation towards alcohol and the relative value of alcohol compared to other reinforcers.</p> <p>Policy and individual level prevention approaches that are consistent with behavioural economic theory are discussed, including strategies for increasing the behavioural and monetary price of alcohol, increasing engagement in rewarding alternatives to substance use, and counteracting student drinkers' tendency to overvalue immediate relative to delayed reward.</p>	Learning through reinforcement	<p>HSE could develop strategies to increase the behavioural and monetary consequences of breaching HSE ie. through heavier fines and strict adherence to sacking for serious breaches.</p> <p>They would also seek to increase engagement in rewarding alternatives to HSE digressions – through the reinforcement and reward of compliance with regulations. This could possibly be achieved through a "you've been spotted" reward scheme where visitors from unrelated departments could provide unbiased feedback about staff behaviour and performance.</p> <p>A HSE compliance league table could be initiated whereby bonuses and benefits are awarded according to a department's position in the league table.</p> <p>Reinforcement of HSE regulations could be achieved through specific training courses, advertising, and HSE screen savers.</p> <p>Counteracting employee tendency to overvalue immediate relative to delayed reward resulting in increased risk taking in order to increase pay and bonuses – provide a tiered remuneration scheme such that total compensation increases with tenure coupled with strict adherence to HSE regulations in that time.</p>
<p>Miller, D. T., & Ross, M. (1975) '<i>Self-serving biases in the attribution of causality: Fact or fiction?</i>' <i>Psychological Bulletin</i>, 82, 213-225.</p>	<p>Self serving bias occurs when agents perceive information differently because of pre-existing opinions – particularly with reference to their perception of themselves. For example successes perceived as through own hard work and failures due to</p>	Self-Serving bias	<p>This area of research has potentially significant impact on H&S in the workplace with regards to responsibility and both agent and firm's</p>

<p>Babcock, L., & Loewenstein, G. (1997) <i>'Explaining bargaining impasse: The role of self-serving biases'</i>, Journal of Economic Perspectives, 11, 109-126</p>	<p>circumstances beyond their control. Miller and Ross found significant effects in their pioneering experiments in the 1970's in games where success and failure was randomised and not attributable to the actions of the agents playing where those succeeding more tended to attribute it to skill and those failing more to elements beyond their control.</p> <p>Babcock & Loewenstein attempted to measure this in an experiment which assigned participants to either the plaintiff or defendant in a hypothetical automotive accident tort case. The case limited maximum potential damages to a payment of \$100,000, (matched with real money on a ration of \$1 to \$10,000) and asked the individuals to consider the evidence (the same evidence) and give a 'fair' assessment of the award. Average discrepancies between plaintiff and defendant's 'fair' assessments were \$14,500 and \$17,700 (for and against the plaintiff respectively).</p>		<p>interpretation of roles and responsibilities and the impact of their behaviours.</p> <p>A review of torts regarding H&S compliance failures (individual versus firm) could highlight such areas of biases and contra interpretations.</p>
<p>Levitt, S.D. & Dubner, S.J. (2006) <i>'Freakonomics: A Rogue Economist Explores the Hidden Side of Everything'</i>, Penguin, USA</p> <p>Gneezy, U. & Rustichini A. (2001) 'A Fine is a Price', Journal of Legal Studies, Vol. XXIX, 1, part 1, 2000, pp. 1–18.</p> <p>Laplante, B. & Lanoie, P (1994) 'The Market Response to Environmental Incidents in Canada: A Theoretical and Empirical Analysis', Southern Economic Journal, Vol. 60, No. 3, pp. 657-672 , Southern Economic Association</p>	<p>The book 'Freakonomics' highlighted the intriguing case of a day-care Centre in Jerusalem which introduced fines to parents who picked their children up late from day care. Rather than reducing the incidence of tardy parents – it actually increased it – because the fine became a set 'price' or cost for picking their children up late. The implication of a fine removed the social stigma motivator and replaced it with a marketable financial 'cost'.</p> <p>Environmental pressure groups have often cited inadequate fines for pollution to be just such a case, where the polluters just adjust their strategic costings to take account of the fines, although some have argued that subsequently perception costs (firm reputation) are then incorporated into the stock trading value.</p>	<p>Dynamic modelling – non static equilibrium modelling in Game Theory</p>	<p>See Section 5 for more detailed breakdown as this is one of the selected studies.</p>
<p>THEME 4: Human Interaction</p>			
<p>Milgram S. (1974) 'Obedience to authority', Harper and Row, New York</p>	<p>The famous Milgram experiment, was repeated in many guises before it was eventually deemed to be ethically compromised. The experiment based around a participant who was invited to partake in an experiment and was asked to turn knobs on a machine while an actor in another room screamed in response to these changes. The participant was lead to believe that his actions were causing pain to the (unknown) actor. In each case another actor in a white coat with a clip board claimed authority and directed them to do as he said. They did, turning the 'levels' (of torture) up significantly beyond that of a control group who were not given such an authority figure.</p>	<p>Key Influencers - Authority</p>	<p>Particularly in workplace situations where a clear hierarchy is defined, persons perceiving themselves as lower ranking may be unlikely to question the behaviours, attitudes and work practices presented by their superiors.</p> <p>The Milgram experiment shows that lack of questioning and acceptance of practices even endures when there are far reaching consequences. This would suggest research into perceptions of authority of firm and organisation with regards to health and safety versus the presence of the HSE.</p>
<p>Lyckholm, L; Workman, S; Lewis, W & Harrington, B (2001) 'Medical errors and medical culture', British medical Journal, Vol. 323, pp570, British Medical association.</p> <p>Singer, P.A.; Wu, A.W.; Fazel, S & McMillan, J (2001) 'An ethical dilemma: Medical errors and medical culture', British medical Journal, Vol. 322, 1236-1240</p>	<p>Investigations especially within the medical profession show that the formation of strong work environment cultures can have both positive and negative effects on working practices and that young doctors (new recruits to a workplace culture) are soon indoctrinated, so much the case that they can behave in ways that may be at odds with prior moral and ethical beliefs.</p> <p>Such a strong working culture may also aid in the 'cover up' of errors and mistakes.</p>	<p>Social Identity theory, In-Groups and Out-Groups and Work Cultures</p>	<p>In the HSE context the existence of and degree of distinct working cultures – particularly within areas of high HSE priority, may be of effect in regulatory and practice compliance and deviation. Moreover, deviation which is more likely to be 'covered up'.</p> <p>An investigation of attitudes to HSE within dominant working culture within high risk industries may be of potential interest in assessing the efficacy of HSE regulation within</p>

