



# A field study of entrepreneurial decision-making and moral imagination<sup>☆</sup>

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## ABSTRACT

How entrepreneurs make decisions under extreme uncertainty and ambiguity is central to explaining entrepreneurial success. However, because of their pioneering nature, these decisions also have significant ethical implications. While there has been an increasing focus on the unique approaches entrepreneurs take to decision-making, less attention has been paid to the inherent ethical dimension of making decisions under high uncertainty. This study applies the concept of moral imagination to the challenges of making entrepreneurial decisions under Knightian uncertainty. It examines the extent to which entrepreneurs use moral imagination to integrate the ethical dimensions of pioneering situations into their decision-making.

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## 1. Executive summary

Entrepreneurs increasingly operate at the edge of human knowledge in making pioneering decisions that bring fundamentally new products and services into existence. Making decisions under such levels of ambiguity and uncertainty is fraught with difficulty. In unstable environments and in experimental situations, consequences and possibilities become impossible to fully determine. However, because of the nature of new technologies and the potential for new products and services to make fundamental changes in our lives, pioneering entrepreneurial decisions are also characterized by potentially great ethical significance. Furthermore, as technological progress tends to outpace moral consensus, entrepreneurs often have to make these decisions without clear guidance over the ethics of their decisions. While there are strong indications that entrepreneurs adopt distinctive cognitive approaches to problem solving under uncertainty, to date we know little about how they incorporate the ethical dimensions of such situations.

Moral imagination has been proposed as an approach to ethics through which decision-makers can combine creative thinking and ethical rigor to move beyond the constraints of rule-based ethical frameworks. This research examines the role of moral imagination in decision-making in highly entrepreneurial contexts. The study specifically addresses the following questions: What role does moral imagination play in incorporating ethics into entrepreneurial decision-making under high uncertainty? If there is evidence that entrepreneurs display distinctive cognitive approaches to solving “strategically” pioneering entrepreneurial problems (Sarvasvathy et al., 1998; Sarvasvathy, 2001), do they also apply different cognitive approaches to the ethical aspects of these situations?

Because of the important contextual and institutional influences on decision-making, the research was carried out in the field, recording real pioneering entrepreneurs making decisions in their own workplaces on the types of problems that are typical to their entrepreneurial environments. A case protocol of a challenging ethically pioneering situation was developed based on field research within the biotechnology industry. Participants were selected for experience in both entrepreneurial decision making and in working in ethically rich environments. Interviews with 12 entrepreneurs, together with a comparison group of MBA students, provide the primary data for analysis and assessment. Verbal protocol and interview data were analyzed using continuous comparison techniques, pattern analysis and other techniques widely used in ethnographic research.

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The findings suggest that the entrepreneurs exercised a much higher degree of moral imagination than the MBA students. The study leads to a series of descriptive propositions about the use of moral imagination in entrepreneurial situations and confirms some of the suggestions of the moral imagination literature, while contradicting other aspects of existing theory. Most importantly, the study adds a greater level of detail to our understanding of how moral imagination might be engaged to incorporate the ethical dimension of entrepreneurial decision-making under high uncertainty. Specifically, the study found that the entrepreneurs tended to select a moral identity of an integrated human being guided strongly by their personal values, to frame the problem as primarily ethical at the outset, and to use a series of techniques through which they imaginatively explored, interpreted and made personal connections to the problem. The MBA students, on the other hand, were more likely to select an identity of a role-playing manager, to frame the problem as primarily one of financial risk, and to use a process of deliberation that emphasized rational calculation on a narrow range of stakeholder perspectives and from a detached or instrumental perspective. These differences beg additional exploration to determine whether they arise from differences in functional background, differences in the contexts themselves, or merely result from raw differences in the length and type of practical experience. However, they offer important insights into distinctive approaches for addressing ethically complex problems in an entrepreneurial context.

The findings have a number of important implications. First, they begin the process of fleshing out the concept of moral imagination, which has, to date, remained an abstract ethical concept of great potential. Second, the study indicates that consideration of the ethical aspects of these decisions is not just a matter of context, moral sensitivity or process and technique; it is also a matter of how decision-makers view themselves, in particular their moral identity, and thus how they see the role of the entrepreneurial decision-maker. Finally, the difference in approaches has important implications for entrepreneurial education, which are briefly discussed.

## 2. Introduction

Entrepreneurs must frequently make decisions under conditions of particularly high uncertainty (Knight, 1921; Schumpeter, 1942; Kirzner, 1973; Venkataraman, 1997). It is only under such conditions that imaginative and enterprising individuals are able to perceive or create novel opportunities that have gone unnoticed or unimagined by others, and in pursuing these opportunities, to capture entrepreneurial profits that would not be available under more certain and stable conditions (Knight, 1921; Venkataraman, 1997; McGrath and MacMillan, 2000). This challenging context contrasts with more static decision situations typically associated with managerial action, where there is uncertainty over which outcome may come to fruition but where most of the possibilities are well understood. Under conditions of “true” Knight (1921) uncertainty, not only are future outcomes uncertain, but even the possibilities are unknown at the decision point, as the relevant data is simply not available (Busenitz and Barney, 1997).

Complicating the situation further, many of the decisions which entrepreneurs make are fraught with ethical tensions (e.g. Dees and Starr, 1992; Timmons and Spinelli, 2004). In entrepreneurial contexts, an ignorance of the full range of possibilities can preclude traditional ethical consideration of costs and benefits (Bucholtz and Rosenthal, 309, 2005). Furthermore, while conventional business decisions are often constrained by social consensus around the ethics of the situation (Brenkert, 2002), in entrepreneurial situations technological innovations can progress well in advance of social consensus (Marshall, 1999), leaving the entrepreneur with less guidance for deliberations and less clarity on the range of possibilities. At the same time, the pressures and demands of entrepreneurial action create an environment in which it becomes tempting to act expediently even when doing so may run afoul of ethical considerations (Bhide and Stevenson, 1990; Morris et al., 2002).

While a growing body of work in entrepreneurial cognition has sought to understand how entrepreneurs make decisions despite uncertainty, we know little about how entrepreneurs address the ethical dimensions of the decisions they make. For instance, scholars have examined the various heuristics and biases that shape entrepreneurs' thinking about the opportunities they consider pursuing (Palich and Bagby, 1995; Busenitz and Barney, 1997; Baron, 1998; Keh and Foo, 2002; Simon et al., 1999). These studies have typically found that entrepreneurs deviate significantly from purely rational models of decision-making when assessing the likelihood of achieving success with their ventures, with success typically defined as the survival, growth and profitability of the entrepreneurial venture (Baron and Ward, 2004). While there has been a recent upsurge in interest in the ethics of entrepreneurship, little of this work has focused on the ethical aspects of the central decision-making process through which entrepreneurs evaluate potential ventures and decide how to pursue them.

In this paper, I draw upon emerging theories of moral imagination to shed light on the processes through which entrepreneurs make decisions in situations characterized by both high uncertainty and ethical saliency. Moral imagination has been proposed as an approach to ethical decision-making in morally ambiguous situations that challenges entrenched mindsets and enables the decision-maker to “creatively ponder viable alternative solutions to what appear insoluble economic dilemmas” (Werhane, 1999, 106). By relating to both the creative and ethical challenges of decision-making, moral imagination has great potential to shed light on entrepreneurial situations. Thus, in this study, I focus on exploring the role of moral imagination in entrepreneurial decision-making. The study attempts to provide detail about how moral imagination is used in practice and what implications this has on the process of entrepreneurial decision-making and on the education of potential entrepreneurs.

