

**Failing Fast:**  
**How And Why Business Angels Rapidly Reject Most Investment**  
**Opportunities**

By

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I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

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## **Abstract**

Seed technology ventures require external sources of debt and equity funding, once they have exhausted founders personal resources, to achieve their potential economic impact. The primary source of equity finance for seed ventures is from Business Angels who invest their own money in the company and frequently provide additional sources of assistance to the entrepreneur. Once seed ventures have completed their business plans, however informally, they pitch their opportunity to potential investors, However, less than three per cent of these pitches to Business Angels are successful. It is suggested that a major reason for this low success rates is a lack of understanding by pitching entrepreneurs of how Business Angels make their investment decisions. Investigating how Business Angels make their investment decisions will identify some of the causes of this high failure rate. In turn this will help to suggest ways for entrepreneurs to increase their likelihood of successful interactions with investors.

Real-time techniques that involve observing successive interactions between five Business Angels and 150 pitching entrepreneurs are used to gather data on the investment decision-making process. The technique of observational interaction has been used in psychological research to observe interpersonal relationships and their development within the context of a complex process. This complex process can best be understood by breaking down the process into stages. In this research the initial interaction between entrepreneur and Business Angel is investigated. It is found that initially the Business Angels use a filtering technique to expeditiously reject most opportunities. This allows, allow them to concentrate their limited resources on further investigation of a few promising opportunities that appear to offer the highest potential return.

The unique data set used in this research is taken from a reality TV show – CBC Dragons’ Den – where entrepreneurs participate in order to receive real investment from five wealthy individuals known as “Dragons”. Using the video material gathered during the recording of the show it is possible to observe how the five Dragons initially filter out most opportunities, before looking at more positive factors when determining their interest in investing in the few opportunities remaining. This filtering process involves a non-compensatory technique - Elimination-By-Aspects, where the presence of a single one of eight potential fatal flaws is sufficient reason for rejection. While this may not be the most accurate technique, it is the most cost effective approach to decision-making for the investors. To increase accuracy at later stages, the investors adopt a more compensatory decision-making approaches.

Improved understanding of the staged nature of the process, and how Business Angels identify fatal flaws at the initial stage of the interaction, provides valuable insights to both investors and entrepreneurs. Armed with this knowledge they can take steps to eliminate such flaws and improve the overall efficiency of the decision making process. This in turn will lead to an increase in successful outcomes of such interactions and consequently the number of seed ventures that are successful in raising third-party funding from Business Angels.

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## **1. Introduction**

Business Angels (BAs) are private investors who provide “risk capital directly to new and growing businesses in which they have no family connection” (Mason and Harrison, 1996, page 153). BAs fund 30 times as many early stage ventures as corporate investors, known as Venture Capitalists (VCs) and are important catalyzers of the economic activity stimulated by new venture creation (Sohl, 2007). However, most of the interactions between fund-seeking entrepreneurs and BAs lead to failure, with less than 3% leading to an investment (Mason and Harrison, 1994; Riding, et al. 1997). Researchers, such as, Freear et al. (2002), Mason and Harrison (2002) and Riding et al. (2007) suggest that this high failure rate is because the current investment process is inefficient, and call for research to identify opportunities for process improvement.

Prior research suggests that the investment decision-making process comprises a number of stages before the final decision to invest, or not, is reached (Feeney et al., 1999; Harrsion et al., 1997). However, as Landström (1998) identifies, most studies only look at a single stage of the process and fail to place each stage within the overall context of the investment decision. Specifically, Landström suggests future studies should consider “investment as a process in which decision-making criteria may vary in the course of time” (1998, page 322). Riding et al. echo this suggestion and note “there remains considerable room for research on the nature of the investment process itself” and “how the various decision criteria are weighted at different points in the process” (2007, page 335). Our research is a response to both suggestions.

Research on the decision-making process has been constrained by two factors, previous data has focused on collecting data from the end of the overall process, rather than at each stage of the process; secondly most research has gathered data on factors that lead to a positive

investment decisions rather than gathering data on the causes of failure (Wiltbank, 2005). Riding et al. (1997) identify the causes of such limitations, noting that part of the problem is because observing BA decision-making processes is difficult. Investor-entrepreneur interactions are usually geographically dispersed (Landström, 1995) and essentially private in nature (Mason and Harrison, 2000). Where data has been gathered, it relies on investors' post-decision recollections, making it difficult to isolate intermediate effects (Svenson, 1979), and compensate for the biases introduced by investors' recollections (Zacharakis and Meyer, 1998). Further, most data that has been gathered has been from opportunities that received investment, This limits the possibility of identifying causes of failure in the decision-making processes and identify opportunities for process improvement (Sharma and Mahajan, 1980).

In this paper, I focus on the first stage of the interaction between entrepreneur and investor in the investment process – the selection stage where measurable failure rates are highest (Riding, et al., 1997). During this stage, I follow the insights of Mason and Harrison (2002) who suggest that investors use a time efficient decision-making process to filter out most opportunities so they can devote more time to the few opportunities that best meet their investment criteria. These observations lead to my research questions: *During the first stage of the investment decision-making process, what factors do Business Angels consider when deciding which opportunities should be rejected? Are these factors the same as those used by a Business Angel to make their final decision to invest or not?*

Using observational interaction techniques to overcome the constraints identified in prior research, and access to a rich data set that includes both successes and failures, I confirm the use of eight critical non-compensatory factors used by investors to reject opportunities at the selection stage of the process. In our sample, the failure of an opportunity to reach a minimum standard in any one of these critical factors leads to rapid rejection of the opportunity, thus the

term ‘fatal flaw’. This decision-making technique greatly reduces the number of opportunities to be considered at subsequent process stages, allowing the investor to devote more time for further investigation to each opportunity that has not been rapidly rejected. However, while the absence of these critical factors is highly predictive of the filtering stage of the process, there is no evidence that the presence of the same factors is able to predict funding. This suggests that BAs consider additional factors to these eight, before making their final investment decision.