			these industries.
<p>Frey BS, Benz M and Stutzer A (2004) <i>'Introducing Procedural Utility: Not only What, but also How Matters'</i>, Journal of Institutional and Theoretical Economics 160, pp. 377–401.</p>	<p>Research into the microeconomics of maximising utility has shown that utility is not just derived from the outcome, but the process that gave rise to the outcome. Of particular effect are procedural utility gained from perceptions of procedural fairness and human responsibility.</p> <p>Fray et al consider several cases where utility is gained from fairness and show that if an economic situation is perceived to be 'fair' co-operation is greater. This particularly extends to the provision of public goods or the costs of mitigation or control where externalities are concerned based on the perceived 'fairness' or property rights.</p>	Procedural Utility - Fairness and Responsibility.	In the HSE context, where there has been some resistance to the 'burden' of H&S executive compliance, there is scope for increasing compliance by examining (and deriving means of influence) perceptions of 'fairness' and 'responsibility' on both employer and employee.
<p>Adams, S. J. (1963) <i>'Wage Inequities, Productivity and Work Quality'</i>, Industrial Relations, October 1963, vol 3. pp.9-16</p> <p>Duval, S. & Wicklund, R.A. (1973) <i>'Effects of Wage Inequities on Work Attitudes and Performance'</i>, Journal of Experimental Social Psychology, January 1973, vol 9(1). pp.1-16</p> <p>Akerlof, G.A. & Yellen, J.L. (1990) <i>'The Fair Wage-Effort Hypothesis and Unemployment'</i>, Quarterly Journal of Economics, May 1990, vol 105. pp.255-283</p>	<p>This article introduces the "Equity Theory" in relation to the workplace and its interplay with job motivation. Instead of merely focusing on what an employee (the self) regards as fair remuneration for his particular responsibilities, the theory incorporates the impact of knowing and considering peer group / colleague situations.</p> <p>Employees compare their reward / investment ratio with that of their peers and if this comparison leads to an assessment of lack of equality, the impact is tangible. For example, demotivated employees, disruptive behaviour, disgruntled staff who are outwardly difficult and uncooperative and staff who demand increased reward and promotion. The theory is defined in terms of a set of inputs and associated outputs:</p> <ul style="list-style-type: none"> •□ Inputs by employees – effort, loyalty, hard work, support to colleagues, flexibility, trust in management etc, •□ Outputs from employers – tangible financials and benefits, intangible recognition, praise, advancement. <p>In situations where the employer faces demand from staff to address the inequity through tangible financial benefits and rewards, the "fix" will only have a short term impact. This is because the employer is facing a moving target in relation to an employee's assessment of their peer group and "peer" assessments will differ from employee to employee.</p> <p>Duval & Wicklund provides corroborating evidence for Adam's Equity Theory and the negative impact of perceived wage inequities on employee motivation and performance. Akerlof & Yellen's article examines the consequences of the worker behaviour hypothesis explicitly referred to as "the fair wage-effort hypothesis." Consistent with the Adams and Duval & Wicklund perspectives, it highlights worker perception of a fair wage and their reduced effort when actual wage is below their perceived fair wage. Their empirical evidence suggests that where workers feel under-rewarded, their effort at work is reduced.</p> <p>However, what is also observed is that when workers are over-rewarded they do not significantly increase effort i.e. overpayment/over incentivising does not increase worker input (as per the Adams' definition of inputs).</p>	The theory of Equity and Fairness (Inequity Aversion)	See Section 5 for more detailed breakdown as this is one of the selected studies.
<p>Charness, G. (1996) <i>'Attribution and Reciprocity in a Simulated Labor Market: An Experimental Investigation'</i>, University of Berkeley, 1996 and 2002 Web Source - http://papers.ssrn.com/sol3/papers.cfm?abstract_id=274192</p>	<p>This experimental research attempts to address why, in a laboratory setting, higher wages offered by an employer lead to considerably more costly effort provision by wage earners. It presents a number of potential reasons but also seeks to explain differences in costly effort provision by the employee when wages are chosen by the employer versus some external process.</p> <p>Both reciprocity and method of wage distribution appear to work in conjunction.</p>	Human Interactive Choices - Reciprocity and Cooperative behaviour	Through higher reward, reciprocity is presented in employee effort and compliance with HSE – as long as the reward increase is driven by a voluntary management decision. However, poor wages or wage cuts do not necessarily imply reduced effort and flouting of H&S. It depends on who determines the salary