In attempting to flesh out emerging theory in this area, this study employs verbal protocol analysis to examine the decision-making processes of 24 entrepreneurs and MBA students as they considered a highly uncertain and ethically salient decision. The study found higher incidence of decision-making processes associated with moral imagination among the entrepreneurs than among MBA students. Further, the study also identified an important role played by the moral identity of the decision-maker throughout the decision process. Finally, the study identifies a number of deliberative techniques associated with moral imagination, thus beginning the process of detailing how moral imagination is used in practice.

### 3. Ethical decision making

A number of scholars have explored ethical decision-making within a business context (e.g. Trevino, 1986; Jones, 1991). Within this stream of literature, many aspects of the decision-making process have been developed, with over 170 empirical articles published between 1996 and 2003. The majority of this work – 70% of recent studies according to O’Fallon and Butterfield (2005) – has focused on identifying the external variables that affect the choices of decision-makers. As such, we have learned a great deal about the influence of individual traits, for example, age, gender, nationality, professional affiliation, religion, etc. (Ameen et al., 1996; Singhapakdi et al., 2001; Cherry and Fraedrich, 2002). Similarly, studies have described how contextual variables, such as moral intensity, competitiveness of environment, and industry type, affect decision-making outcomes (Robertson and Rymon, 2001; Shafer et al., 2001; Shapeero et al., 2001; Oz, 2001). However, what remains less clear is the *process* through which managers make ethical decisions, or specifically *how* individuals “wrestle with the process of resolving ethical conflict” (McDevitt et al., 2007). This has led some to observe that “[extant] ‘models’ of the decision process often fail to give a compelling account of the actual processes in which an individual engages when making decisions about ethical issues and constitute little more than a list of variables which may influence that unexplicated process” (Bartlett, 2003).

Furthermore, ethical decision-making in a specifically entrepreneurial context is also not well understood. Research has shown that, because of the highly uncertain contexts in which they operate, entrepreneurs tend to adopt distinctive cognitive approaches to decision-making. For instance, studies show that entrepreneurs tend to apply decision-making approaches that are less rational (Busenitz, 2003; Busenitz and Barney, 1997), less comprehensive (Fredrickson, 1984) and more reliant on heuristics (Busenitz and Lau, 1996), and that they tend to consider different sources of information (Kaish and Gilad, 1991) and in different ways from non-entrepreneurs (Palich and Bagby, 1995). Furthermore, entrepreneurs have been found to make greater use of means-focused or “effectual” thinking, where, for example, goals emerge through action (Sarasvathy, 2001). While these studies indicate that entrepreneurs adopt distinctive cognitive approaches to problem solving under high uncertainty, we know little about how they incorporate the ethical dimensions of these problems. Various studies have focused on whether entrepreneurs tend to act more or less ethically than other managers, resulting in some contradictory findings (Bhide 2000; Kalleberg and Leicht, 1991; Van Auken, 2005; Morris et al., 2002; Teal and Carroll, 1999). This puzzle remains unsolved.

This raises the central question of this study: if there is evidence that entrepreneurs display distinctive cognitive approaches to solve “strategically” pioneering entrepreneurial problems (Sarasvathy et al., 1998, Sarasvathy, 2001), do they also apply different cognitive approaches to the ethical aspects of these situations?

### 4. Moral imagination and entrepreneurial decision-making

Noting similarities between moral and creative decision-making challenges in the entrepreneurial process, scholars have suggested that moral imagination could enrich our understanding of ethical decision-making within the entrepreneurial context (Dunham and Werhane 2000, Bucholtz and Rosenthal, 2005). Moral imagination has recently emerged from the ethics literature as a more practical and productive approach to ethical decision-making than traditional rule-driven ethical approaches (Kekes, 1991; Nussbaum, 1990). Introduced to the business context by Werhane (1999), moral imagination has been further applied to Rest’s four-stage model of ethical decision-making by Moberg and Seabright (2000). However, despite its growing influence in ethical theory there has been only one empirical study of moral imagination (Caldwell and Moberg, 2007), which focused on the influence of ethical culture rather than the entrepreneurial context. While debate over the precise meaning of moral imagination continues within the philosophy literature (Moberg and Seabright, 2000), for the purpose of this study I will follow Caldwell and Moberg (2007) by adopting a definition of moral imagination that is characterized by moral sensitivity, perspective-taking and the creation of fresh alternatives. However, even though Moberg and Seabright’s model remains the most complete, the authors acknowledge that many questions remain, such as, “What tools aid the internal process of imaginative deliberation? Is moral imagination facilitated by the ability of decision-makers to flexibly switch between ethical paradigms? What role does self-perception have in the process of moral imagination?” (Moberg and Seabright, 2000). With these questions in mind, this study explores the degree to which moral imagination plays a role in the ethical deliberations of entrepreneurs within highly ambiguous and ethically charged decision contexts.

### 5. Methods

This qualitative field study uses an adaptation of verbal protocol analysis (Ericsson and Simon, 1984). A number of factors influenced the design of the study. First, scholars have observed that ethical deliberation is “inherently subjective and experiential” (Bartlett, 2003, 232), where “no two people think in exactly the same way about the right thing to do” (Blake and Carroll, 1989, 99). Therefore, the subtlety to moral language and technical complexity of entrepreneurial situations requires a nuanced approach. Second, ethical decision-making research can be vulnerable to “social desirability bias” where participants’ post hoc responses may reflect how they wish to be seen, rather than how they actually behave (Busenitz et al., 2003, 300). One advantage of the study’s requirement of “talking aloud” while solving problems is that the possibility for conscious, or subconscious, deception by subjects is significantly reduced (Ericsson and Simon, 1984). Third, as the subjects’ ethical decision processes can be affected by the nature of the ethical dilemmas at hand (Jones, 1991), a complex business case, rather than a survey or simple ethical vignette, was used to replicate the type of ethically-rich decisions faced by the subjects in practice. Fourth, the literature has demonstrated that decision context, both physical and cultural, also has a moderating influence on the decision process (Trevino, 1986). Therefore, the protocol

**Table 1**  
Comparison of sample groups.

Participant	Entrepreneurs		MBA students	
	Years experience working in ethically intense environment	Years experience of entrepreneurial decision-making	Years experience working in ethically intense environment	Years experience of business decision-making
1	14	10	0	0
2	5	10	0	6
3	21	19	0	7
4	20	17	0	7
5	17	7	0	6
6	18	18	0	0
7	13	10	0	1
8	19	11	0	3
9	20	20	0	5
10	Not recorded	Not recorded	0	5
11			0	2
12			0	1
Average	16.3	12.4	0	3.5

was applied in the field, in the workplace of the participants, confronting participants with decision problems within their own organizational contexts. For contrast, the study also presented the protocols to a group of MBA students.

