Cognitive Aspects of Entrepreneurship: Decision-Making and Attitudes to Risk

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1 Introduction

There is currently significant interest in the application of theories from cognitive psychology (Barsalou, 1992) to the study of entrepreneurship (Forbes, 1999). Enthusiasts of this approach have claimed that the traits approach to explaining why people choose to become entrepreneurs, in which psychological characteristics such as risk-propensity and need for achievement are studied, has largely failed to produce clear-cut results (Palich and Bagby, 1995; Shaver and Scott, 1991). Shaver and Scott (1991: 31) view achievement motivation as the only trait that seems to have a convincing association with new venture creation. They also make methodological criticisms of traits research. As far as risk is concerned, it appears from the evidence that entrepreneurs consider themselves to be no less risk averse than other people.

Because of the somewhat disappointing results of the traits approach some researchers have turned to studying how entrepreneurs think. If the cognitive
processes of entrepreneurs are different then this will affect their assessments of opportunities and their perceptions of the risks that they involve.

This chapter will review literature on the study of the cognition of entrepreneurs and how it affects their attitudes to risk. The review begins with the heuristics and biases approach. Various decision-making biases related to over-optimism are then considered. Following this perceived self-efficacy, intrinsic motivation, and intentions-based models are discussed. Some theories dealing specifically with attitudes to risk are then covered. These include prospect theory, Kahneman and Lovalo’s model of risk taking, and Das and Teng’s theory of risk horizons and future orientations. Finally, the information cost approach to the analysis of entrepreneurs’ decision making is discussed. Some relevant references to culture research are also given in the conclusion.

2 Cognitive heuristics and biases

Kahneman and Tversky laid out the heuristics and biases approach to cognitive psychology in the 1970s. This approach claims that people use heuristics in decision making. Heuristics are mental shortcuts that are used to reduce information overload and yield quick decisions. However, according to this approach, the use of heuristics can result in systematic biases. Evidence of the existence of biases is claimed as proof of the use of heuristics. The approach differs authors such as Simon (1957) and Giegerenzer and Todd (1999) in that it stresses not just the use of heuristics as an effective means of making decisions, but also biases that might result from the use of particular heuristics.
Baron (1998) argues that entrepreneurs make decisions in conditions likely to maximize the impact of cognitive biases. These involve high levels of uncertainty, novelty, emotion, time-pressure, and information overload. Busenitz and Barney (1997) take a positive view of heuristics and biases in entrepreneurs’ decision making, in particular in the start-up years of a venture. They note that the use of heuristics may be crucial in speeding-up and simplifying decision making, and that overconfidence may be beneficial both in implementing a decision, and in encouraging enthusiasm in others.

Note that there have been significant criticisms of the heuristics and biases approach, though the approach is nonetheless very popular in psychology. Shanteau (1989) gives a review of the debate. Among the criticisms are:

- A failure to specify when people using heuristics perform well, and when they do not, and not enough attention being paid to the adaptation of heuristics
- A tendency to overstate the generality of biases
- Experiments on heuristics and biases deny people the tools they need to come to the correct answers
- To identify a bias in decision making one must know what the ‘correct’ decision would have been in each case. Researchers measure biases relative to what is correct ‘in their view’.
- A lack of a general theory, or specific models of the underlying processes
- Unjustified analogies between perceptual illusions and biases resulting from heuristics
- Experts may not exhibit the biases observed with naïve subjects
• If a bias is identified, it is difficult to link it to an individual heuristic, as many heuristics might lead to the same bias

2.1 Heuristics

This section will now discuss some heuristics, and then the next section will deal with some of the biases that can result from their use, and their relevance to entrepreneurship. The three best-known heuristics considered under this approach are the availability heuristic, the representativeness heuristic, and anchoring and adjustment (Tversky and Kahneman, 1974).

2.1.1 Availability Heuristic

Under the availability heuristic (Tversky and Kahneman, 1973) people base their probability estimate for an outcome on how easy it is for them to imagine it, in other words how ‘available’ it is to their perceptions. Some outcomes are more available simply because they were more noticeable when they occurred in the past. So more spectacular outcomes are relatively more available. Outcomes that are hard to picture or difficult to understand will be perceived as being less probable. These can include those to which a particular person has had little exposure.

For instance, people are often more worried about being involved in an aeroplane crash than a road crash, despite road travel being much more dangerous, partly because an airliner crash is a sensational news story.

2.1.2 Representativeness Heuristic
Representativeness is how closely an event or object resembles its parent population in its essential properties, and the degree to which it reflects the features of the process that generates it (Kahneman and Tversky, 1972: 431). Under the representativeness heuristic people make decisions according to comparisons with similar situations already known about.