<p>Akerlof, G.A. (1982) <i>'Labor Contracts as Partial Gift Exchange'</i>, Quarterly Journal of Economics, Nov 1982, 97(4), pp.543-69</p> <p>Akerlof, G.A. (1984) <i>'Gift Exchange and Efficiency-Wage Theory: Four Views'</i>, American Economic Review, May 1984, 74(2), pp.79-83</p>	<p>In terms of reciprocity, the experiment is designed to test whether causal attribution influences the level of material payoffs an individual is willing to sacrifice to benefit another person.</p> <p>In terms of method of wage distribution, the experiment is conducted via a simulated labour market in which wages are determined by either the employer or an external process.</p> <p>Key findings appear to infer that there is a positive relationship between level of wage received and the effort level chosen. The interplay with wage level and method of distribution is illustrated by the fact that effort choices when low wages are intentional and decided by the employer appear to reflect negative reciprocity ie. workers never sacrifice money to benefit the employer with increased effort.</p> <p>When volition is absent and the low wages are decided by an external party, feelings of revenge dissipate.</p> <p>A further experiment is conducted involving scenarios of pay-cuts. It is shown that workers respond more negatively to a wage reduction voluntarily chosen by management than to one mandated by a poor business economic environment. Pay cuts are also perceived to be more fair when a business is struggling versus when it is prospering</p> <p>The positive impact of reciprocity is illustrated if a firm pays a higher wage to an employee and the employee is likely to reciprocate with higher quality work, as long as the employer's volition selects the wages. This is not the case if they are in the control of a third party (NB: the opposite is the case if wages are reduced by an external party)</p> <p>The 1982 article begins by presenting a case of observed behaviour amongst female workers at a utility company in the eastern United States. In this situation, it is noted that a certain group of the workers significantly exceeded the minimum work expectations in terms of hours and output. What is more, they do not expect promotion in return.</p> <p>The author argues that this behaviour is attributable to certain sentiment felt by each worker toward co-workers and their employer. They are satisfied that they AND their co-workers are being fairly treated. As a result, the women achieve a certain amount of personal utility in return for "an exchange of gifts". The mutual gift exchange is defined as work in excess of the minimum expectations on the side of the workers. In this case, on the side of the employer, the gift refers to wages paid in excess of what employees could receive from another job in another company. In other cases, the employer gift could merely be fair treatment by the employer toward the employee. Therefore, the employer would not necessarily have to pay a wage in excess of what employees could receive from another job in another company – it would just have to be deemed fair or considered the norm by all employees.</p> <p>Clearly, reciprocity is another key feature in this article where the respective gifts are linked – effort in excess of the minimum requirement is linked to the "fair" wage and / or fair treatment received.</p> <p>What denotes a fair wage and fair treatment is driven by "group norms". In order to ascertain a group norm, employees perform a certain amount of peer comparison. They not only want to ascertain that their wage and/or treatment is consistent with their peers but also want to ensure that their peers are fairly treated respective to</p>		<p>levels and any necessary pay cuts. If the latter is associated with management then disgruntled employees may exhibit a greater tendency to flout regulations than if decided by an independent third party.</p> <p>Differences in perceptions regarding the justification of a wage cut impact loyalty to an employer when employees feel unfairly treated ie. wage cut in struggling versus not struggling business scenario.</p> <p>When decision makers are self interested and disrespectful, people quit more, work less hard, flout H&S and are less productive. Conversely, a voluntary wage increase of a low wage by management may be more effective than one that is mandated by the Government (eg. Minimum wage)</p> <p>In terms of remuneration, compliance with H&S will be promoted within the organisation if employees feel fairly treated as a whole and not necessarily as individuals.</p> <p>In terms of sanctions and fines imposed for non-compliance, employees must believe that their peers are being fairly treated.</p>
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	themselves (the role of sentiment).		
<p>Gladwell, M. (2000) <i>'The tipping point'</i>, Little Brown and Company, Boston, USA</p> <p>Teraji, S. (2007) <i>'Morale and the Evolution of Norms'</i>, Journal of Socio-Economics 36(1) (2007), pp. 48-57</p> <p>Kahneman, D.; Knetsch, J.L. & Thaler, R. (1986) <i>'Fairness as a constraint on profit seeking: Entitlements in the market'</i>, American Economic Review, September 1986, 76(4), pp. 728-41.</p>	<p>Social norms influence behaviour. Social norms are in turn defined by the prevailing culture which comes about from prevailing behaviours. Changes to those social norms occur through the actions of a few – the cultural architects, which fan out across networks of people, each with their own roles.</p> <p>Teraji (2007) provides insight into the diversity of economic performances by individuals within organisations. A state of norm performance is generated via social interaction within the organisation. Two steady states of effort levels are defined – 1) Enforced by altruism where everyone chooses the high effort level and high morale is sustained 2) On the other hand, if the norm, which is enforced by envy, is persistent, everyone chooses the low effort level and the performance decays in the long run.</p> <p>In Kahneman et al (1986) The authors suggest that individuals (the company / employer in this case) put positive value on the well-being of others (customers / employees in this case). Consequently it presents departures from decision making based on pure self interest. In this case it implies movement away from a profit maximising firm to one of investing in the firm's reputation to improve goodwill and employee morale. This fairness concept is driven by customer / employee opinion. The article uses household surveys of public opinions to infer rules of fairness for conduct in the market from evaluations of particular actions by hypothetical firms. As an example, this includes the derivation of community standards of fairness that apply to wage setting by firms.</p>	<p>Group think (Herd behaviour), decision making within the firm & social 'norms'</p>	<p>It is important to understand both cultures and working cultures and those whom are the architects, the connectors and salespeople of those culture ideas.</p> <p>Behavioural change is most effective when the channels that 'tip' accepted norms are harnessed, rather than worked against or using an 'en masse' approach. This would seem to suggest, that focus group research may be of benefit in creating educational materials and behavioural modification incentives to encourage H&S compliance.</p> <p>The "desired" norm is to create, enforce and sustain the high effort level HSE could seek to ascertain morale levels through surveys and reinforce and reward the high effort / high morale performance state. Discussion forums / working parties could be set up and led by the high effort / high morale individuals. This would promote social interaction with the high morale/high effort individuals and encourage their attitude as being the "norm".</p> <p>In the HSE environ, workplace surveys could attempt to ascertain community standards of fairness in relation to remuneration and incentive schemes. If there is commitment toward the agreed community standard then there is more likely to be promotion of adherence to regulation.</p>