The development of the case protocol had a number of phases. Initially, focus groups of biotech entrepreneurs were asked to describe typical entrepreneurial decisions they had faced with significant ethical dimensions<sup>1</sup>. Several of these incidents were developed into full narrative cases. Each draft-case was reviewed by an industry expert to ensure the correct use of language and ensure realism in the cases. Finally, the cases were further developed through a pilot study. Using survey data from pilot participants, a case was selected for the protocol which was felt to be most typical for participants in this pioneering field. A copy of the case protocol is included in Appendix A to facilitate understanding of the study and the interpretation of the results. In brief, this case asked participants to choose to which customers they wanted to sell a unique biotech product which suffered limited production capacity in the short run. The product had many legitimate, but also some troubling illegitimate possible uses. The customers varied both in their profitability and in the clarity over the legitimacy of their intended use.

The biotechnology industry was selected as the setting, given the high levels of entrepreneurial decision-making, high levels of uncertainty and ambiguity, and high levels of ethical content. With the guidance of the leading biotech industry association, Genotype<sup>2</sup> Corp. was selected as a suitable business for the study. Twelve employees of Genotype were recruited by the Director of Corporate Affairs according to the following guidelines supplied by the researcher: “being experienced working in areas of high innovation, being experienced in making entrepreneurial decisions of significant ethical complexity, and each having a minimum five years’ experience in biotechnology.” The sample included both entrepreneurs who had been directly involved with the start-up in the firm, and active corporate entrepreneurs (Pinchot, 1985) who were responsible for innovation within a range of functions such as marketing, research or finance (Marvel et al., 2007). Most of the corporate entrepreneurs worked in the development and launch of new biotechnology products (See Tables 1 and 2 for details of the types of decisions and experiences of the subjects). Participants were not told of the criteria but were simply asked if they would participate in some “research into decision-making.” In order to provide a contrast to this sample of entrepreneurs, the study also used a comparison group of 12 MBA students selected randomly from a list. One limitation of the study is that, while the comparison group was used as a contrast to the entrepreneurs, this was not a controlled study. A number of possibly confounding factors could explain differences between these groups, most notably experience in entrepreneurial situations, life experience, domain expertise, training and education. Future studies are needed to separate these factors. However, the purpose of the study was simply to begin the process of better understanding the detailed practice of moral imagination. Finally, the overall sample size – 24 participants – is consistent with established methodology for protocol analysis (Isenberg, 1986).

Participants were asked to complete the talk-aloud protocol and the interviews were recorded for later analysis. Following the protocol with a series of open-ended questions, the interviewer asked participants to talk about how they solved the problem and how they made decisions in their work environments. The participants also completed a short survey which collected information about their experience, background and about the case protocol.

## 6. Data analysis

I followed Caldwell and Moberg (2007) and focused on the following three components of moral imagination: moral sensitivity, as indicated by frequent references to the ethical dimensions of the issue at hand; perspective taking, that is, the examination of

<sup>1</sup> The firms involved were all participants, through Bio, the biotechnology industry group, in the development of a training package on biotechnology ethics that was being carried out by Georgetown University, Johns Hopkins University and the University of Virginia. The author was also a researcher on that project. None of these firms was the ultimate site for the research study.

<sup>2</sup> The identity of the firm has been disguised. Genotype is a leading Biotech firm with a reputation for entrepreneurship and innovation. It was founded by a group of entrepreneurial scientists, a number of whom were participants in this study, and is based in Cambridge, MA.

**Table 2**

Examples of types of experience and decisions made by participants.

Participant #3	University researcher in biotechnology. Left to found biotech start-up. Continued to work as research scientist as well as new product development manager for 10 years. Has developed and launched dozens of new biotechnology products
Participant # 2	Left entrepreneurial career to become a research scientist focused on developing a drug treatment under the orphan drug program. Successfully raised two rounds to financing to cover the first two years research, while still carrying out basic research. Eventually sold-out the business to Genotype and is currently New Business Director for Genotype.
Participant # 9	Head of R7D lab for genotype. Makes decisions over which research projects are funded and which are commercialized. Has supervised dozens of patient trials including, for example “one which involved drilling holes in the skulls of patients in order to assess the efficacy of the drug treatment.”

Information taken from field notes of interviews.

the problem from the perspective of multiple stakeholders; and the consideration of multiple or unconventional alternative actions. However, given the early stage of development of theories on moral imagination, I remained open to emergent constructs that may also play a role in moral imagination. Concepts that did not fit into the preceding three categories were content analyzed according to the constant comparison method (Glaser and Strauss, 1967; Locke, 2001). This approach is compatible with similar studies that have examined and elaborated constructs and relationships that are not yet well articulated in the literature (Isabella, 1990). Thus, conceptual constructs emerged from a systematic analysis of the data rather than being derived solely from prior theory. As a result a number of new conceptual categories emerged, which were refined through comparison between the categories and new data incidents. For example, only through several iterations of analysis and findings did the category of “moral identity” emerge as a critical element of the framework developed.

The data analysis, coding and concept development were primarily carried out by the researcher, who personally conducted the face-to-face interviews onsite in the workplace. However, a number of additional measures were taken to ensure the validity and reliability of the coding and classification procedures. In line with many leading studies (Isabella, 1990; Sadler-Smith and Shefy, 2007), a sample of the raw data was given to an independent reviewer<sup>3</sup>. In order to avoid the effects of chance agreements, Cohen’s Kappa (K) was calculated, which compares actual percentage agreements with expected percentage agreement (Cohen, 1960). K is an index which ranges between 1 and zero. “Values of K in the range 0.81–1.00 are described as ‘almost perfect’; values between 0.61–0.80 are ‘substantial’; and values in the range 0.41–0.60 are moderate” (Sadler-Smith and Shefy, 2007, 195). Using this approach, K for this study was calculated to be 0.83. In addition, during the development of the emergent codes and categories the analysis was shared and reviewed by a professional colleague experienced in similar work and numerous modifications and changes were made. As such, I took these steps as evidence of reliability in the coding and category development process.

## 7. Results

The findings of the study have been structured around four major characteristics identified by the study: moral identity, a category which emerged from analysis of the raw data, and the three major components of moral imagination within the ethical decision-making process: moral sensitivity, perspective taking, and consideration of fresh alternatives.

### 7.1. Moral identity

One of the key findings that emerged from the study is the association between the moral identity adopted by the participants and their use of moral imagination in the decision process. The entrepreneurs tended to adopt a moral identity of a fully integrated human-being making a personal decision. In contrast the MBA students tended to adopt the moral identity of a detached professional carrying out a role.

Among the entrepreneurs, one participant captured the integrated self-concept nicely by stating that, “I also have to think of myself as a citizen of the world, and think about ‘Where do I want this to go and what do I want it to be doing?’” This moral identity was associated with two characteristic approaches to the decision protocols: evaluation of the situation against the entrepreneur’s personal beliefs and emotional engagement with the problem. For instance, it was common for the entrepreneurs to deliberate in the first person; for example, “I myself have problems with broad opportunity, uh, and to access people’s genetic backgrounds without the legal situation clarified so I have got real questions here.” Furthermore, by applying their personal beliefs they were able to reduce some of the ambiguity of the case. Thus, while one participant argued that, “I don’t have any problems in dealing in these sorts of [ethically complex] areas,” and another concluded, “[s]o is that ethical, socially acceptable? My own personal feeling is that it is not,” both integrated their personal beliefs into their decisions. At the extreme, some of the entrepreneurs used a personal belief at the center of their deliberations. For example, when contemplating his own decision process, one participant observed, “one way that I do that [make difficult decisions] is, me personally... if we put the patients first, lots of these ethical business issues become easy, so that’s what I use as a tool to help clarify.”