Grether (1980) notes flaws in experimental evidence in psychology literature. He carried out experiments that confirmed predictions based on use of the representativeness heuristic for inexperienced or financially unmotivated subjects, but found the evidence was less clear for others.

2.1.3 Anchoring and Adjustment Heuristic

Anchoring refers to a tendency to ‘anchor’ on some initial reference point, which may be suggested by the way a problem is formulated or by some initial computation. The anchor influences perceptions, so that estimates fail to adjust sufficiently from it. For instance, if people are asked if the correct price for a good is less than or greater than £30, and are then asked for their best guess of the correct price, they will tend to give an answer to the latter question that is close to £30.

2.2 Resulting biases and entrepreneurs

2.2.1 Overconfidence
Overconfident people attach higher probabilities to particular outcomes than are warranted by what they know (Russo and Schoemaker, 1992; Zacharakis and Sheperd, 2001). Overconfidence is equated to having poor meta-knowledge, which is the case where people do not know what they do or do not know. Evidence shows that people are generally overconfident in their beliefs. For references to general research on overconfidence see Brenner et al (1996).

According to Russo and Schoemaker (1992) overconfidence can result from the availability heuristic, the anchoring and adjustment heuristic, confirmation bias, and from hindsight bias. The confirmation bias (Klayman and Ha, 1987) is a tendency to seek more, and attach greater weight to information that confirms beliefs, and to tend to fail to seek out, and to ignore disconfirming information. Klayman and Ha suggest that people use a positive test strategy as a default heuristic, and that this heuristic often works well, but leads to problems when used in the wrong circumstances. The hindsight bias is a tendency to see past events as having been more predictable than they actually were.

Note that it is not necessarily a ‘bias’ to collect less information when confident. It is rational to attach less value to information collection when confidence is high (Hirschleifer and Riley, 1979:1394-7). However, if the level of confidence is not justified, then this itself will bias information collection, even if the information collected is optimal given the initial level of confidence.

2.2.2 Belief in the Law of Small Numbers

Belief in the law of small numbers refers to people overestimating the degree to which small samples of information resemble the population from which they are drawn
(Tversky and Kahneman, 1971, 1983). People do this when they follow the representativeness heuristic. Entrepreneurs may tend not to use large samples because they are not available, and because they often do not have the resources necessary to collect them (Busenitz and Barney, 1997).

It has been claimed that entrepreneurs’ start-up decisions may be based on biased information because business failures are less well publicized than successes (Simon, Houghton, and Aquino, 2000), and exist for a shorter time. Simon and Houghton (2002: 115-6) argue that belief in the law of small numbers may explain why entrepreneurs often overestimate demand. According to Busenitz and Barney (1997) entrepreneurs often use biased samples such as a small number of friends or potential customers.

2.3 Evidence of biases among entrepreneurs

Simon, Houghton, and Aquino (2000), in a survey of MBA students’ willingness to start businesses, found support for the view that belief in the law of small numbers, and illusion of control both reduce perceptions of risk. This view is further supported by Keh, Foo, and Lam (2002) in a study of owners of top SMEs in Singapore. They followed a similar research methodology, but also tested for planning fallacy bias. In their study illusion of control was fully mediated by risk perception while Simon, Houghton, and Aquino found it was only partially mediated by risk perception. Both studies failed to find support for the significance of overconfidence, and Keh, Foo, and Lam also failed to find support for the significance of the planning fallacy. However, Busenitz and Barney (1997), in a study of start-up entrepreneurs, found
strong support for the view that the entrepreneurs tended to be overconfident and that they employed the representativeness heuristic.

Note that it is particularly crucial in this field to thoroughly consider the methodologies of studies before deciding how much weight to give to the results of each study. Some of the authors explicitly recognize methodological concerns, but further criticisms are also possible. For instance, both Keh, Foo, and Lam (2002) and Simon, Houghton, and Aquino (2000) follow the methodology of Russo and Schoemaker (1992) in testing for overconfidence. This involves asking each respondent to give 90% confidence limits for ten different statistics such as Singapore’s unemployment rate in 1999 (Keh, Foo, and Lam: 142). The respondent is judged overconfident if more than one of the true figures lies outside the confidence limits given. One interpretation of this would be that people place too much weight on their central expectations. However, it could be argued that such statistical, general knowledge judgements bear little relation to those concerning entrepreneurial opportunities, and so the relevance of the results to entrepreneurial decision-making remains to be proved. The assumption seems to be that if a person exhibits a cognitive bias in making one type of judgement, then he will exhibit the same bias in making entrepreneurial decisions. Note also that psychologists have found that while people tend to be overconfident in general knowledge overconfidence tests, when asked after a test to estimate the number of questions they have answered correctly the estimate given tends to be correct, or too low (Gigerenzer, 1991; Griffin and Tversky, 1992).