<p>Dawes, R.; Robyn M. & Thaler R.H. (1988) <i>'Anomalies: Cooperation'</i>, Journal of Economic Perspectives, Summer 1988, 2(3), pp. 187-97</p> <p>Frank, R.H. & Hutchens, R.M. (1993) <i>'Wages, Seniority and the Demand for Rising Consumption Profiles'</i>, Journal of Economic Behaviour and Organization, August 1993, 21(3), pp. 251-276</p> <p>Loewenstein, G. & Sicherman, N. (1991) <i>'Do Workers Prefer Increasing Wage Profiles'</i>, Journal of Labor Economics, January 1991, 9(1), pp. 67-84</p>	<p>It presents a set of anomalous empirical results in relation to rational choice and refers to individuals as sensible co-operators rather than selfish rationalists. Evidence from laboratory experiments is reviewed to define when and why humans cooperate. For example, in the context of public goods provision, why do people cooperate rather than free-ride as selfish rationalists? It describes a key concept of cooperation in terms of Reciprocal Altruism where individuals reciprocate kindness with kindness, cooperation with cooperation, hostility with hostility. In the context of the workplace, if the employer has a reputation for being cooperative, this in turn is reciprocated with cooperation from the employee. However, this will continue until they realise that they are being taken advantage of by others (eg. Employers paying their wage) and there is no possibility of reciprocity from their employers in the future (for example, through improved remuneration / reward in the future). A further theory of cooperation is presented through the notion of "impure altruism" – where employees cooperate because "doing the right thing" becomes the motive (a satisfaction of conscience)</p> <p>The later two studies present evidence against earlier theorists of wage deferral using data collected from airline pilots and inter-city bus drivers. Despite their contrary findings, their research is an excellent source of explanatory into those pre-existing theories. For example - 1) large scale investment in firm specific training early on in the productivity life cycle plus the prospect of premium wages at a later date through staying with the firm 2) Bonding contracts (Lazear 1981 and 1979) – Devised to prevent workers from cheating the firm (eg through not taking adequate safety precautions). A worker who cheats the firm stands to forfeit their subsequent earnings stream, which, in future years, contains substantial premiums above marginal productivity. The latter is deemed to be a suitable strategy when adequate monitoring of employees is not comprehensive or possible.</p> <p>The above findings are further illustrated by this article. Loewenstein and Sicherman (1991) argue that many workers prefer increasing wage profiles over flatter or decreasing wage profiles of greater monetary present value. This is despite the effect on total consumption.</p>	<p>Human Interactive Choices - Reciprocity and Cooperative behaviour</p>	<p>In the context of HSE, if there is no possibility of reciprocity from employers in the future through increased future rewards then employees will also stop cooperating.</p> <p>An employee may infer that he/she is being taken advantage of when there is no reward for adherence to HSE whilst others are flouting and still being paid the same wage.</p> <p>The concept of impure altruism could be exercised through the setting up of HSE discussion forums. Those who cooperate with their employer and adhere to HSE regulations through the satisfaction of conscience can try to influence those who actively breach HSE.</p> <p>In the HSE environment, unless 24 hour, job-wide monitoring of adherence to H&S is possible, then employees must be incentivised in some way to avoid malfeasance Therefore, employers could structure future wage streams in such a way that there are substantial premiums over marginal productivity in the long run and improve awareness of this to staff. On the contrary job/site wide monitoring could be improved by increasing the number of HSE visits, employing more HSE officers and/or providing more job specific H&S training to new joiners.</p>
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5. CONCLUDING REMARKS AND SUGGESTIONS FOR FURTHER RESEARCH