<sup>3</sup> The reviewer, a trained ethnographer experienced in non-business fields, was not aware of the purpose of the research. She was given a list of six major codes along with a brief description and examples. She then independently coded a sample of the transcripts. These were compared to the coding previously carried out by the lead researcher.

The entrepreneurs were also more likely to display their emotions as they assessed the situation. For example, on reading the recommendations made by their subordinates in the case, one participant shouted, “That is crap! So I would be seriously considering finding another marketing manager for diagnostics,” while another responded heatedly, “I would seriously consider getting rid of this guy because it seems to me that they have vastly underestimated the opportunity for this sort of device.” This greater tendency to respond emotionally was especially interesting as, of course, the participants were only responding to a hypothetical text-based case.

In contrast to the integrated human moral identity described above, the MBA students tended to adopt the moral identity of a detached professional carrying out a role. This approach was associated with impersonal analysis, evaluation of the situation against the beliefs of others and a separation between their personal values and professional role that was almost completely absent among the entrepreneurs. For example, the MBA students were only one-third as likely to analyze the case from a personal perspective. They more commonly talked about the case in the second or third person and referred to their role as a manager or as a professional. This decision-making role as a professional tended to be associated with a focus on making decisions for the benefit of shareholders and, as such, from a dominantly financial perspective. One student described it as follows, “Being in a management role, you’re – the number one stakeholder at the top of the list is the investor... So that’s really the number one issue.”

Another MBA student observed, “I am cognizant here of the fact that we are a publicly traded company and we have got to generate the returns that our shareholders are looking for.” Another fretted that, “we know that shareholders want profits, and don’t want the company broken up.” Others adopted a decision-making role of trying to satisfy executive management, offering comments like, “the executive committee is who I’m making the recommendation to and they are going to want me to recommend something with better profits.” Significantly, the MBA students did not apply personal values or emotions to the decision-making process, which was made explicit by a number of the participants. One particular series of deliberations is illustrative in this regard:

“Wearing the VP of research and product development hat...you know...sick patients are not really our concern...as cold and heartless as it appears, and this is probably not what I would say personally – I’m heartless. And even while I’m saying that...thinking through it, you know my personal beliefs don’t match up with what I do for a living.”

This final perspective draws a sharp contrast with one of the final observations of an entrepreneur, who stated that, “It seems to be that the decision that you personally feel most comfortable with is the right one...the ones that feel best are the ones to go with.”

## 7.2. Moral sensitivity

From the beginning of their analysis, the entrepreneurs were much more likely to explicitly frame the problem from an ethical perspective (See Tables 3 and 4). A typical comment was, “I feel that a company exploiting this kind of technology and innovation also has a responsibility to be ... working hand and glove on the ethics issues here.” Another put it this way, “I am going to bring it down more to ethics and this is the ethics of not using our machine just to make money and potentially hurt a lot of people.” Overall the entrepreneurs made twice as many references to ethical concepts (or related terms) as did the student comparison group. Furthermore, while all of the entrepreneurs, at some point or other, identified the case in ethical terms, 25% of the MBA students completed the case without any reference at all to “ethics” or related terms.

Two characteristics of the entrepreneurs’ perception of the problem seemed to lead them towards their more explicitly ethical perspective: complexity seeking and consideration of long-term strategic consequences. The entrepreneurs were much more likely than the MBA students to describe the problem as being highly complex, and this characterization was frequently linked to the issue of ethics. As one entrepreneur put it, “[t]his is one of the more complicated ones [problems]. I think it is clearly an ethical issue related to the values that your company has.” Or as another observed, “...we are talking about real complex ethical, controversial, confidential privacy issues here.” This recognition of the ambiguity and open-endedness of the situation seemed to orientate the entrepreneurs towards questions of ethics or values as a source of guidance. Thus, one entrepreneur stated that, “[m]y decision here is going to be based a lot on ethics because this is an area where there isn’t a clear guidance of what it is,...um..., exactly how the system is going to be used and what its future is.” While another observed that, “[f]or ethical reasons we need to understand more about this technology and its potential uses before we start to sell a lot.”

The second characteristic that led the entrepreneurs towards an explicitly ethical framing of the problem was an appreciation of the long-term strategic consequences of the decision (See Table 3). As one participant put it, “[t]he responsibility of a decision-maker is to return shareholder value, but over the long run, not necessarily over the immediate period in front of you.” This

**Table 3**

Total Coded Incidents – entrepreneurs versus student comparison.

Problem framed as...	Entrepreneurs		Students	
	# of Incidents	S.D.	# of Incidents	S.D.
...a long term <i>strategic</i> problem	9	0.6	3	0.5
...an explicitly <i>ethics</i> problem	7	1.0	2	0.4
...a <i>financial</i> problem	1	0.3	7	1.0
... a <i>control</i> or <i>risk</i> problem	0	0	9	1.1

**Table 4**

The framing of the decision protocol by category – entrepreneurs vs. students.

Framing as a strategic problem	<p>"I think that placing ten machines isn't the real issue. It is what we want to do as a company, and where do we want to go, what is our vision in how we want to do business." Participant G9</p> <p>"What I'm thinking right here is this is not going to be typical medical need, ethical decision allocation. Rather it's purely a customer development, market development allocation where a lot of what we have to be thinking about is customer value." Participant G10</p>
Framing as an ethical problem	<p>"My decision here is going to be based a lot on ethics because this is an area where there isn't a clear guidance of what its, um, exactly how the system is going to be used and what its future is." Participant G8</p> <p>"This is one of the more complicated ones [problems]. I think it is clearly an ethical issue related to the values that your company has." Participant G7</p>
Framing as a financial problem	<p>"What would you do? So it looks like Gordon Geico (sic) is hanging out in the shadows. Obviously we want to improve profitability and that seems to be the focus of the shareholders and obviously it should be our focus in a sense. We are looking at the top line revenue numbers so let me do some quick math here" Participant S2</p> <p>"The executive committee is who I'm making the recommendation to and they are going to want me to recommend something with better profits. What are the profit potential for the next ones." Participant S11</p>
Framing as a control or risk problem	<p>"I think really the strategy is to diversity our risks." Participant S7</p> <p>"...one thing I have learned in the past that especially with a new product that you might have some risks and uncertainties but that you don't go about it by giving away control to anybody [with] an exclusive contract." Participant S3</p>

tendency to consider the situation in the longer term enabled the entrepreneurs to move beyond consideration of immediate consequences and to reflect also on the underlying normative bases of the business itself. Thus, one entrepreneur concluded, "I am thinking [about] this in the long term...I think that placing ten machines isn't the real issue. It is what we want to do as a company, and where do we want to go, what is our vision in how we want to do business."