I proceed as follows. First, I provide a background on extant research on the BA investment decision-making process and raise concerns about the biases and constraints of prior research. Using insights on the staged nature of the investment process and adaptive decision-making techniques, I propose the filtering technique used by BAs during the selection stage of the process and suggest eight critical factors used to differentiate between continuing to engage in the evaluation of a particular opportunity and the decision to reject it. I confirm that investors identify the presence of a single fatal flaw as a cost-effective filtering technique based on our observations of 50 interactions between entrepreneurs and investors who participate in a Reality TV show. The use of a real-time approach, that gathers and records data while the event is taking place, allows some of the identified biases to be overcome, and a rich data set collected that provides both qualitative and quantitative insights. This technique allows each of the stages in the overall process to be observed and provides insights into how BAs adapt their decision-making techniques at different stages in the process. Analysis of this data set provides insights into entrepreneurial behaviours in this context and how the information exchanges with the potential investor can increase or reduce the likelihood of an opportunity moving to the next stage of the investment process. I conclude this paper by suggesting some direct implications for entrepreneurs from our research and then outlining how this research can contribute both theoretical and practical insights that might stimulate future research in this area.

## **2. BA investment decisions**

High growth-potential companies often require additional equity financing. However, the percentage of such ventures able to attract third party funding is low (Riding, et al., 1997). This is traditionally attributed to the fact that either many ventures are not ready for investment or there is a lack of available risk capital. Mason and Harrison (2002) challenge this view, suggesting there are inefficiencies in the investment decision-making process that limit the number of ventures funded. They propose that improved process understanding will reduce the number of failures in interactions between entrepreneurs and investors, an insight that this paper builds on.

Most research that attempts to understand the BA decision-making process usually starts by assuming that BAs make their investment decision in an identical manner to VCs. This assumption often occurs because, it is assumed that VCs are professional experts in this area and therefore they must make better decisions. In addition, there is an assumption that VCs constitute the major source of funds for new ventures. It is also considerably easier to collect VC information than BA data due to the increased accountability VCs have to their funders for their decision-making processes. Recent research, for example by Van Osnabrugge (2000), in examining the differences between BA investment decision-making and that of VCs identifies several causes of these differences. The most important factors being the differences in objectives and expectations that exist between BAs and VCs and the fundamental difference in roles of each set of investors, due to differences in agency relationships — BAs invest their own money, while VCs invest funders' money. The increased level of VC accountability affects both their decision-making criteria and decision justification.

VCs are also not the largest funders of seed ventures. In fact, BAs rather than VCs dominate the early stage of venture funding, investing more money and about 30 times more

frequently (Sohl, 2007). As Sapienza et al. (1996) note, this is partly a function of the investment expectations of VC funds, which encourage VCs to invest in later stage opportunities, where liquidity events are sooner and perceived risk levels lower. It is also a function of the important coaching role that BAs can undertake, an investment in time which is more challenging for VCs due to their need control their management expense ratios. The relative importance of BAs as a source of early stage finance is also noted by Madill et al., (2005) who observe that pre-existing BA funding is a pre-requisite for VC investment in 90% of cases. The importance of BA investments, current low interaction success rates and incomplete understanding of BA decision-making processes, motivate this research. As Mason and Stark (2004) suggest, recognizing how BAs, VCs and banks differ in their decision-making processes, will allow entrepreneurs to respond appropriately to each one and increase the likelihood of success in each case.

## 2.1 Factors considered by BAs when making their investment decisions

Research on BA investment practices dates back to the early eighties when Wetzel was motivated to understand the importance and demographic characteristics of BAs in a specific regional context - New Hampshire, U.S.A (Wetzel, 1981). Further demographic research was carried out by: Haar, et al. (1988) in the U.S.A., Mason and Harrison (1995) in the U.K. and Riding, et al. (1993) in Canada. These studies conclude that BAs are: wealthy males who had direct startup experience and invested in local ventures. To explain BAs' motivations and behaviors, DalCin, et al. (1993) attempted to better understand their psychological attributes concluding that BAs have a high internal locus of control and need for achievement.

Research on the characteristics of BAs has now been extended to help explain their investment decision-making processes (Feeney et al., 1999; Sudek, 2006). This research looks at

factors considered by BAs and the decision-making process itself. Specifically positive factors BAs consider when making a decision to invest identified in prior research are summarized in Table 1 (Bachher and Guild, 1996; Feeney et al., 1999; Haar et al., 1998; Haines et al., 2003; Landström, 1998; Paul, 2007; Sudek, 2006; Van Osnabrugge, 2000). Product, market and entrepreneur are all important categories in the decision-making process, as are the financial potential of the business and the investment terms (Sudek, 2006). Specific individual factors frequently mentioned as being of high importance include: an identifiable barrier to future entry, the presence of a large and growing market and evidence of a sustainable business model. In the Table, very high positive ratings are indicated by +++, high positive ratings by +++ and positive ratings by +++.

Differences in the nature of each factor can affect how the BA assesses it, for example, some of the factors are objective - such as number of years of relevant entrepreneurial experience or the date a patent was issued. These can be rapidly and easily determined. Others are more subjective, such as entrepreneurial trustworthiness or investment-fit and take longer to assess. Much of the previous work that identifies the relative importance of these factors ignores how or when in the process, each factor is assessed. Despite our observations about agency differences affecting the decision-making process, there are few obvious differences between the factors considered by BAs and VCs. This is apparent when comparing our analysis of BA factors with a similar summary of factors considered by VCs compiled by Zaccarakis and Meyer (1998, page 61), shown in the Appendix.