Another possible criticism of some studies is that in presenting people surveyed with short case studies many details are left out about which respondents might make varying assumptions, which they might or might not state in their replies. For example, entrepreneurs might think in terms of employing different strategies in
exploiting an opportunity. For instance, some might think in terms of investing on a significant scale at the outset to exploit an opportunity quickly, while others might think in terms of making irreversible investments step by step to gather information on likely success. Different strategies would entail different levels of risk and potential returns. Further, as mentioned by Shaver and Scott (1991) when commenting on traits research methodologies, when asked to give advice on what someone else should do a respondent may not necessarily give advice that he would follow himself.

Such criticisms probably reflect the inherent difficulty of unambiguously measuring individual cognitive biases in complex and judgemental decision frameworks such as those faced in entrepreneurial opportunity evaluation.

3 Over-optimism and related biases

3.1 Optimistic bias

Optimistic bias is the tendency to believe things will turn out well. According to Taylor and Brown (1988) optimistic bias has three main forms. These are over-positive self-evaluation, over-optimism about future plans and events, and over-optimism due to the illusion of control bias.

Cooper et al. (1998) found in a survey of entrepreneurs that, while only around 25% of new businesses survive for more than five years, 81% of the entrepreneurs believed that their chances of success were at least 70%, and 33% believed they were certain to succeed. The interpretation of such results requires some care however. For instance, such positive statements may partly reflect a need for self-justification.
Cooper et al suggest that entrepreneurs may engage in what psychologists have termed ‘post-decisional bolstering’, in which decision makers tend to exaggerate the attractiveness of an option once it has been chosen. Entrepreneurs may also have a natural tendency to speak positively about their efforts due to an incentive to encourage others, such as financiers, employees, and customers to believe that they will be successful. If entrepreneurs are over-optimistic in making the decision to start a venture, and in making initial decisions on the venture, then this has additional implications as compared to a situation in which they only become over-optimistic once an initial commitment has been made.

Note that a number of authors have proposed models that attribute over-optimism and related biases to rational behaviour rather than cognitive factors. For instance, Van den Steen (2004) assumes that agents sometimes under-estimate, and sometimes over-estimate the likelihood of success of an action. In selecting actions with high probabilities of success, they are likely to choose those whose probabilities they have overestimated, and hence they will tend to be over-optimistic. Over-confidence, and illusion of control also form part of his model. Zabojnik (2004) assumes that people have the option to conduct tests of their abilities, and that such tests have opportunity costs. In his model this leads to a tendency for people to have over positive self-evaluations.

De Meza and Southey (1996) argue that most facts characterizing small businesses can be explained by new-entrants tending to be over-optimistic, and that banks have an important role in deciding which new-entrants should be given credit. In their model banks are more realistic in their estimates of the prospects of entrepreneurs, as the entrepreneurs themselves tend to rate their prospects too highly. Coelho et al. (2004) take a similar view, pointing out that over-optimism implies that
government should not intervene in order to correct what is usually taken as under-provision of finance for start-ups. Another perspective is offered by Bernardo and Welch (2001). They view overconfident entrepreneurs as providing a positive information externality to their social group by being more likely to explore their environment. If such externalities are significant enough then social welfare will be increased through having some overconfident people among the population, even though such people will not be behaving in an optimal fashion with regards to their own private welfare.

3.2 Heuristics & biases

Overconfidence, as defined above, leads to incorrect estimates of risks faced, but expectations might be either too favourable or too pessimistic, depending on whether a person’s probability estimates are biased towards positive or negative outcomes.

However, it may well be that people who are optimistic enough to undertake entrepreneurial ventures have tended to have been biased by overconfidence towards underestimating the risks that they face. Similarly, belief in the law of small numbers may lead to overconfidence if a small sample is used that is biased in a positive direction. Anchoring may lead to over-optimism about a venture as it progresses, in cases where expectations are anchored on forecasts that progress so far suggests are too optimistic.

3.3 Illusion of Control
The illusion of control is the tendency for people to believe that they can control, or influence, outcomes over which they actually have no control, or to overemphasize the level of control that they do have. It results from two main factors. Firstly, it can be difficult to judge the relative importance of skill and chance. Secondly people are motivated to control their environments. If entrepreneurs have an illusion of control then they will perceive less risk because they will believe that they will be able to minimize the occurrence of negative outcomes.