The level of moral sensitivity and the related characteristics of the entrepreneurs contrasted with the students, who tended to frame the case more narrowly as a problem of financial risk (See Tables 3 and 4). Associated with this perspective was a tendency to simplify the problem in a single dimension, and to view the situation in the short term often from the perspective of public relations. Thus, while the entrepreneurs grappled with and freely expressed their sense of the ambiguities which ultimately led to an ethical framing, the MBA students were much more confident and simplistic in their assessment of the nature of the problem. This simplification took two forms. For some, the decision to frame the case in terms of financial return was straightforward and alternative approaches to framing the problem were not considered. A typical student concluded that, "since we are looking at the same timeframe and this is pure numbers, then I would go with option number one," or another who simply stated that, "obviously case number one has a better gross margin – yes, I would go with number one." While some others did acknowledge alternative ways to frame the case, they explicitly chose to reject them. For instance, one MBA student stated that, "[benefits to patients are] just not relevant to me. Honestly, I'm more concerned about upside versus downside here. Which is the smarter decision? Not necessarily which one is the one that's more ethically correct." While another concluded that:

"I think that this is a great opportunity. I'm not exactly sure what markets or end uses they are targeting, but I do know that we will never get these kinds of margins in the USA and clearly I never actually took ethics in business school, so I'm not really bothered by any problems."

For the students this financial framing of the situation tended to be associated with a more short-term perspective on the problem, specifically articulated in their perception of external threats to themselves as decision-makers, either in terms of perceived pressure from outside the company or from within the executive team. They tended to perceive greater danger from external market forces and from shareholder demands. For example, one MBA student asked, "Obviously we want to improve profitability and that seems to be the focus of the shareholders and obviously it should be our focus." This short-term perspective was also associated with an emphasis on public relations that was almost completely absent among the entrepreneurs. For example, one student suggested, "we would have a PR disaster on our hands if we sell this [to an inappropriate end use]." Others saw public relations as a tool that could be used to resolve particular concerns, such as, "You've got to go with option one here. There's a moral question [over it], but I think that can be overcome," or, "I would see if I could negotiate something that comes out with a good spin." In more extreme examples, some MBA students adopted an explicitly instrumental approach to ethical issues, justifying their reasoning with comments like, "Let's go forward tentatively or cautiously and be sure that if this situation begins to turn poor for us that we have a way of spinning it such that we don't come out looking like real assholes."

### 7.3. Perspective taking and moral inclusion of stakeholders

Another distinctive characteristic of the decision-making process undertaken by the entrepreneurs was their consideration of the problem from the perspective of an extremely wide range of stakeholders. No one group of stakeholders dominated the deliberative process. Overall, the entrepreneurs considered 17 different stakeholder groups in 267 coded incidents (see Fig. 1 and Table 5). The entrepreneurs spent considerable time evaluating the problem, the consequences and the possibilities from the perspective of customers, shareholders and employees as well as from the perspective of indirect stakeholders such as patients, other scientists and the general public.

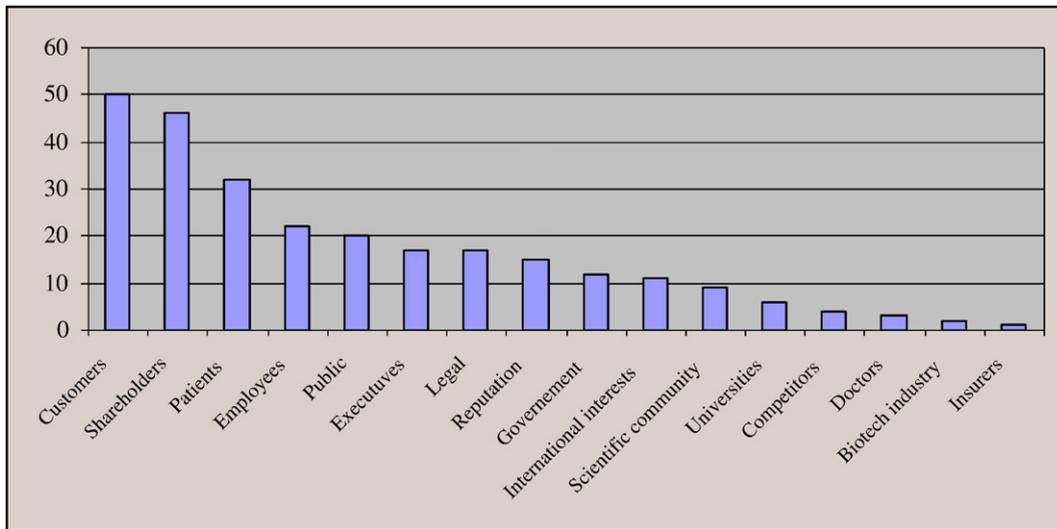


Fig. 1. Total incidents of consideration of stakeholders by entrepreneurs – by category.

Unsurprisingly, all of the entrepreneurs reflected on how the decision facing them might affect financial investors in the business. One participant suggested, “We would take a very hard look at the financial implications, and as it may be the short-term implications in P&L [profit and loss] management, for what it means to the business.” Others took the perspective of broader external financial interests and how the decision might affect the perception of financial strength, for example, “but the other factor that I’m thinking of is back to the Wall Street equation... Wall Street is an extraordinarily unforgiving world.”

However, in addition to paying attention to the perspectives of financial stakeholders, the entrepreneurs also spent considerable time deliberating from the perspective of their customers and potential customers. Customer interests were not simply viewed as short-term profit opportunities, but also in terms of longer-term strategic relationships. For example, when considering the option of selling the new product at a low price to some research-intensive customers, one participant commented:

“...and yeah, maybe we don't get as much profits, but they [preferred customers paying less than premium prices] will do greater things with it – that will drive our business, and we will get a higher profile of potential customers that will benefit our ultimate customers with patience.”

Furthermore, customer relationships were not considered as having solely instrumental value towards longer-term profits, but were also considered to have a value in their own right: “I believe that we should be selling the capacity...to our existing customer base... I’m compelled by that... [they] are carrying on important research with our product. We have already developed productive relationships with them.”

Table 5

Number of instances of stakeholder consideration – by stakeholder.

Stakeholders	Entrepreneurs		Students	
	Incidents	S.D.	Incidents	S.D.
Biotech industry	2	0.4	0	0.0
Competitors	3	0.6	1	0.3
Customers	28	2.8	22	1.4
Doctors	2	0.6	1	0.3
Employees*	22	2.6	0	0.0
Executive committee	9	0.9	8	1.7
Reputation*	3	0.6	12	0.7
Government*	4	0.7	8	0.8
Insurers	1	0.3	0	0.0
Legal*	16	1.7	1	0.3
Patients*	27	2.9	5	1.2
Public	13	1.5	7	1.0
Scientific community	5	0.9	4	0.8
Shareholders	23	3.4	23	1.5
International	4	0.9	7	0.8
Universities	4	0.5	2	0.4
Totals*	166	10.87	101	3.9

Employees were also important to the entrepreneurs. One entrepreneur, for example, weighted the employee recommendations highly because they had come from a team-based approach: “I very much like [this]; it is a great decision-making methodology... I am very happy with this team I have inherited; it's a wonderful thing.” However, others strongly rejected the employee advice, even to the point of questioning the judgment and abilities of these hypothetical employees. One entrepreneur stated that, “I'm going to have a private discussion afterwards with Karen [an employee who recommended a particular course of action] about taking at face value what aggressive start-up customers tell you about these things and pushing back on them.”

Indirect stakeholders also tended to play a significant role in the deliberations of the entrepreneurs. For instance, in the case protocol, the end users were patients using genetic technology who did not have a direct relationship with the firm. (The firm in the case was depicted as selling the equipment “wholesale” to laboratories and hospitals.) Nevertheless, the perspective of these patients typically played a significant role in the deliberations of the entrepreneurs. In fact, for one of the entrepreneurs, the possibility of the technology revealing information about ailments for which there are no cures yet was critical.