After consultation with the HSE, a number of areas were chosen from the current research hubs of behavioural economics that may be of interest to, or have greater potential for, application to the field of H&S compliance. These potential areas of interest have been identified in conjunction with the Economics Analysis Unit of HSE. However, further research in any of these suggested areas will be subject to a wider consultation across HSE, taking into account any previous research performed and the new HSE strategy and business plan.

In discussions with HSE it was found that these areas may be of greater potential interest because they:

- (i) Bring into consideration knowledge and ideas from areas of economics and related disciplines not previously associated with H&S issues;
- (ii) Have the potential to measure or quantify (using economic techniques) various impacts that may currently be under investigation as areas of interest in the HSE.

Area (1) - Long Tailed Perception of Risk [The problem of understanding low Risk of high Cost]

From the theme of *Computational Issues: Bounded Rationality* (Theme 1), the problem of understanding low risk but potentially high cost (i.e. ‘catastrophic’) H&S failures is of particular interest in ‘dangerous’ occupations, or those industries which routinely use high risk materials and processes.

The knowledge that human agents may perceive risks in a skewed sense, and have that perception reinforced on a daily basis with small regular rewards, can go some way to explaining how (despite routine H&S safeguards) catastrophic failures can and do still occur. Understanding the motivational structures of the agents involved and how such behaviour is incentivised – but often goes unnoticed until a catastrophic failure, can help identify potential areas where this kind of risk perception and routine could lead to catastrophic failure in the future.

In discussions with HSE, researchers flagged up a 2006 study by the Health and Safety Laboratory on *Industry Major Hazard Performance Indicators* (major hazard being defined as low frequency high consequence events). It is our understanding that most major hazard industries report on lagging indicators but these are not necessarily viewed as potentially predictive of incidences.

The 2006 scoping study was performed by the Health and Safety Laboratory using the Major Hazard Industry Performance Indicators and it was recommended that a high level cross sector performance indicators model be produced. Such a model was envisaged as having three major elements: sound control of risks; positive safety culture and operational efficiency. Within the positive safety culture, several

dominant activities were identified as indicators: work task; work environment; individual responsibility and management; management attitudes; management actions; and safety management systems. Within these areas there is potential for the perception of expected utility risk to be of importance and an element including motivational structures could be included within that assessment.

A widely cited example of failure to apply statistical risks is the refusal/unwillingness of some drivers to wear seatbelts. Prior to the passing of laws making the wearing of seatbelts compulsory this unwillingness, despite the low utility cost (the time taken to put the seatbelt on), generating small everyday gains (effort savings), outweighed perceptions of high risk (death or disabling injury) for the majority of motorists - and less than 1/5 of motorists used a seatbelt regularly (see Williams and Lund, 1986). Thankfully wearing seatbelts is now required under law in the UK and elsewhere.

The recommended future research might usefully focus on ascertaining the perceived expected utility risk and reward associated with particular behaviours. The techniques of analysis pioneered by Kahneman & Tversky (1979) in the context of gambling games can, with suitable modification, be applied to such a scenario.