Importantly, Feeney et al. (1999) and Mason and Harrison (2003), note the absence of certain factors linked to the rejection of a specific opportunity. These negative factors, also shown in Table 1, include: entrepreneur experience, prototype availability, patent protection and

TABLE 1:

Factors considered by Business Angels when making investment decisions

|   |                           |                  | + ve factors            |                      |                       |                       |                  |                    |             | - ve factors |                      |                        |                        |
|---|---------------------------|------------------|-------------------------|----------------------|-----------------------|-----------------------|------------------|--------------------|-------------|--------------|----------------------|------------------------|------------------------|
| Factor<br>(++ = positive,<br>-- = negative) |                           | Critical Factors | Bachher , Guild (1996)) | Feeney et al. (1999) | Haines, et al. (2003) | Van Osnabrugge (2000) | Landström (1998) | Haar et al. (1988) | Paul (2007) | Sudek (2006) | Feeney et al. (1999) | Mason, Harrison (1996) | Mason, Harrison (2003) |
| Product                                     | Interest/Benefits         | *                | ++                      |                      |                       | ++                    | ++               | +++                |             | ++           | ---                  | -                      | --                     |
|   | Status                    | *                | ++                      |                      |                       |                       |                  |                    |             |              |                      | ---                    |                        |
|   | Protectability            | *                | +++                     |                      |                       | +                     | ++               | ++                 |             | +++          |                      | ---                    |                        |
|   | Innovation/Quality        |                  | +++                     |                      |                       | +++                   |                  |                    |             |              |                      | -                      | -                      |
| Market                                      | Market size               | *                | +                       |                      | +                     | +++                   | +                | +++                |             | +++          |                      | -                      | --                     |
|   | Customer engagement       | *                | +                       |                      |                       |                       |                  |                    |             |              |                      |                        |                        |
|   | Growth potential          |                  | +++                     | +                    | +++                   | +++                   | ++               |                    | ++          | ++           |                      |                        | -                      |
|   | Supply/Distribution       | *                |                         |                      |                       |                       | +                |                    |             |              |                      | -                      | -                      |
| Entrepreneur                                | Market dynamics           |                  | ++                      |                      |                       | +++                   | +                | +                  |             | ++           | ---                  | -                      | -                      |
|   | Industry experience       | *                | +++                     | +                    | +                     |                       | +++              | +++                | +++         | +++          | ---                  | ---                    | ---                    |
|   | Track record              |                  | +                       | +++                  | +                     | ++                    | +++              |                    |             | ++           | -                    | -                      |                        |
|   | Passion, commitment       |                  | +++                     | +                    | +                     | +++                   |                  |                    |             | +++          | ---                  |                        |                        |
|   | Integrity, trustworthy    |                  |                         | +++                  | +                     | +++                   |                  |                    |             | +++          | ---                  |                        |                        |
| Financial                                   | Tech. knowledge           |                  | +++                     |                      |                       | +++                   | ++               |                    | ++          |              |                      |                        |                        |
|   | Expectations              |                  |                         | +++                  | +                     |                       |                  |                    |             |              | ---                  |                        |                        |
|   | Profitable/ realistic     | *                |                         | +++                  |                       | ++                    |                  |                    |             | ++           | ---                  | ---                    | --                     |
|   | Capitalization, cash flow |                  |                         |                      |                       | ++                    |                  |                    |             | ++           | ---                  | -                      |                        |
|   | Size of investment        |                  |                         | +++                  |                       | +                     |                  |                    |             | +            |                      |                        |                        |
|   | Plan/presentation         |                  | +                       | +                    |                       |                       | +++              | +                  |             |              | ---                  | -                      | --                     |
| Investment                                  | ROI /valuation            |                  |                         | +                    | +                     | +++                   | ++               |                    |             | ++           | -                    | -                      | --                     |
|   | Liquidity                 |                  |                         | +++                  | +                     | +                     | ++               |                    | +           | +++          | -                    |                        | --                     |
|   | Team characteristics      |                  |                         |                      |                       |                       | +++              | +++                | +++         | +++          | ---                  | ---                    |                        |
|   | Entrepreneur fit          |                  | ++                      | +                    | +++                   | +++                   |                  |                    | ++          | ++           | ---                  |                        |                        |
|   | Business fit              |                  |                         |                      |                       | +                     | ++               | ++                 | +++         | +            | -                    | -                      | --                     |
|   | Location                  |                  | ++                      |                      |                       | +                     | +                | +                  | +++         |              |                      |                        |                        |
| Analysis                                    | Referral source           |                  | +++                     |                      | +                     |                       |                  |                    |             |              |                      | -                      |                        |
|   | Co-investment             |                  | +                       |                      |                       | +                     | +                |                    |             | +            |                      |                        |                        |
|   | Investor role             |                  | +++                     | +++                  | +++                   | +++                   | ++               |                    |             |              |                      |                        |                        |
|   | Research Method           |                  | Q                       | T                    | F                     | T, P                  | Q                | P                  | R           | P            | T                    | I,R                    | V,R                    |
|   | Analysis                  |                  | M                       | Q                    | Q                     | M                     | C                |                    | Q           | VM           | Q                    | Q                      | Q                      |
|   | Number of Business Angels |                  | 20                      | 153                  | 51/20                 | 302                   | 73               | 121                | 30          | 72           | 153                  | 1                      | 30                     |

Research Methods: Q1 = Questionnaire with on-site interview/support, T = Telephone survey, P = Postal questionnaire, R = Real time technique, F = Focus groups, V = Video base

Analysis: M = Mean ranking, C = Conjoint Analysis, Q = Qualitative and quantitative response analysis

projected profitability (Harrison et al., 1997), product attractiveness and market conditions (Feeney et al., 1999), and relevant entrepreneurial experience or a growing market opportunity (Riding et al., 1997). In fact compared to the positive factors, Harrison et al. (1997) note that these negative factors can be fatal, such that their absence immediately eliminates an opportunity from further consideration. For this reason I call them ‘fatal flaws’.