Simon and Houghton (2002:114-5) suggest that the illusion of control may be associated with entrepreneurs underestimating competitors’ responses to their initiatives. They cite Kerin et al. (1992) who argue that pioneers may fail to recognize that competitor responses are beyond their control, and Zajac and Bazerman (1991) who argue that cognitive biases lead to a belief that competitor responses will not affect their chances of success.

3.4 Planning Fallacy

The planning fallacy (Kahneman and Tversky, 1979a) is a tendency for people to underestimate the amount of time that it will take to complete tasks. It tends to be particularly strong in unique and highly uncertain situations.

The planning fallacy may be partly the result of people focusing on plan-based scenarios rather than relevant past experiences (Buehler et al., 1994). Kruger & Evans (2004) argue that the planning fallacy is the result of a failure of people to break multifaceted tasks down in their minds into their component parts. They find that when people are prompted to unpack the tasks the planning fallacy is reduced.
The planning fallacy leads to risks being underestimated, as it is likely that costs will turn out to be higher than expected.

3.5 Self-justification and escalation of commitment

Self-justification is the tendency to justify decisions, even if they had negative outcomes. Feelings of personal responsibility for decisions lead to the need for self-justification. The decision maker is influenced to justify his actions by his need both to prove his competence and rationality to himself (psychological self-justification), and to others (social self-justification). This can lead to escalations of commitment to failing courses of action (Staw, 1980). This would increase the risk of entrepreneurs making substantial losses.

3.6 Mood

Affect Infusion (Forgas, 1995; Baron, 1998) is the influence of affective states on decision-making. According to the Affect Infusion Model mood influences decisions when heuristics are employed, and when detailed decisions are being made, for example when mood affects recall from memory. Complexity and uncertainty increase the role of mood in decision making. People in a good mood are more optimistic about events, so affecting risk perceptions (Johnson and Tversky, 1983). Mood may also to some extent be shared across society (Loewenstein et al., 2001).

4 Perceived self-efficacy
Perceived self-efficacy, or simply ‘self-efficacy’, refers to the degree to which someone believes he has the ability to successfully complete a task. There is evidence of a positive correlation between perceived self-efficacy and the decision to be an entrepreneur (Chen et al., 1998; Shane, 2003: 111-2). Entrepreneurs’ self-efficacy has also been found to affect their business strategies and performance levels (Westerberg, 1998).

Perceived self-efficacy (Bandura, 1977, 1986, 1995; Gist and Mitchell, 1992) is closely related to the concept of perceived behavioural control, which forms part of the Theory of Planned Behaviour. People with high self-efficacy believe themselves capable of successfully taking adaptive action as challenges unfold. They tend to choose to undertake more challenging tasks and are less likely to be deterred from them. The latter point makes those with high self-efficacy more likely to succeed in a task, but also carries the risk of over-optimism, and of escalating commitments to failing courses of action (Glen et al, 1997).

The correlation between self-efficacy and actual abilities is imperfect. People who are clearly capable can perceive themselves as having low self-efficacy, while those who objectively clearly have poor capabilities for a task can be very confident.

The strongest sources of self-efficacy perceptions are mastery experiences, which are interpretations of the results of one’s own past efforts. Vicarious experiences (observing others) also have an impact, as do social persuasions (the comments of others), and somatic and emotional states. Emotional states impact through the emotional reactions people feel to the prospect of carrying out any specific task, and also through general emotional states, which affect people’s overall levels of optimism.
A variety of cognitive factors impact on people’s interpretations of information affecting their perceptions of their self-efficacies. For instance, people may selectively recall failures. Inaccurate assessments of self-efficacy may also result from past performance having been partly the result of group interdependencies. A further factor is a person’s attributional style. Someone with an optimistic attributional style explains negative events in terms of external causes and explains positive events in terms of internal causes (Baron, 1998).

Stajkovic and Luthans (1998) provide a meta-analysis of research on self-efficacy. There is much evidence showing a link between self-efficacy and success, although there is clearly an issue with causality in interpreting such evidence as success breeds higher self-efficacy, while high self-efficacy can breed success. Note that Hawkins (1992) argues that self-efficacy is a predictor rather than a cause of behaviour.

A further concept refers to the perceived self-efficacy of a group. This is termed collective efficacy (Bandura, 1995). This is the level of collective belief within a team of its own effectiveness in carrying out a task. Teams with high collective efficacy choose more challenging goals, put in more effort, and are more persistent. Studies have found support for a link between perceived collective efficacy and team performance (Sheperd and Krueger, 2002: 171-2).