For example - an analysis could be undertaken using a framework of perceived risks for hazardous events and their associated costs. Particularly hazardous events which may manifest or be exacerbated by H&S failings, for instance, events such as a tower crane collapsing, an explosion due to a Liquid Petroleum Gas escape, or a loss of containment of a biological agent. A questionnaire applied to a representative group of workers using a scale of events with low or high probabilities – for instance getting a head on the toss of a coin (an even probability or likelihood) down a scale of up to 10 events to say the chances of being struck by lightning (1 in 7 million) to the chances of winning the Jackpot on the lottery (1 in 14 million). An assessment in monetary terms of the expected lifetime costs to a person could then also be ascertained.

Results could then be compared with actual risks and associated costs and areas identified which have led to the misvaluation of risk and the costs of risk. Such quantitative results could then be used to assess the potential magnitude of effects of this misvaluation of risk with respect to ‘risky behaviour’ in the workplace and the significant elements which contributed to the misvaluation. This would then have implications for educational materials and the effectiveness of these based in the notion or re-defining utility risk perceptions.

Area (2): Costs of Processing Information (Cognitive Dissonance) [Information Overload]

Stigler’s (1961) Nobel Prize winning work on the ‘costs’ of information overturned conventional choice theory that had always (but often only implicitly) assumed that more choice is better than less. What Stigler proved was that information comes at a cost – and that the cost is the cognitive burden of processing it. His work demonstrated how, after a point, processing information can generate a negative utility (or a disutility) and that the extent to which this is the case may be influenced

An example of how such a study could be specified would be to use an experimental group of subjects – specifically not current H&S experts (i.e. those not bringing prior knowledge to the experiment) and provide subjects with a specification for a hypothetical business for which they are the newly appointed H&S officer. One group of subjects would be given access to all current H&S literature (leaflets, booklets and internet), the other to a limited amount of H&S information. Subjects should then be asked to provide a list of H&S issues they would address. These listings could then be compared to those of an H&S expert and graded in terms of content, quality and potential risk. In addition, qualitative questions could also be asked in terms of feelings of subjects as to their understanding of their role and responsibilities in response to the literature. Averaged group scores could then be compared and analysed for significant inter-group deviation, in order to shed light on the effectiveness of each of these alternative information delivery strategies.

Area (3): Self Efficacy and Efficacy of Choice *[Stakeholder Involvement]*

What the studies highlighted under this heading show is that an agent's belief in his/her ability to influence outcomes, to make decisions and the expected efficacy of these actions/decisions in effecting the outcome, significantly affects their actual behaviour and, in particular, their decision-making. Indeed, in Hepler & Chase's (2008) study the use of video representations of a simple sporting task (predicting the trajectory of a ball in a soft-ball match), decision-making self-efficacy and task self-efficacy were found to be significantly (to 99% confidence) correlated – with decision-making self-efficacy accounting for a major proportion (about 58%) of task self-efficacy.

Although the studies highlighted in the table were applied to decision-making outside of the sphere of health and safety – Kaplan's (2000) paper showed that these principles held when applied to the issues of environmentally responsible behaviour. Using policy based evidence from a variety of sources – mostly from public engagement programs in Scandinavia and the Netherlands - environmental programs were found to be more successful when participants were themselves engaged in program formulation, implying that compliance with regulation is greater when the agents are part of the decision making process.

This research would seem to suggest that while the act of empowering an agent or individual to be part of the decision making process encourages greater compliance, the converse is also true – that the act of being rendered a subject and being told what to do effectively de-motivates the agent from compliance.

Although the idea of stakeholder involvement generating a greater level of compliance with environmental regulations (for example) is now widely accepted, most of the evidence for this is through reviews such as Kaplan's of environmental governance initiatives.

From an economic perspective decision making under utility theory would suggest that an agent will derive different levels of utility from different outcomes and will maximise their utility for the least cost (which includes – as above – the costs of processing the information). What the above hypothesis implies within an economic framework is that the utility value of outcomes is actually changed by the process of involvement.

Both of these instances (of empowerment and disempowerment) are easily identifiable in an H&S context, suggesting that the utility gained from participation in the creation of mandates and regulatory frameworks may improve compliance over and above that which would be expected with financial incentives – such as avoiding fines.

A study in a behavioural economics context could identify both an empirical basis and attempt to measure relative magnitude in order to weigh up alternative strategies against costs.

A first tier level of research would therefore involve the application of experimental techniques to explore the potential effects of worker (and management) engagement upon H&S compliance. Experimental observations could be generated by attitude questionnaires (again derived from the field of motivational psychology) towards compliance – including, for example, indicators of how likely individual behaviour is to affect an H&S issue; how likely the subject is to experience H&S risks and/ or how likely subjects are to comply with, or deviate from, H&S procedures. Such questionnaire evidence could usefully be evaluated alongside evidence revealed in responses to suitably constructed qualitative questions, allowing investigators to explore such issues as reasons/rationalisations given for deviations. An analysis of correlations between beliefs of efficacy and high compliance and between non-efficacy and non-compliance would provide further evidence regarding the strength of the ‘stakeholder’ effect. Building on this, a second level of analysis could then be undertaken in order to test how improving beliefs in self-efficacy (through say a consideration of a spectrum of alternative programmes offering differing degrees of stakeholder involvement) influence compliance.