I also include in Table 1 an assessment tool developed by the Canadian Innovation Centre - the Critical Factor Assessment. This assessment tool, based on the product development work of Cooper (1994), uses eight critical factors that are both positively and negatively correlated to long term business potential – but not directly to investment potential. The identification of so many factors is confusing to the entrepreneur trying to make sense of the relative importance of each positive and negative factor. I suggest that at the initial stage of the investment decision-making process, the eight factors identified in the Critical Factor Assessment are the most important, with other factors of relatively smaller importance or considered at alternate stages in the process. How and when each factor is considered is discussed further in Section 3.

## 2.2 The BA investment decision-making process

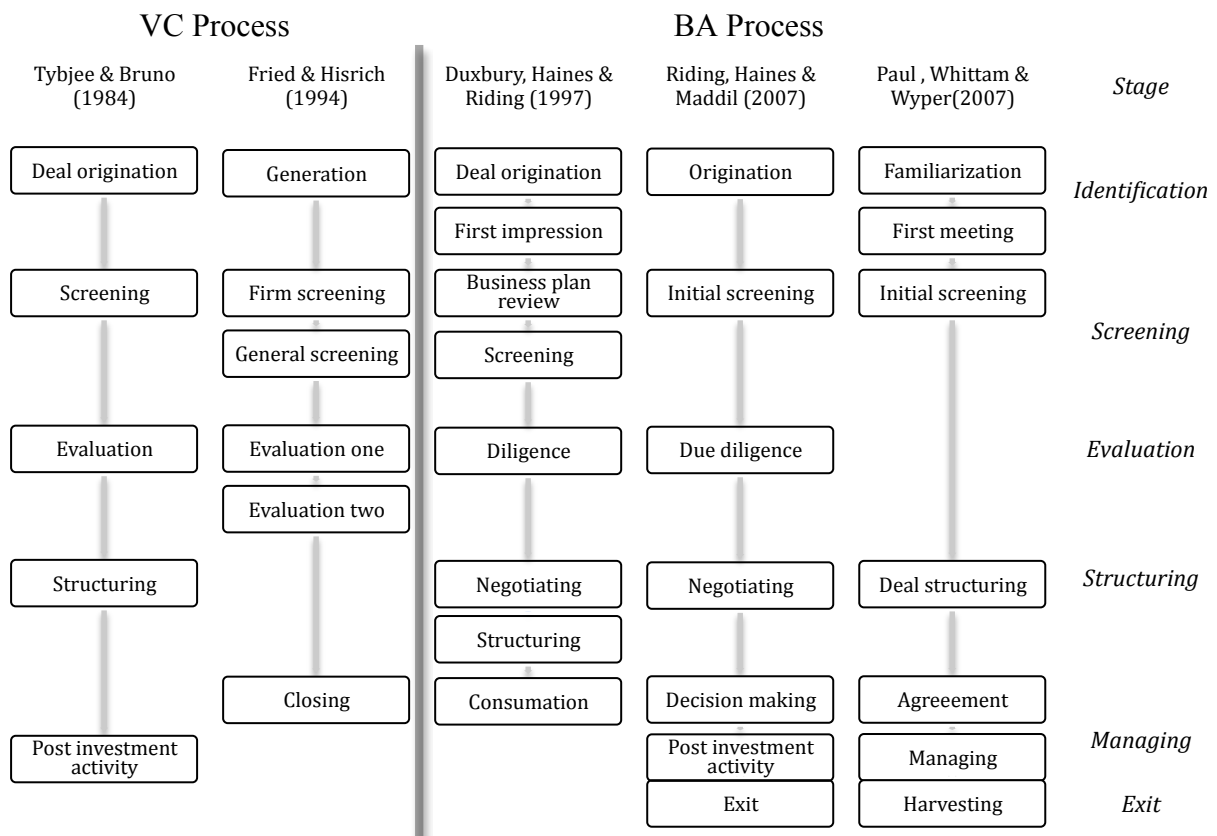
Researchers have identified the staged nature of the investment decision-making process, suggesting different decision-making activities occur at each stage. The general model includes a stage that occurs before the interaction between investor and entrepreneur takes place, the interaction itself and the stage once the investment has been made. In Figure 1, I show three models of the BA investment process (Duxbury et al., 1997; Paul et al., 2007; Riding et al., 1997) alongside two classic VC investment models (Fried and Hisrich, 1994; Tyebjee and Bruno, 1984). The first formal model of the BA process was developed by DalCin, et al., (1993) and reveals all three phases of this linear model, which include both the pre and post interaction



stages: (a) identification, (b) screening (c) diligence, (d) negotiation, (e) deal consummation and (f) venture management. It is this model that was expanded by Riding et al. in 1997, when sub-stages in both the identification and screening stages of the process were added. An complementary approach was developed in 2000 by Van Osnabrugge, that has recently been confirmed by Paul et al. (2007) based on interviews with 30 BAs.

The pre-interaction stage of the process - identification, occurs when trusted third parties refer a limited number of fund-seeking entrepreneurs to a specific interested investor (Fried and Hisrich, 1994). Amatucci and Sohl (2004) note that it is difficult to obtain a first meeting with the investor without a referral from an individual with a high reputation. The BA will also likely consider the nature of the business, and the track record of the entrepreneur before agreeing to meet.

FIGURE 1  
Stages of the decision-making process



At the next stage, the first part of the interaction process itself, the investors uses a screening or selection process to filter out most opportunities with limited business potential – based primarily on the information provided by the entrepreneur. This avoids the investor in wasting time on opportunities with limited business potential. During the next stage of the process - evaluation or assessment, the potential business value and investment risk of the opportunity are determined. Some of the decision-making models refer to this stage as diligence<sup>1</sup> because the investor validates the information provided by the entrepreneur based on his prior knowledge and access to third party information. This process also requires the BA to expend effort in interpreting the validated information and using it to complete an initial assessment of the future value of the venture and the perceived risks faced both by the venture and their investment in it. The investor then modifies his or her valuation and risk assessment of the venture and investment based on a combination of direct experience and their availability of complementary assets. If this modified assessment of risk and return meets their investment criteria, he or she will make an offer to invest that includes a valuation and a shareholder agreement that structures the proposed working relationship. Subsequent to investment, both parties work together to manage the growth of the business, before identifying and agreeing an appropriate liquidity event.