A problem with the concept of self-efficacy is that it can be used in a way that does little more than simply substitute for the term ‘self-confidence’, which is already well used in entrepreneurship theory. It would, in fact, be entirely possible to model links between self-confidence, the decision to become an entrepreneur, and entrepreneurial behaviour as rational responses to self-knowledge, and self-learning.
It is perhaps in the more detailed insights into how self-confidence forms that self-efficacy theory can contribute most.

5 Intrinsic motivation and creativity

Intrinsic motivation (Deci and Ryan, 1985) is the motivation to do something for its own sake: because it is interesting and enjoyable. This is in contrast to sources of extrinsic motivation such as the receipt of a reward for carrying out an action, or the threat of being punished if results are not favourable enough. Hence intrinsic motivations provide additional incentives to undertake entrepreneurial activities (Delmar, 2000). People may become entrepreneurs in order to follow their interests. Interests may also be a good predictor of entrepreneurial behaviour. Intrinsic motivations may be more effective than extrinsic motivations in leading to creativity (Amabile, 1997). Intrinsic motivation is related to challenge and ability, and so is closely linked to perceived self-efficacy.

Evidence suggests that in some circumstances the introduction of extrinsic rewards can reduce intrinsic motivation. This is known as the overjustification effect (Greene, Sternberg, and Lepper, 1976). It would seem to be relevant to incentive systems for encouraging entrepreneurial behaviour within organizations, suggesting that in some cases it may be better to focus on encouraging intrinsic motivation, and to be careful not to damage them through extrinsic motivations. Discussions of economic applications of intrinsic motivation and overjustification (crowding-out) are provided by Frey (1997), and Frey and Jegen (2001).

A link between in intrinsic motivation and creativity was mentioned above. Ward (2004) provides an overview of cognition and creativity, noting the importance
of analogy, problem formulation, and merging separate ideas. There is evidence supporting the proposition that entrepreneurs tend to be relatively creative (Shane, 2003: 56-8)

6 Counter-factual thinking and Regret Theory

Counter-factual thinking is ex post thinking about how things might have been done differently. Counterfactual thinking can lead to regret, which can have the negative effect of lowering perceived self-efficacy. It can also lead to the formation of alternative strategies for the future, so that better strategies can be learned from experience.

Gaglio and Katz (2001), theorising about Kirzner’s concept of entrepreneurial alertness, hypothesized that alert people engage in counterfactual thinking that undoes causal sequences. They are therefore more prone to increase the complexity of their mental schema, and to change those schema, in response to novel events. Gaglio (2004) provides a more in-depth discussion of counterfactual thinking, and its importance in entrepreneurship. Baron (2000) found that entrepreneurs are relatively less likely to engage in counterfactual thinking, have weaker regrets over missed opportunities, and find it easier to admit past mistakes both to themselves and to others.

Note that ‘regret’ plays a somewhat different role in regret theory (Loomes and Sugden, 1987). In regret theory the overall level of satisfaction gained from following a particular decision option is a combination of the basic utility from the actual consequence, plus a decrement or increment due to regret or ‘rejoicing’ over
avoiding the consequences of alternative decision options. In regret theory regret is taken into account ex ante when making the decision.

7 Intentions-based models

Krueger (2000) espouses intentions-based theory as a means of understanding what triggers entrepreneurial activity. He argues that organizations influence attitudes towards entrepreneurial initiatives among their members, that organizational culture helps to determine subjective norms, and that organizations can take steps to improve their members’ perceived self-efficacy (which he uses instead of perceived behavioural control) and perceived collective efficacy. For instance, he suggests that organizations should provide their members with multiple low-risk mastery opportunities in order to enhance perceived self-efficacy. Shepherd and Krueger (2002) further consider the cognition of entrepreneurial teams from an intentions-based perspective.

According to intentions-based models, intentions are the best predictor of voluntary behaviour. Fishbein and Ajzen (1975) proposed the Theory of Reasoned Action. According to this theory, intention to act is determined by the decision-maker’s attitudes towards the behaviour and by his subjective norms. Attitudes towards the behaviour are its expected consequences. Subjective norms are what the decision-maker believes people whose views he cares about will think about the behaviour. Sheppard et al. (1988) give a meta-analysis of studies on the theory.

The Theory of Planned Behaviour (Ajzen, 1991) is an extension of the Theory of Reasoned Action. It adds a third factor into the determination of intentions. This is
perceived behavioural control. It is the decision-maker’s beliefs about how much control he will have over carrying out the behaviour.

Tests of these models in psychology have mainly been based on self-reports. However, evidence has suggested that self-reports may not be reliable (Ross et al., 1986; Manfredo and Shelby, 1988). See Budd and Spencer (1986), and Evans (1991) for critical assessment of the models, and of tests on them.