Area (4): Self identity, discrepancy and cognitive dissonance *[Committing and Vesting to Standards]*

The concept of cognitive dissonance was first explored in the 1950’s [see, in particular, Festinger, 1957]. The basic concept may be defined as a feeling of discontent when a person is forced to hold two contrasting ideas or beliefs. Higgins expounded this in his 1987 paper on self-discrepancy, where he postulated that holding certain beliefs about oneself would affect one’s behaviour in line with those beliefs in order to avoid self-discrepancy or the feeling of cognitive dissonance. This concept was later identified by environmental economists as exerting a potentially strong effect upon compliance with environmental regulations and agreements. In short, they saw commitment as exerting a superior power over coercion as a means of influencing behaviour – particularly with regard to compliance with environmental issues.

One of the challenges revealed from our review of the existing literature – is that although there seems to be a strong degree of acceptance that self discrepancy and cognitive dissonance impact on environmental regulatory compliance, surprisingly little in published papers explicitly addresses the actual magnitude of these effects and their possible statistical significance.

In an economic context one would consider the notion of negative utility – that an experience of self-discrepancy or cognitive dissonance would result in a utility cost and that therefore utility maximising behaviour would seek to minimise self-discrepancy or cognitive dissonance according to its utility cost. It is using this measure that a study on the potential effects of commitment and cognitive dissonance in H&S compliance could be based.

If H&S is seen as alien to personal cultural beliefs, then it is unlikely that compliance will be won through the use of disciplinary measures. Evidence from environmental campaigns suggests that cognitive dissonance via self-discrepancy is a potentially powerful force, with the action of getting businesses to commit publicly to compliance with environmental aims typically proving more effective than attempts at coercive behaviour.

In the HSE context, a study could be undertaken to find areas (similar to those in which environmental campaigners have had success) in which compliance could be better fostered through the encouragement of firm or industry ‘commitments’ to standards. In discussions with HSE, the authors understand that as part of the national HSE strategy in 2000 the top 350 companies were encouraged to report H&S performance as part of the *Corporate Social Responsibility Statement* in their annual accounts. Therefore it is not unreasonable to suggest a similar pilot be introduced to encourage companies to commit to targets.

Such a study would warrant a straight to pilot approach. The generation of an assurance brand for H&S commitment would be required, similar to those generated for example, for the *ISO9000* (environmental) standard awards or *Investors in People* (training) awards. Data from those firms committing to the awards and displaying their certification could be collected and analysed against a control group – who would agree to be part of the study.¹¹ Tests for significant deviations between the two groups could reveal impact on different H&S risk areas.

Area (5): The theory of Equity and Fairness (Inequity Aversion) *[Fairness]*

In relation to the workplace, ‘Equity Theory’ (see Adams.1963) looks at job motivation and the way(s) in which perceptions of ‘fair’ remuneration - or more aptly, reward - influence effort. In this context, reward is taken to include not only

¹¹ Not against general industry wide indicators, as participation in the study would likely have an effect that would need to be properly controlled for.

monetary remuneration but also non-pecuniary reward and, most importantly, considers perceptions within the individual's peer-group.

In economics, decision-making within the labour market (which includes effort as one of the dimensions of labour supply) is typically modelled as an optimum/utility maximising choice between work (or 'market activity') - seen as a proxy for income - on the one hand and leisure on the other. Equity theory, however, takes the conventional analysis somewhat further by recognising that employees compare their own reward / investment ratio with that of their peers and against their assessment of their personal effort relative to that of their peers. If such comparisons lead to an assessment of lack of equality then, it is argued, there will be a reaction in terms of the aggrieved worker's personal effort in the future. In essence employees try to balance input and output, where for example:

- *Inputs by employees* – effort, loyalty, hard work, support to colleagues, flexibility, trust in management.
- *Outputs from employers* – tangible financial rewards and benefits, intangible recognition, praise, advancement.

Importantly, in the H&S context, these effects are not limited to effort directly relating to the work task or environment, but can also manifest themselves in various forms of negative effort behaviour. For example, demotivated employees may engage in wilful disregard of certain procedures in order to save on effort or engage in procedural sabotage for disruptive purposes (i.e. evoke a negative equity gain to the employer).

For example – Sapsford & Turnbull (1993, p.58) report evidence of a statistically significant negative correlation (-0.36) between accident rates in the British coal mining industry during the period 1947-83 and the number of workers involved in industrial disputes as a measure of labour unrest.

The further two papers highlighted in the table [see Duval & Wicklund (1973) and Akerlof & Yellen (1990)] provide corroborating evidence for Adams' Equity Theory and the negative impact of perceived wage inequities on employee motivation and performance. Their empirical evidence suggests that where workers feel under-rewarded, their effort at work is reduced. However, what is not examined in these studies is the extent to which such demotivation vents itself in procedural disregard and/or sabotage. It would be this element that may be of the greatest relevance in the H&S context.