Both Paul et al. (2007) and Riding et al. (2007) point out that these process models are simplified and do not reflect the iterative nature of the process. They note that viewing the process as a linear progression does not reflect its complexity or that opportunities can become stuck at various stages. As Riding et al. suggest “there remains considerable room for research on the nature of the investment process itself.” They go on to recommend the use of models from other

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<sup>1</sup> We confine the use of the term diligence to a more expensive part of the consummation process that takes place once an agreement to invest has been made. It involves outside assistance from accountants, lawyers or technologists to verify factual claims made during the interaction by the entrepreneur (Jensen and Meckling, 1976).

disciplines that posit “how individuals arrive at decisions,” noting that this issue does not yet “appear to have been considered with respect to business angels” and conclude there is a need to study “how the various decision criteria are weighted at different points in the process” (2007, page 336). This research responds to these suggestions.

### 2.3 Identifying and addressing the limitations of prior research

Prior research that relies on data gathered from investors’ post decision recollections, limits our ability to understand how and when each factor is considered in the overall decision-making process. Zacharakis and Meyer (1998) observe further problems in relying on investors’ recollections, noting investors do not always themselves understand how they make decisions - instead relying on “gut feel”. Shepherd and Zacharakis (1999) also identify another problem when relying on investor’s recollections - the introduction of confirmation seeking and outcome or hindsight biases.

Confirmation seeking bias occurs because an investor may justify his previous decision-making process by interpreting information in a way that confirms his preconceptions (Mynatt et al., 1977). As a result, an investor tends to provide reasons to defend his previous decision rather than trying to recollect the actual decision process he or she used at the time. Outcome or hindsight bias occurs when the decision-maker reflects on his decision once the outcome of that decision is known (Baron and Hershey, 1988). Retrospective data gathering allows an investor to modify recollections of how a decision was made based on outcome information obtained subsequent to the decision-making process rather than solely on information he knew at the time. This is a particular issue in decision-making under uncertainty. At the time of the decision there were future risks and uncertainties that subsequently may be perceived as being more predictable than they were (Fischhoff and Beyth, 1975). As a result, an investor tends to remember what he or she thought would happen more strongly if those predictions end up being correct. The

combined effect of these biases increases the likelihood that decision-making explanations do not reflect the actual decision-making process that was used.

Selection bias causes another problem that limits understanding of factors that affect negative and positive decisions. Most research data is gathered from companies that receive investment, rather than companies that do not. This limits researchers the ability to identify factors that differentiate between success and failure. For example, it is difficult to use entrepreneurial confidence as a diagnostic decision-making tool, as suggested by Sudek (2006), when Astebro et al. (2007) find evidence that too much confidence is often linked to failure. To fully understand the role of each factor in the decision-making process, it is necessary to better understand its differential impact on success or failure. However, collecting data from companies that fail to attract funding is challenging. Many of these companies do not survive - so accessing information subsequent to the event is difficult. Even in cases where decision-makers who did not invest are identified, it can be hard to understand their real reasons for their decisions.

Hall and Hofer (1993) suggest real-time data gathering techniques can overcome these constraints and biases. These techniques record data while the interaction progresses allowing for subsequent analysis and observation of detailed process. The collection of this type of data set, which includes both successful outcomes and failures, provides an opportunity to identify diagnostic factors that differentiate between the two. It also facilitates an understanding of when in the overall decision-making process each factor is considered and how the investor gathers data about each of the factors of interest.

Verbal protocol analysis, described by Ericsson and Simon (1984), is the most commonly used real-time technique first applied to VC investor decision-making by Sandberg, et al. (1988). Mason and Stark (2004) used the same technique to record BA's thoughts about the investment decision-making process. The use of this technique addresses some of the validity concerns

identified but does not eliminate several of the identified biases because it still relies on investor's recollections. Outcome bias can be reduced using concurrent verbal protocol analysis, where the investor records his or her thoughts while making the investment decision. However, recording these insights in real-time can inhibit the actual interaction (Kuusela and Paul, 2000). Alternatively, if the investor uses verbal protocol analysis post-interaction, by referring to tapes or transcripts, he or she can again impose outcome or confirmation-seeking biases. An alternative approach, designed to remove these biases has been experimentation, with participants playing the role of either investor or entrepreneur (Cable and Shane, 1997). However, experimental techniques may contain hypothetical responses that reduce external validity, as they cannot replicate the entrepreneur's attachment to the idea, emulate the real risks involved or place the interaction as the first step in the development of a long-term relationship. I conclude that a better research method is the use of third party trained observers to gather and analyze information exchanges and participant behaviours in an environment, with real risk and the knowledge by participants of the long-term implications of any negotiated agreement. This approach is known as observational interaction (Gottman, 1998).

### **3. Hypothesizing the investment decision-making model**

The nature of the interaction between entrepreneur and investor, like similar complex negotiations, proceeds through a number of stages, with behaviours evolving as the parties move from one stage to the next (Adair and Brett, 2005). I suggest that investment decision-making can be broken down into a number of stages where the investor adapts his decision-making technique at each process stage. Based on the investor's previous investment experience he or she selects the most cost-effective technique to use at each stage, starting with one technique which he or she has developed based on previous experience and then changing this technique at subsequent stages in the process as the nature of the context changes. This research focuses on the selection stage of the process, when the BA is faced with evaluating a large number of potential investment opportunities. At this stage the investors chooses a decision-making technique that minimizes his or her required effort per opportunity to rapidly reject most opportunities, while limiting the chance of discarding one of high potential. This elimination of most opportunities from further consideration allows him or her to focus a much greater level of attention on the remaining opportunities of greater interest. At these subsequent stages, when most unsuitable opportunities have been filtered out, the investor changes his decision-making technique to identify positive reasons to invest.