Fazio (1986) proposed an alternative intentions-based theory called the Attitude Accessibility Theory. According to this the faster someone can express an attitude, the stronger it is. The more accessible an attitude is, the more likely it is to guide behaviour.

8 Prospect theory and framing: attitudes to risk

Baron (2004) suggests that entrepreneurs may have a tendency to frame decisions in terms of the gains they will fail to make if they do not become entrepreneurs, rather than the losses they might make if they do, and that this therefore makes them more risk seeking. Baron also suggests that the overweighting of small probabilities may lead people to become entrepreneurs (the weighting function employed in original prospect theory overweights very low probabilities).

Palich and Bagby (1999) found evidence that entrepreneurs frame equivocal business scenarios significantly more positively than others. Entrepreneurs were much more likely to view scenarios as opportunities where others would see them as offering low returns in relation to their risks.

Framing refers to the way in which a decision maker is presented with, or perceives, a decision problem. For instance, a positive way of framing a gamble is to
tell a person he has a 55% chance of winning, while a negative way of framing it is to
tell him he has a 45% chance of losing. There is evidence that people are more likely
to accept a proposition when it is positively framed (Wang, 1996; Kuhberger, 1998).
Prospect theory is often used to explain framing effects. According to prospect theory
(Kahneman and Tversky, 1979b) the prospect of a loss is more heavily weighted than
the prospect of a gain when making a decision. This is termed loss aversion. Gains
yield an increase in the level of utility that is lower than the reduction in utility
yielded by losses of the same magnitude. In addition, the decision maker is risk averse
when choosing between gains, and risk seeking when choosing between losses.
Choosing between gains is subject to what is termed the certainty effect. The certainty
effect is where the difference between certain gains and probable gains is given a
higher weight by a decision maker than the same sized difference in uncertainty
between probable gains.

Loss aversion is one reason for status quo bias (Kahneman et al, 1991), under
which people have a bias towards preferring things as they are. Loss aversion means
that people give a greater weight to the negative consequences of change than they do
to the positive consequences.

Original prospect theory was modified by Tversky and Kahneman (1992) to
create cumulative prospect theory. It employs a modified mathematical model. The
exact behaviour predicted by the theory depends on the parameter values employed
(Neilson and Stowe, 2002) but citing experimental evidence Tversky and Kahneman
claim the following pattern of risk aversion: risk aversion for high probability gains,
risk seeking for low probability gains, risk seeking for high probability losses, and
risk aversion for low probability losses.
Evidence in support of prospect theory was discussed by Camerer (1998). However, some studies have produced results that are contradictory to it (Sitkin and Pablo, 1992).

There is some question as to whether prospect theory is applicable to situations in which probabilities are judgemental. Research has suggested that people may have problems reasoning with explicit probabilities. For instance, Weber et al (2004) and Hertwig et al (2004) find evidence that while decisions based on descriptions may be made as if probabilities of rare events are over-weighted, decisions based on experience are made as if the probabilities of rare events are under-weighted. This brings into question whether empirical results based on decision-making with explicitly stated probabilities are applicable to judgemental decision-making scenarios faced by entrepreneurs. It also suggests that the relevant experience of an entrepreneur may be significant in determining how accurately risk is perceived, as it helps to determine the frequency with which the entrepreneur has experienced different types of events.

9 Timid choices and bold forecasts: A further perspective on risk taking

Kahneman and Lovallo (1993) present a cognitive model of risk taking. The model is based on risky decisions that are not repeated routinely, and which are not made under severely adverse conditions. In severely adverse conditions prospect theory predicts that high-risk gambles are likely. There may also be a tendency towards escalation of commitments (Staw and Ross, 1989).
The model makes two separate predictions. The first is that people tend to underestimate risk. The second is that when they do recognize risks they tend to be biased towards a greater aversion to them than would be rational.

Forecasts are based on plans. The most likely scenario might be for things to go smoothly according to plan, but there can be a vast number of individually less likely ways for things to diverge from the plan causing less favourable outcomes. The sum of the probabilities of unfavourable scenarios is then large, but according to the model forecasts are nevertheless based on the optimistic scenario, hence leading people to become subject to the planning fallacy. This is a potential fault in taking an inside view of a problem. Kahneman and Lovallo claim that an inside view is overwhelmingly preferred to an outside view in intuitive forecasting. An inside view focuses on the case at hand, while an outside view focuses on the statistics of a class of similar cases. They claim that an outside view is more likely to yield realistic estimates, giving some protection against wildly unrealistic estimates.