“If it [the firm's technology] indicates the likelihood that you would develop a cancer in the near term...things that you don't know of... then it gets really complicated and causes anxiety and breaches...then I think from our company image standpoint, then um, and out of respect of building this market, I would feel more comfortable going [another] route.”

Some considered the mental well-being of the patients as relevant to their decision, for example: “... there is the issue of potentially creating lots of very upset people because if you start to give the information without the full range of understanding and knowledge you can create a lot of problems.” Other entrepreneurs worried that patients could be vulnerable to exploitation by others: “I would ask for clarification on any genetic material, even if the guardian supplied permission, I think there is potential for [patient] abuse there.” In sum, consideration of the case protocol from the perspective of a wide range of stakeholders was characteristic of the way that the entrepreneurs deliberated.

Data from the MBA student comparison group confirmed and clarified the distinctiveness of the approach of the entrepreneurs describe above. Overall, the students exhibited nearly 50% fewer incidences of stakeholder consideration during their deliberations (see Table 5). Second, the MBA students also focused their deliberations on a much narrower group of stakeholders, particularly focusing on financial stakeholders. Interestingly the students considered the financial stakeholders with broadly the same frequency as did the entrepreneurs; however, because they gave much less consideration to other groups, the relative emphasis on financial stakeholders was much higher with the MBA students. It was also notable that the students paid very little attention to either patient or employee stakeholder perspectives regarding the decision at hand.

#### 7.4. Consideration of fresh alternatives

The third distinctive component of moral imagination displayed by the entrepreneurs was coming to moral judgment through the consideration of alternatives beyond the conventional. This approach was associated with two characteristics: challenging of case facts and the use of personal narratives or analogous stories.

The data suggests that the entrepreneurs were often confident in reinterpreting the meaning of facts or questioning the veracity of data in the case (See Table 6), thereby loosening up the constraints built into the case and making room for more creative thinking to generate a wider set of alternatives or to find ways to remove tensions between different groups of stakeholders. As one put it “I just don't buy into the pressure from the markets in this decision, that pressure is always there” demonstrating the unwillingness of the entrepreneurs to accept interpretations that might have put pressure on them to ignore or minimize the ethical issues.

Some of the entrepreneurs also challenged, on occasion, the very basis or objective of the decision-making process. For example, several participants challenged the directive from the Executive Committee in the case, which indicated that short-term finances should be given particular weight. One such decision-maker commented simply that, “I don't buy the concept that the Executive Committee is under great pressure to generate bottom line growth.”

An additional characteristic that was related to the generation of fresh alternatives was the use of analogous situations and personal stories throughout their reflections (See Table 6). This use of personal stories was a reflection of their distinctly “narrative”

**Table 6**  
Total coded incidents – entrepreneurs vs. student comparison.

	Entrepreneurs		Students	
	Incidents	S.D.	Incidents	S.D.
Long term perspective	<b>9</b>	1.1	<b>1</b>	
Complexity seeking	<b>12</b>	1.6	<b>3</b>	0.5
Challenges case facts or case structure	<b>13</b>	1.0	<b>3</b>	0.5
Uses analogies or refers to personal experiences	<b>12</b>	1.5	<b>4</b>	0.5
Speculative scenarios	<b>14</b>	1.5	<b>3</b>	0.6
Emotional or personal reaction	<b>21</b>	2.2	<b>10</b>	1.2

approach to framing the problem at hand. The analogous stories seem to be used for several purposes. First, they were used in order to interpret or categorize the case facts in light of contemporary issues. For example,

“I think that I would go to the US market with it because I think that it is the best plan, more accepting and I think that people have taken AIDS tests like this and it has worked out. There are other sexually transmitted diseases like this. The pregnancy test things like this that consumers are doing themselves more and I think that if that was the level of information and I assume it is for right now for this [case].”

Second, the entrepreneurs also drew on purely personal experiences in their use of analogies. Personal anecdotes linked to analogous situations were used to import lessons or principles that have been learned elsewhere into the decision-making process. For example, one entrepreneur reflected on his current job: “We struggle with this here as well [in the participant’s current job] in providing genetic diagnostic tests for diseases for which there is not yet a cure – is that ethically something that is right to do? And a lot of times we say no.” Finally, analogous situations were also used in the deliberative process of the decision-makers as a tool to help imagine future possibilities. For example:

“If we had a country like we have had recently, just take Bosnia for instance, where people are committing genocide and I think you have only to look back generations on what your ethnicity is, then you could potentially see our product being a state sponsored genocide just as a worse case scenario but something that I would be worried about with a Bermuda-based company that wasn’t subject to US law.”

## 8. Discussion

The study presented here supports and extends the emerging literature on moral imagination, while providing important insights into the ‘black box’ of ethical deliberation within an entrepreneurial context.

*Moral identity* has been used to describe an individual’s self concept made up of their personal responsibility and their moral ideals (Blasi, 1980, Moberg and Seabright, 2000, 867). Thus, individuals with high levels of moral identity will tend to describe themselves in moral terms as ethical human beings with “ethical thoughts feelings and behaviors” (Caldwell and Moberg, 2007). Individuals with low moral identity will tend to describe themselves in non-moral terms as, for instance, role players or agents for other moral actors. Thus, moral identity can play a role in identifying the personal stakes that the decision-maker has in a decision and therefore can help the decision-maker transform their moral judgments into moral intentions (Jones and Ryan, 1997).

The study suggests that the use of moral imagination in decision-making under extreme uncertainty is related to the strength of the moral identity of the decision-maker. Furthermore, the performance of the entrepreneurs in the study suggests that moral identity may be an antecedent influence on the three main components of moral imagination referred to in the study. It was notable that the entrepreneurs frequently referred to their moral identity right from the start of their decision process. For instance, the data illustrates several instances where high moral identity directly led to the early framing of the situation as an ethical problem. Entrepreneurs continued to refer to their moral identity throughout their later deliberations. This suggests that moral identity can influence the use of moral imagination in all stages of the decision process, rather than just during the later stage of intention-formation as has been previously proposed (Jones and Ryan, 1997).

In the study, moral identity was linked to the entrepreneurs’ willingness to approach the problem from a highly personal position. Unlike the students, who characterized themselves as carrying out the role of professional, the entrepreneurs presented themselves as fully integrated human beings, as “citizens of the world.” They emotionally engaged with the problem and demonstrated a desire to make a decision that was driven by their own beliefs and values. This highly personal approach is consistent with other research that has indicated that entrepreneur tend to act upon their own values more than most managers (Busenitz and Barney, 1997). While it could be argued that this highly personal approach might produce less efficient entrepreneurial decision-making, in this study a strong personal stance seemed to drive a greater sense of responsibility and therefore a greater willingness to grapple with all aspects of the problem, including the ethical. The emotional engagement with the issue, rather than clouding the entrepreneur’s thinking, seemed to allow the entrepreneur to understand the situation in a more full-blooded way (Nussbaum, 1990), to perceive the situation with a greater depth than is possible through intellectual analysis alone (Freeman et al., 2007).