#### **3.1 The investment decision-making process**

Payne, et al. (1993) define decision-making as taking and then processing several pieces of information in order to reach a conclusion. They note the effort required by the decision-maker is a function of: the number of pieces of information considered, their complexity and the context in which the decision is made. They suggest that individuals break down complex decisions into a series of stages and choose the most cost-effective decision-making technique to use at each

stage - where cost-effectiveness is a function of effort and level of accuracy required. A decision-maker, faced with making similar decisions over time, will use heuristics to choose his decision-making techniques, although the choice of technique used can also be influenced by the investor's need to justify his decision-making to others. A summary of the primary decision-making techniques developed by Payne et al. (1986) is provided in the Appendix, which also shows a figure that identifies the relationship between effort in decision-making and accuracy of decision.

Shepherd et al. (2005) note the time constraints placed on VCs that limit the amount of time they can spend evaluating new investment opportunities. BAs are also time constrained, as they often undertake their investment activities on a part time basis and have to balance management of their existing portfolio and other responsibilities with the identification of new opportunities (Mason and Harrison, 2002). Payne et al. (1993) identify one of the most common filtering technique deployed at an early stage in a selection process is Elimination-By-Aspects (EBA) first noted by Tversky in 1972. While EBA is often the most cost effective initial decision-making technique, it does not always provide the most accurate outcomes. The fact that investors are willing to use it implies they are willing to trade off a reduced effort requirement for a less accurate outcome.

In explaining EBA, Tversky (1972) suggests that it is different from the traditional view of multi-factor decision-making where important factors in each opportunity are assessed and the one with the highest weighted average of all factors is selected. This compensatory approach allows a high score in one factor to compensate for a low score in another. In contrast, EBA uses elimination criteria to reject unsuitable options. This reduces the need to assess each factor or determine its relative importance, because as soon as a single 'fatal flaw' is identified the interaction is terminated. To use EBA, decision-makers first consciously or sub-consciously

identify critical factors and then determine a minimum standard for each. Any opportunity that fails to meet this minimum standard for any factor is determined to have a ‘fatal flaw’ and rejected. This non-compensatory technique means that the presence of a single ‘fatal flaw’ cannot be compensated for by other positive factors.

### 3.2 Identifying fatal flaws and critical factors

Critical factors in either the entrepreneur or opportunity must be easy to measure and must be objective – that is their presence will be readily agreed between different assessors. In addition, the absence of certain of these critical factors, termed fatal flaws must also be easy to assess minimum standards where absence is highly correlated to business failure. If critical factors are to be used as a diagnostic then high scores should be positively correlated to business success and low scores to business failure. Important critical factors include: company sales revenue, patent status and entrepreneur work experience. Despite the opportunity for some subjective interpretation of these objective factors, if the inter-rater reliability between trained observers comparing assessments of these factors is high, then we can confirmed the objective nature of these factors.

The use of objective diagnostic tools and the ease with which the associated factors can be determined facilitates their use early in the decision-making process. At later stages in the process, subjective factors, such as perceived risk and expected return, can also be considered (Fried and Hisrich, 1994). These subjective factors require more effort by the investor to assess and quantify and are based on the investor’s expert knowledge: increasing the likelihood that individual investors will assess them differently. Factors considered later in the process are compensatory, where a high score in one factor can compensate for a low score in another factor



(Muzyka et al., 1996). For example, higher expected levels of return can compensate for a higher level of perceived risk.

To provide a starting point for the assessment of the investment decision-making process, an existing business diagnostic tool was chosen – the Critical Factor Assessment. This tool was developed by the Canadian Innovation Centre and considers factors that are both diagnostic and objective (CIC, 2006). Over thirty years, the Canadian Innovation Centre has deployed this tool looking at more than 10,000 innovations, in order to determine their business potential and provide a diagnostic tool to interested parties. The Critical Factor Assessment tool uses eight factors, where not achieving a minimum standard in any one of the eight factors creates a fatal flaw linked to failure. In addition, high positive scores in each factor are correlated to business success. In 2004, Astebro validated the predictive ability of this tool by comparing 561 initial assessments of market potential with product launch outcomes five years later. In his sample, very early stage entrepreneurs accessed the federally funded Innovators Assistance Programme operated by the Canadian Innovation Centre to predict their likelihood of market success (not venture funding). Astebro (2004) verified the predictive accuracy of the Critical Factor Assessment, comparing forecasts of success and failure against actual product entry in the market. He noted that the Critical Factor Assessment's overall predictive accuracy was 79.1% - 74.2% accurate at predicting successful product launch and 79.7% accurate at predicting failures to launch the product. Given the lead-time between the study and the outcome measurement (five years), and the many implementation issues that can inhibit potentially successful products from reaching the market, this predictive accuracy is very high. As Astebro (2004) himself notes in the study the Critical Factor Assessment has about twice the predictive accuracy of professional VCs.

The eight critical factors detailed in Table 2, look primarily at product and market factors.

The presence of each factor is linked to market success, while the absence of each factor is directly correlated to failure. Within the eight factors three are product related factors: adoption – how easily will potential users adopt the product, development stage – is a high level of technology development still required, and protectability – is there a barrier to entry for potential competitors. Three market factors are included: customer engagement – does the product meet a real need, route to market – is there a realistic route to market, and market potential – is there a sufficient market to provide an interesting opportunity. In addition, there is one factor about relevant entrepreneurial experience, and one about the realism of the financial projections of the company.