Considering individual decision problems in isolation from others (i.e. using narrow decision frames) leads to sub-optimal decision-making as the advantages of pooling risks are ignored. Hence risk aversion is increased beyond the optimal level. Kahneman and Lovallo claim that it can be inferred from observed preferences that there is indeed a tendency for people to consider problems separately.

10 Risk and time

Das and Teng (1997) claim that neither the traits nor the cognitive approach to entrepreneurship can adequately explain the different attitudes to risk of entrepreneurs relative to non-entrepreneurs. They note that risk is intrinsically embedded in time
(Vlek and Stallen, 1980), and argue that the failure to incorporate time is a deficiency in both traits and cognitive research. They put forward the notions of risk horizon, and future orientation to help explain entrepreneurial risk behaviour. Although they adopt a traits approach they suggest that a more sophisticated framework might be developed by incorporating cognitive factors.

Future orientation is a personality trait, which they relate to the further trait of risk propensity. A person’s future orientation is whether he is more preoccupied with what will happen in the short-term, or with what will happen in the longer-term.

They suggest two types of risk horizon: short-range entrepreneurial risk and long-range entrepreneurial risk. Short-range risk is defined as variances in outcomes in the near future. Long-range risk is defined as variances in outcomes in the distant future. Into these concepts they incorporate the concept of missing-the-boat risk and sinking-the-boat risk (Dickson and Giglierano, 1986). Sinking-the-boat risk is particularly evident in new ventures in the short-run due to lack of financial slack and back-up. Missing the boat risk is more long-range, as it is about what the entrepreneur might miss out on in the future. They argue that the same individual may be given to low-risk behaviour with regards to long-range risk, while being given to high-risk behaviour with regards to short-range risk, or visa versa. They also argue that different types of entrepreneurs will tend to have different risk-horizons.

11 Economising on information costs

Another approach to analysing behaviour that deviates from full rationality assumes that people are rational in response to the information costs that they face. This begs the question of whether insights drawn from psychology, such as those discussed
above, can be brought together with economizing models of entrepreneurship to provide enriched theories, or whether the two approaches are incompatible.

Informational issues are central to entrepreneurship theory. For instance, Austrian theorists such as Hayek and Kirzner point out the importance of lack of information about others’ plans in leading to profit opportunities within markets (Pasour, 1989), and to the importance of alertness in identifying such opportunities. However neoclassical economics, assuming perfect knowledge, eliminates such possibilities. From an information cost perspective, once the entrepreneur suspects an opportunity may exist, the decision to investigate further depends on the relevant information costs not being too high. Information costs differ among entrepreneurs, depending on their contacts, expertise, the production facilities available to them, opportunity costs, and so on. For instance, some entrepreneurs already in the relevant industry might be able to cheaply trial a new idea, while for others trialling the same idea could be much more expensive. Opportunity identification, investigation, and exploitation can be seen as an information collection process, with the entrepreneur’s optimal strategy being closely related to his information costs, and his beliefs.

The real options approach in entrepreneurship theory (McGrath, 1999) gives lessons on how to respond to future information arrival. According to real options thinking the entrepreneur should value uncertainty, making investments that generate real options. For instance, a relatively small investment may generate the information needed to know whether it is worthwhile to invest on a larger scale. Hence high rates of failure of new entrepreneurial firms can be at least partly interpreted as the result of a process of testing the water, or in other words of creating real options. One restriction on the application of this line of reasoning is that sometimes entrepreneurs
need to invest on a significant scale at the outset in order to build barriers to entry before others, who observe what they are doing, copy their ideas.

However real options theory, in particular theory that is closely derived from financial option models, involves a particularly restrictive assumption. The efficient markets assumption, used in the valuation of options traded on financial markets, means that all currently available information is already reflected in the market price. The result of real option models paralleling this assumption is that it is assumed that there is no endogenous information collection process to go through in valuing a real option, or in deciding whether to exercise it. It is simply assumed that particular information will arrive at particular times, rather than that the decision maker has to decide what information to collect. The entrepreneur is assumed to be a creator of real options rather than a collector of information.

Note that, when considering what information an entrepreneur will collect, it is a mistake to assume that he will economize on information costs simply by deciding how much information to collect, then collecting it, and then making a decision. This neglects the sequential aspect of economising on information costs. The collection of information inherently involves option value (Wadeson, 2004). For instance, economic search theory involves the derivation of rules to decide when to stop collecting information and make a final decision. There is option value in the decision of how much information to collect. Information collected so far affects the expected value of collecting further information, so the decision of when to stop needs to be made as the information is collected; not before. There is also option value in deciding which information to collect next. Information collected so far changes beliefs, so affecting choices over the subsequent path of information collection.
In order to optimize the information collection process, and hence option value, the correct choices have to be made over what information to collect next. Other things being equal, it is best to collect cheaper information next. However, the incentive to collect particular information next is also increased if it is more likely to alter the subsequent path or lead to rapid abandonment.