*Moral sensitivity* refers to the ability to discern potential ethical implications and dimensions in the decisions we are trying to make. Morally sensitive framing may or may not include an explicit description of the situation as ethical, but it does incorporate a “basic awareness of how our actions could affect others’ welfare” (Rest, 1986 as cited in Moberg and Seabright, 2000). Moberg and Seabright have suggested that moral imagination can potentially enhance moral sensitivity in a number of ways. First, they argue that moral imagination encourages the decision-maker to challenge traditional schemas and scripts (Fiske and Taylor, 1991; Abelson, 1981). This tendency to describe problems using the dominant scripts and schemas of a situation has been associated with a decision-making approach that can blind ethical perception, result in emotional distancing, and lead to a focus on theoretical or schematic interpretation rather than on active thinking about the people involved (Moberg and Seabright, 2000, 851). In contrast, moral imagination can stimulate a mindful approach that stimulates new thinking on the situation, a rejection of scripts, and the noticing of ethical consequences.

In this study, entrepreneurs exhibited high levels of moral sensitivity, framing the problem as ethically laden from the start. In examining the factors that drove this heightened moral sensitivity, this study extends our understanding of the components of

moral imagination within the entrepreneurial context. Specifically, the moral sensitivity exhibited by the entrepreneurs seemed rooted in their tendency to acknowledge the complexity of the problem and to address the long-term consequences. Complexity seeking enabled the entrepreneurs to identify multiple features of the problem overlooked by the MBA students. The longer term perspective freed them from the scripts of short-term profit maximization. Together, these approaches allowed the entrepreneurs to explore the problem in all its messy dimensions and to engage in a sort of mental “free play” (Johnson, 1993; Werhane, 1999) with it. By doing so, the entrepreneurs deepened their thinking about the problems, “aerating” all the issues (Eisenhardt, 1989), their ramifications and possible responses.

The findings on the performance of the entrepreneurs suggest a strong association between the use of moral imagination and a very broad consideration of stakeholder interests. Broad and inclusive consideration of stakeholders has been widely associated with moral imagination. Moral inclusion can play a role in increasing the scope of justice (Moberg and Seabright, 851, 2000) whereas moral exclusion can create barriers to moral consideration (Treviño and Weaver, 1997). Furthermore, moral inclusiveness has been associated with an enriched capacity for the creative synthesis between conflicting demands (Bucholtz and Rosenthal, 311, 2005). However, the findings here also illustrate that moral imagination can influence perspective taking not just by increasing the scope of the stakeholders who are considered, but also through greater consideration of the nature of the relationships between the decision-maker and potential stakeholders. In this study, stakeholders' interests were not all considered to be of equal merit. The entrepreneurs weighted multiple factors, including the particular historical relationship which they had with particular stakeholders (McVea and Freeman, 2005), and also considered the moral worth of the stakeholder themselves. This finding is sympathetic to the suggestion that moral imagination can influence decision-making through the depth, as well as the breadth, of stakeholder considerations particularly by employing perspective taking and empathy (Moberg and Seabright, 853, 2000).

While the study confirms suggestions that entrepreneurs look at a larger volume and a greater variety of information than other managers (Kaish and Gilad, 1991), it builds on this finding by identifying the kinds of information to which they appeal when seeking to address the ethical dimensions of problems. By immersing themselves in the details of particular persons and relationships involved in the situation (McVea and Freeman, 2005); to those stakeholders' wants, needs, values, and aspirations; and to the potential good which can be constructed for all stakeholders over the long and short term, morally imaginative entrepreneurs provide themselves with the information and understanding they need to generate wise decisions (Sternberg, 2003).

The third distinctive component of moral imagination is coming to moral judgment through the *consideration of alternatives beyond the conventional* (Caldwell and Moberg, 194, 2007). As such, moral imagination “helps in developing fresh interpretations of particular scenarios...” (Werhane, 107, 1999). In the literature it has been suggested that moral imagination at this stage in the decision-process must entail the flexible use and integration of the full range of ethical theory traditions – rule-based, relationship and case-based (Moberg and Seabright, 2000). Thus, in considering fresh alternatives and forming judgment, moral imagination would be associated with the use and blending of utilitarian, deontological, virtue and other formal ethical frameworks. However, it is in this aspect of moral imagination that the study diverges the most from the literature. The data in the study shows little evidence at all of the use, or the integration, of formal or traditional ethical theories of any sort in order to generate or form judgment around fresh alternatives. In contrast, the study suggests that entrepreneurial moral imagination is associated with two characteristics during the formation of moral judgment: the challenging of case facts based on personal experiences; and the use of analogous or personal stories to resolve tension or create solutions.

Within the moral imagination literature it has been suggested that exposure to narrative literature can help activate moral imagination (Nussbaum, 1990; Caldwell and Moberg, 2007, 194). A facility to carry out this sort of analogous thinking can play an important role in helping the decision maker to imagine fresh possibilities and consequences. This in turn can serve as a means for identifying additional indirect consequences or dangers beyond the intuitive and for creating new solutions that dissolve the tensions between different interests. These findings are also sympathetic with suggestions of the importance of metaphors, analogies and thought experiments to making sense of complex and evolving situations (Weick, 1996, Nussbaum, 1990). The findings here build on these ideas by linking them to a more future orientated and ethical process. The construct of sense making thought experiments have been criticized for a retrospective emphasis and for an absence of ethical consideration (Wicks and Freeman, 1998). However, in the study reported here, the thought experiments of entrepreneurs encompassed their concerns about how they would personally feel about certain potential outcomes or how their actions might shape the field in which they operated. Such sense making has more in common with moral imagination (e.g. Werhane, 1999) where reflection on “possible future selves” is a central part of the formation of moral intent (Moberg and Seabright, 2000).

This research also has implications for further study and for education. The study raises important questions about what is driving the differences between the decision-making roles adopted by the entrepreneurs and the MBA students. While the two comparison groups in the study were selected primarily as experts and novices, there are a number of potential explanations underlying these differences: domain expertise, selection, experience, and education. Since morally imaginative skills are rare in the inexperienced and presumably more common in the experienced, do those without these skills fail over time or are they otherwise de-selected either by the internal organization or by external stakeholders? Or do these imaginative deliberative skills develop in the same person over time? In other words, can the inexperienced rationally calculative person eventually become more imaginatively deliberative over time? If time does indeed play a role, to what extent is this change affected by experience, or to what degree is it affected by education or training? These questions have some important implications for teaching. Since the inexperienced participants were MBA students, to what extent is their relative absence of morally imaginative skills reinforced by the MBA curricula? To what extent does MBA training reinforce an overemphasis on rationally calculative deliberation? Recently a number of authors have raised similar questions about the potential harms caused by an overemphasis on quantitative skills in

MBA programs (for example, Ghoshal, 2005). However, from the perspective of this paper, these issues raise a more specific challenge with regard to entrepreneurship training. Since entrepreneurs will, by definition, be more likely to be involved in making these kinds of decisions in the future, then surely entrepreneurial studies should explicitly include training aimed at developing the moral identity, as well as the technical skills, of entrepreneurship students to encourage the sort of morally imaginative skills that students will need in order to creatively rise to these challenges. Does the ethical responsibility of creativity require particular attention in entrepreneurship programs? If so, what sort of teaching tools, materials and programs might develop these skills as an alternative to waiting for the effect of experience?