TABLE 2:  
Canadian Innovation Centre’s Critical Factor Assessment

| <b>Factor</b>   | <b>Key Question</b>   | <b>Rating</b> | <b>Explanation</b>                                |
|---|---|---------------|---|
| 1.<br>Adoption  | Will customers in target market easily adopt this product?              | A             | Customers will easily adopt product or service    |
|   |   | B             | Benefits harder to identify, some adoption issues |
|   |   | C             | No clear benefits, or major adoption issues       |
| 2.<br>Product status  | Product ready for market, or still major work required before it ships? | A             | Finished product                                  |
|   |   | B             | Design complete all technical issues addressed    |
|   |   | C             | Needs more research and development               |
| 3.<br>Protectability  | How easy will it be for other people to copy the product or service?    | A             | Product patented or significant other barrier     |
|   |   | B             | It will not be easy to replicate.                 |
|   |   | C             | Anyone could copy it easily.                      |
| 4.<br>Customer engagement   | Is a first customer identified? Does product meet customer need?        | A             | Customers in place, or committed to purchasing    |
|   |   | B             | Customers engaged in development project          |
|   |   | C             | No first customers identified.                    |
| 5.<br>Route to market   | Is there a realistic marketing plan and route to market?                | A             | Realistic marketing plan / distribution partner   |
|   |   | B             | Options identified - no agreements in place       |
|   |   | C             | Limited thought given to distribution issues      |
| 6.<br>Market potential  | Is there a large market for this product?                               | A             | Large market potential (i.e over \$20 million)    |
|   |   | B             | Medium market potential (i.e. over \$5 million)   |
|   |   | C             | Unable to predict - likely less than \$5 million. |
| 7.<br>Relevant experience   | Has senior management direct / relevant entrepreneurial experience?     | A             | Significant relevant experience                   |
|   |   | B             | Limited experience, but appropriate knowledge     |
|   |   | C             | No evidence of required experience                |
| 8.<br>Financial model   | Evidence they are going to make money? Asking for enough investment?    | A             | Sound business model and cash management          |
|   |   | B             | Unclear profitability, limited cash management    |
|   |   | C             | No evidence of profit or cash management          |
| Numeric equivalents: (A+ = 10, A= 9, A- = 8, B+ = 6, B = 5, B- = 4, C+ =2, C = 1, C- = 0) |   |               |   |
| © Canadian Innovation Centre, 1996, 2001, 2006  |   |               |   |

### 3.3 Hypotheses

I have suggested that during the selection process the investor, based on his or her time constraints and the number of presented opportunities, will be encouraged to use the cost-effective EBA decision-making technique as initial filtering tool. If this is the case then during the selection stage of the process the investor will be looking to identify the presence of a fatal flaw in any one of the critical factors to enable him or her to rapidly reject unsuitable opportunities. Although not necessarily conscious of their use of this technique, investors will be willing to sacrifice a small level of accuracy for a substantial reduction in effort. If the investor cannot find a reason to reject an opportunity because of the presence of a single fatal flaw, he or she will allow the opportunity to be considered further at the next stage of the decision-making process.

*Hypothesis One: The presence of a single fatal flaw in a venture seeking funding will cause the investor to reject it as a potential investment opportunity.*

Certain limitations have been identified with the use of EBA as a decision-making technique. EBA is a filtering decision-making technique that identifies the failure of each opportunity to reach a minimum standard in any one of a limited number of factors to be sufficient reason for rejection. This technique limits the accuracy of decision-making because it does not allow trade offs that a more compensatory approach might. However, investigating such factors and trading them off against each other, is something that the investor does not have the time undertake with each opportunity. The investor thus adapts his or her technique, subsequent to the initial filtering technique to utilize alternate decision-making techniques that consider

additional factors to the initial critical ones and uses a compensatory approach to trade off between each. I suggest that there are several stages in the decision-making process before the final decision to invest, or not, is made – as shown in the Appendix. At each subsequent stage of the decision-making process, it seems likely that the investor further adapts his decision-making process and considers additional factors. It would thus seem logical that while the eight factors considered at the selection stage are used in the decision-making process, these factors alone can not predict the final investment decision.

*Hypothesis Two: For those opportunities not rejected at the selection stage there will be no correlation between their Critical Factor Assessment score and the final investment decision.*

#### **4. Research Methods**

Three primary constraints in previous research have been found to limit validity: recollection biases, selection bias and post decision data collection. These reduce the ability of previous researchers to provide insights that can improve funding success rates. The research methodology selected is specifically designed to overcome these potential biases in order to provide more reliable process insights. The use of real interactions between entrepreneurs and investors, which embed real risk and long-term relationship development during the interaction, will improve validity.

The choice of enhanced real-time approach - observational interaction requires that interactions between entrepreneurs and investors are first video-taped and then coded by independent trained observers prior to extracting the data for analysis. This methodology not only facilitates the interpretation of negotiation behaviours and information exchanges, it also allows individual interaction examples to be extracted for review and illustration. Observational interaction relies on the assessment of interactions based on exhibited behaviours and information exchanges, rather than on recollections of what happened. Careful analysis of several interactions can provide deeper insights than participants' recollections alone. The use of trained observers enables a less partisan view of relationship development and facilitates the observation of factors that the participants themselves may be unaware (Gottman and Notarius, 2000). This is particularly valuable, as most previous research has gathered data based exclusively on investors' perceptions, which can limit the ability to draw reliable conclusions from the data set. In addition, the pitfalls of selection bias are avoided by using a data set where the majority of interactions result in failure. This provides valuable insights into diagnostic factors that differentiate between success and failure instead of the more traditional approach of identifying factors linked to success. Real-time data collection techniques also allow the relative

importance of each factor to be investigated and the mechanisms for assessment better understood. In addition, the use of this technique at subsequent stages of the decision-making process allows an improved understanding of the factors considered change and the investor's decision-making techniques adapt.

#### 4.1 Context

Our entrepreneur-investor interactions consist of a series of negotiations between five BAs and 50 entrepreneurs taking part in a Canadian Reality TV show – CBC Dragons' Den. In the show, unrehearsed interactions between entrepreneurs and the group of five investors are recorded, with the expectation that the BAs, known in the show as Dragons, invest between \$10,000 and \$500,000 in a few selected opportunities. In season two of the show (2007), 150 entrepreneurs were selected from over 1500 applications to present in the 'Den', and their interactions were recorded in CBC's Toronto studios in May and June, 2007. Dragons' Den is the property of Sony Corporation and is a globally syndicated reality TV show that is currently recorded and shown in ten countries. The show has a standard format, in which selected entrepreneurs pitch their business opportunities to five Dragons, who during the interaction must decide either to invest in a business or provide a reason for rejecting each opportunity.