Further, information is often collected as a by-product of implementation actions (Wadeson, 2010). For instance, in starting a venture the entrepreneur learns more about it, such as the market response. Therefore, as part of optimising his information collection process, the entrepreneur has to decide how and in what order to perform implementation actions. Collecting information as a by-product can reduce the option value that it involves, as reacting to the information in ways that do not build on what has already been done involves a loss of sunk costs. By-product information leads the entrepreneur to adjust his plans after launching a venture, but in ways that are to some degree constrained by his initial investments. Having gained by-product information the entrepreneur might alternatively decide that he prefers abandonment. For instance, he might have discovered that there is not the market for the product he is producing that he had expected. This need not be seen as ‘failure’, as it can be the result of an entirely efficient process of information collection. The point is that the entrepreneur needs to collect the right information, in the right sequence, and in the right ways. Further he needs to be willing to abandon at the correct moment, if it is justified by the information that he has collected.

The theories from psychology described in earlier sections do not seem to be contradictory to the essential message of this information cost approach. However, it does suggest that entrepreneurs may often collect information and respond to it in less than optimal ways. For instance, anchoring on plans of success, the confirmation bias,
and the need for self-justification can all reduce the option value that entrepreneurs gain in the information collection processes that entrepreneurial ventures involve. This can also then lead to increased risk, such as that of escalation of commitment to failing courses of action. It may also be, however, that educating people in the logic of such processes can reduce such biases. For instance, people could find self-justification in having efficiently collected information that leads to abandonment, or by thinking in terms of exercising their real options. Additionally, it is possible that successful serial entrepreneurs, due to selection and experience, tend to be less susceptible to such biases, and are therefore able to more flexibly respond to new information. For instance, Baron’s (2000) finding that entrepreneurs find it easier to admit past mistakes suggests that they are less susceptible to self-justification bias. However, cognitive biases may also play an important role in decisions of whether to become entrepreneurs in the first place. Hence it may be that successful, and experienced entrepreneurs tend to be less susceptible to cognitive biases relative to novice entrepreneurs. On the other hand, past success may itself increase some biases, such as overoptimism.

There seems to be no reason why some of the theories described in previous sections should not be used alongside, or incorporated into, economic models. For example, over-optimism could be analysed by seeing what happens to the entrepreneur’s strategies as his initial beliefs become more favourable. This might lead the entrepreneur to decide to launch a venture, to launch it on a larger scale at the outset, and to collect less information before doing so. Such integrations of the two approaches could prove fruitful in allowing further analysis of how entrepreneurs’ strategies may be affected by cognitive factors.
12 Conclusion

The cognitive approach seems to be a promising line of study, offering interesting insights into entrepreneurship. Some of the literature in this field is rather uncritical of the theories from psychology whose use they promote in the study of entrepreneurship. It is necessary to recognize that psychology is not a fixed body of knowledge but is evolving, and subject to its own debates. Hence in using its theories entrepreneurship researchers should recognize criticisms and counter arguments made by psychologists themselves. They should also take account of debates in psychology on the advantages and disadvantages of alternative methodologies for carrying out empirical studies on the theories.

It should also be noted that in many instances there are significant inherent difficulties involved in trying to draw firm conclusions about cognitive processes from evidence of behaviour in making complex decisions, such as those faced by entrepreneurs. For instance, proving a bias means knowing what the optimal behaviour would have been, but this may be very difficult to determine.

In order to understand the decision-making processes of entrepreneurs it is also necessary to consider the lessons of the real options, and information cost economizing approaches. The latter approach stresses the option value involved in processes of information collection inherent in entrepreneurial ventures and provides insights into how such processes should be sequenced. This view can be combined with effects identified by psychologists in order to better understand how entrepreneurs’ strategies may often deviate from optimality.

Finally, some readers will be interested in how culture is related to entrepreneurial cognitions (Mitchell et al, 2002), and to risk taking (Weber and Hsee,
1998, 2000). Culture would seem to have a significant role. For instance, in the theories from psychology described above, some of the more obvious ways in which culture might have an impact are through subjective norms (intentions-based models), social persuasions (self-efficacy theory), and the role of social self-justification (escalation of commitment theory). Lehman et al (2004) provide a review of culture research in psychology.