## 9. Conclusion

This study has sought to examine the decision making processes of entrepreneurs facing ethical dilemmas in situations of high uncertainty and ethical salience. The results have implications for practicing entrepreneurs, for further research, and for educators.

From a practitioner perspective, the study begins the process of identifying an ethical decision-making framework that is particularly well suited to the challenges of morally charged but highly uncertain circumstances. However, the study also suggests that if entrepreneurs are to make better decisions in these kinds of situations, it is not just a matter of developing greater skills and practicing ethically sensitive techniques such as broad stakeholder management. How entrepreneurs see themselves and the role through which they choose to make their decisions is also critical to the ethical and entrepreneurial outcome. Without recognition of their “human” role as decision-makers, such skills and techniques can remain underdeveloped or underused. While much work remains to be done in this area, and we must be careful about drawing broad conclusions at this stage regarding the use and effectiveness of these techniques and approaches, the study nonetheless suggests that moral imagination in the kinds of complex situations facing entrepreneurs requires the cultivation of a set of skills and sensibilities that go well beyond the rational calculus.

## Appendix A. Case protocol

This problem involves making a decision about which customers to supply. You are in the fortunate position of having more demand for one of your new products than you can possibly fulfill. You have to present your recommendation to the executive committee tomorrow.

### *Background*

The product is called D.I.S. (DNA Identification System). As part of a previous project that you funded on genetic data analysis, your researchers have developed a new technique that can produce a genetic profile of an individual from a blood or hair sample or similar piece of human tissue. What is revolutionary is that the test can be carried out for a few cents and can be processed in only a few minutes.

It has never before been possible to provide comprehensive genetic profiles as cheaply and quickly as with the D.I.S. system. As a result, there are relatively few laws and regulations surrounding the offering of such service to the general public. Indeed a number of firms are trying to set up chains of genetic testing bureaus. Because Trident is working right at the edge of scientific knowledge, public debate on these issues has barely even begun. However, there certainly are no signs of general consensus, nor is the prospect of new legislation in this area imminent. The technology can also cheaply identify the racial background of subjects going back several generations. This feature offers great potential to scientists studying diseases that are associated with particular ethnic groups. However, this has also raised the concern that such information could be abused.

Because of manufacturing bottlenecks, your ability to supply D.I.S. systems is significantly less than the expected short-term demand. The manufacturing division is working hard at scaling up production from custom assembly production to mass production. Nevertheless, the manufacturing manager has assured you that he can guarantee a capacity of no more than a dozen systems over the next twelve months. Eventually they hope to reach a capacity of several hundred machines per year.

### *Decision team*

You have asked the product development team to develop a customer attractiveness analysis to determine, in the short run, where the next ten systems should be sold. However, since they are unable to agree among themselves on the best possible choice, three members of the team, Tracey J., Karen S., and Bob M., are each presenting a strong case for the customers of their choice. It is now up to you to make a decision as to which customer to choose.

1. Tracey J., Marketing Manager – International Operations: “I have a really exciting development for you all. I wouldn’t have dreamt of this proposal even a few months ago. We have been contacted by Falcon Industries, who would like to purchase a license to market the D.I.S. technology outside the USA. They are willing to pay \$15 million for the ten systems that we have available over the next twelve months, which would result in a gross margin of 70%. Beyond this, they would only request an exclusive license for sales outside the USA and would guarantee us a margin of 50% on all future sales. I have spoken with our

legal department, and they have assured me that these international sales are legal. Furthermore, our public relations department believes that the US government is unlikely to have any objections to sales in the future. Falcon is a private firm based in Bermuda. They also have offices in China, India and Brazil. Falcon has been around for over a hundred years. It started out as an import/ export business, but over the last twenty years they have developed an expertise selling licensed high technologies around the world. They have a number of exclusive agreements in nuclear power technology, aviation and electronics assembly. Over the years they must have been reliable partners, as they have been granted extensions to a number of these licenses several times. They seem to have a particular expertise in accessing the Chinese and Indian markets. From what I've heard, several rival manufacturers have tried to compete with them by directly marketing their product in these markets, but have always failed to get a foothold. I think this is a great opportunity. I'm not exactly sure what markets or end uses they are targeting, but I do know that we will never get these kinds of margins in the USA. Furthermore the agreement would leave us free to develop the national market any way we like. Look I know that Falcon got into trouble a while back when they tried to sell military technology to a government blacklisted by the US government. There was a lot of bad publicity, but they pulled out of that deal and their new management team has assured us that that is all in the past.

2. Karen S., Marketing Manager – Hardware Systems: “I don't know Tracey, who are the people behind Falcon? It is a private firm and we don't seem to know too much about them. I don't think that that is the way to go. Our best opportunity in the short term is to sell all the volume we have available to Genotype Corporation. Genotype is a new business founded explicitly to bring genetic testing directly to the consumer. They are well funded and have already raised \$100 million of venture capital funding. They are committed to being the first firm to provide genetic services at low cost in major cities across America. This is a very exciting opportunity because Genotype is offering good prices and has the ability to be a strategic partner in developing this product over the next few years. They aim to provide testing on any genetic material supplied to them (in the case of children they would require the permission of a legal guardian). They will provide customers with the fullest possible account of their genetic profile. Thus, the results would include information on genetic characteristics about which a great deal is already known. It would also include information on genetic characteristics the significance of which will only be fully investigated in the coming years. They will also provide, at a range of prices, various levels of interpretation and counseling services on the latest findings of genetic research. Because of the urgency of their commitment to the project, they are prepared to offer generous terms for the sale. They have offered to purchase ten systems, at gross margins of 55%, for total revenue of \$10 m. They will also pay the full sum on-delivery and make a down payment of \$1 m for options on the purchase of 20 further machines. I think Genotype are ahead of the next wave in healthcare. I think we have to commit to them now, or they will look for other partners.”
3. Bob M., Marketing Manager – Diagnostics: “Thanks Karen, but I have to say that I disagree. I'm just not sure we should be selling our product to a consumer-focused, 'fast-food' genetic testing outfit when we don't even know the significance of some of the information these customers will be getting. We need to be careful here. I believe that we should be selling the capacity that we have available to our existing customer base in research institutions across the USA. We have already delivered six systems over the last two years to institutes across the country. These partners are carrying out important research with our product. We have already developed productive relationships with them. They not only provide a reliable long-term market for the product, but they also will also be using the product to its greatest potential. Unfortunately, the current recession has put pressure on the finances of both government and private research institutes. The best prices that I have been able to negotiate would result in a total sales margin of 38% and total sales revenue of \$7.3 million for the ten machines we have available. I know that there is not much growth in this market. It will take us a few years to fill our capacity this way. And on top of this, sales will be strongly affected by the whims of the research budgets of the government and universities. Nevertheless, lot of the work in this field is highly speculative; however, as a whole, developments in this area have almost unlimited potential. Focusing on the research market is just the right thing for us to do.”

After the presentation, the team members continue to have long and heated debates about the pros and cons of the various sales opportunities. However, rather than reaching consensus, the discussion seems to drive them even further apart. The executive committee is under great pressure from the market to generate bottom-line growth. There have been a number of rumors suggesting that shareholder unhappiness about profit performance could start to attract the attention of take-over specialists, who might try to split Genotype up and sell the parts for greater than the sum.

What would you do?

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