It is important to recognise that Equity Theory implies that straightforward improvements in rewards may not necessarily generate higher effort, for they may (especially when they are applied in an 'across the board form') leave perceived inequities little changed. Equally, they may appear under some circumstances to exert little influence upon 'measured effort' because their influence is actually working through a reduction in (unmeasured) negative/disruptive activities, such as wilful disregard of regulations (including those relating to H&S) and disruptive behaviour.

Appendix 1

Behavioural Economics - Search terms

PLEASE ALSO TRY WITH BOTH SPELLINGS: BEHAVIOUR / BEHAVIOR

Anchoring (+behaviour... look only for economics related)
Asymmetric information

Behavioural imperfections
Behavioural preferences
Behavioural shift
Behavioural theory of (then look for econ related)
Bounded rationality

Calendar effects / investing / economics
Choice framing
Cognitive bias / biases
Cognitive dissonance
Cognitive economics
Cognitive framing
Consumer confidence
Cooperation / co-operation
Curious preferences

Decision framing
Default behaviour / Default consumer choice
Disposition effect
Dividend puzzle
Dynamic choice
Dynamic inconsistencies

Efficient wage hypothesis
Equity Premium
Equity Premium Puzzle
Endowment effect
Experimental Behaviour
Experimental Economics
Exotic preferences

False extrapolation
Fat tail choice

Game (+ either preferences / learning / co-operation etc)
Gift economy / economics

Happiness (only economic use + Layard as filter)
Hyperbolic discounting
Heuristic behaviour / Heuristics

Incentives (+ behaviour... look for economically related)
Inertia

Information

Inter-group behaviour (look for any economic applications)

Inter-temporal consumption / preferences / choice

Intuition (+ econ*)

Learning (+ Preferences)

Limits to arbitrage

Long tail choice

Loss aversion

Loss realisation / realization aversion

Market signal / signalling

Matching Law

Melioration theory

Mental accounting

Money illusion

Momentum investing / decision making / choice

Overconfidence / over-confidence (look for economic applications)

Paradox choice

Perceptions of fairness / fairness

Preference reversal / reversals

Preference anomalies

Present bias

Procedural utility

Property rights (+uncertainty + Behaviour)

Prospect Theory

Psychology (+ Economics + Decisions + Preferences + Choice)

Rational addiction

Rational human error

Reinforcement (+ Choice / preferences / behaviour)

Risk (+ Decision/s)

Satisfaction delay

Self perception / theory (look for any economic applications)

Self discrepancy / theory (look for any economic applications)

Self serving bias

Social categorisation / categorization (look for any economic applications)

Social contagion (look for any economic applications)

Socially cued consumption (look for economic applications)

Social learning (look for economic applications)

Status-quo bias

Sticky preferences

Strategic behaviour

Sunk cost fallacy

Time inconsistency

Uncertainty (+Decision / preferences / choice)

Wikinomics

APPENDIX 2

BEHAVIOURAL ECONOMICS RESEARCH WITHIN THE GOVERNMENT ECONOMIC SERVICE

As one element of our terms of reference we undertook a search for reports and reviews undertaken by or sponsored by the UK Governmental Economic Service, where the abbreviations in parentheses indicate the sponsoring department:

- Gift Aid: Behavioural Economic Research [HMRC]
- Consumer Confidence [BERR]
- Consumer Empowerment [BERR]
- Unsecured Indebtedness [BERR]
- NIBAX Model of dynamic structural microsimulation, in order to analyse savings and labour supply behaviour [DWP & HMRC]
- Pension Increase Pledge (PIP) [DWP]
- Exploring the Experimental Economics Approach in Pensions [DWP]
- The Determinants of Bus Patronage in England [DfT]
- Understanding Strategic Behaviour of Young People: An Experimental Economics Approach [DCSF]

Behavioural economics

A review of the literature and proposals for further research in the context of workplace health and safety

Historically, economists can be accused of having ignored behavioural issues. However, recent times have seen an upsurge in interest generated by the failure of conventional economics to adequately address recent economic reality. As a consequence, research was commissioned by the Economics Analysis Unit of the Health and Safety Executive, with three main aims: to provide a detailed review of the current and emerging literature on the use of behavioural economics; to provide initial proposals relating to the sorts of policies that could be both feasible and effective in changing favourably the health and safety behaviour of both employers and employees; and to offer recommendations on priorities for further research.

Several theories have been identified that could be relevant in health and safety policy making, including: that there is a skewed perception of risk; there is a cost of processing information; that compliance with health and safety might be affected by the level of stakeholder involvement and/or employees' perceptions of fairness; that the act of publicly committing to standards affects health and safety performance; and that the monetising of non-compliance through fines can affect health and safety outcomes. The decision as to whether and how any of these theories might be further researched by HSE is subject to a wider consultation across HSE.

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