Entrepreneurs from across the country were encouraged to apply to participate in the show, with initial selection completed through regional or online auditions. Auditioning entrepreneurs and their businesses varied enormously in terms of experience. Some of the businesses were still at the idea stage, while others had several hundred thousand dollars in revenues. Entrepreneurs participating were motivated by their need for money, the desire to gain access to experienced entrepreneurs resources or simply to benefit from displaying their product on national TV. The 150 entrepreneurs who were invited to the "Den" to make pitches for money were selected in one

of two categories, their likelihood of gaining investment, or their entertainment value. The audition process ranked every opportunity in both categories and this data was used in subsequent analysis to determine which opportunities should be included the sample set of 50.

Interactions were standardized in terms of format and context. The entrepreneur started by stating her<sup>2</sup> name, the nature of the proposed business and the amount of capital required. The Dragons would then quiz the entrepreneur on details of the business and her experience with the aim of deciding whether or not to make an investment offer. If an offer was made a negotiation followed during which the entrepreneur had the opportunity to reject, accept or counter the offer. This iterative negotiation process continued until either both parties agreed on the investment terms, or the entrepreneur or all five investors walked away.

Overall the Dragons rejected most opportunities, some rapidly and others after a more prolonged interaction. When each Dragon withdrew, he or she was required to provide a specific reason for the rejection of that opportunity. Under the TV show's rules, each Dragon, individually or in syndication with the other Dragons, had to invest at least the original amount requested by the entrepreneur, or there was no deal. However, once the investment amount was offered the percentage of equity exchanged for this investment was subject to intense negotiation.

Actual interactions recorded in the show mirrored standard entrepreneur – BA interactions found in other less public environments. Line tapes of these interactions were used for this research on the process rather than the edited versions used for broadcast content. Line tapes are single continuous recordings of the live interaction that includes several camera angles as well as comments made between the Dragons after each interaction. Availability of these line tapes gave

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<sup>2</sup> In the paper we will use the female form to denote the entrepreneur as we note that in 2001 in Canada more than 47% of SMEs are owned or part owned by women, with the percentage of women entrepreneurs increasing each year (Statistics Canada, 2002).

observers the opportunity to examine and re-examine process interactions, extracting increasingly sophisticated levels of data for subsequent analysis.

#### 4.2 Data gathering techniques

To confirm or deny our hypotheses data had to be gathered on: the stage of the decision-making process when each interaction terminated, the funding decision for each opportunity and its Critical Factor Assessment score. The Critical Factor Assessment score was used to both identify the presence of a fatal flaw, and to rate the overall likelihood of each opportunity's commercial success.

The stage of the process at which the interaction terminated was measured by observing how the information exchanges between the parties changed as the interaction continued. Specifically at early stage in the process – selection, most information exchanges between entrepreneur and investor were objective. However, as the interaction proceeded to subsequent stages, information exchanges became subjective and required greater effort by both entrepreneur and investor to interpret. The change in the ratio of subjective to objective information exchanges was then used to determine the stage of the process and to identify specifically at which stage each interaction terminated.

The process for measuring the relative subjectivity or objectivity of each interaction was first determined based on the approach of Kim and Myaeng (2007) who looked to determine objectivity in artificial intelligence systems. Using this framework, each statement made could be broken down into objective, subjective or indeterminate, and a ratio between the level of objectivity and subjectivity at each point determined. This ratio could then be compared to observations of interactions, where independent trained observers established the correlation between this ratio and the stage of the interaction.

Using a sample data set of 20 opportunities from season one of Dragons Den to avoid



using the research data set influencing the coding, interactions were transcribed and analyzed based on the subjective or objective nature of the information exchanges. Each two-minute segment was examined and the ratio of objective to subjective interactions determined. Most initial interactions were objective (company name, nature of product, why the product was developed, entrepreneurs experience) but became increasingly subjective (perceived need, market opportunity, competitive advantage) as the interaction progressed. Ten season one opportunities were initially evaluated and for the three that passed the selection stage the level of subjective versus objective statements measured. This stage was determined to be reached when the percentage of objective interactions fell below  $85\% \pm 2\%$  (i.e. one was at 87%, one at 85% and one at 83%). This process was then repeated with the data set from ten more season one opportunities. It was found that 85% was a good benchmark for predicting when the two opportunities passed the selection stage from the second sample. 85% was then adopted as the benchmark for objectivity, when the level of objectivity in interactions fell below this level, it was determined that the interactions had passed the selection of the process in the real data set.

The Critical Factor Assessment score for each opportunity was determined on three separate occasions, each by a different observer. The high inter-rater reliability obtained between the Critical Factor Assessment scores undertaken by the three observers, confirmed the reliability of the assessment tool. Observers were trained by the Canadian Innovation Centre using reference data from season one, where trainees were introduced to the Critical Factor Assessment process and then analyze a sample of opportunities. These observers were either graduate students or recent graduates from business and technology programmes at universities in Southern Ontario. Variations in the score of each factor were discussed, with the intent that the trainees and the trainer could come to a consensus score for each factor for each opportunity. The exercise was then completed with another set of samples and the category inter-rater reliability

assessed. If this was found to be below 90%, then a discussion ensued and the training process was repeated. Once the inter-rater reliability exceeded 90% before any discussion between the trainee and the trainer, the training was determined as complete. Trainees were permitted to annotate the A, B and C Critical Factor categories (explained in Table 2) with + and – to allow them to discriminate between opportunities, however only the basic A, B, and C ratings were used in the training process as class inter-rater reliability was found to be of much greater significance than absolute scores (Shrout and Fleiss, 1979).

The Critical Factor Assessments on each opportunity were undertaken at three different times. The first observer used information provided by the entrepreneur before or during the audition process; the second observer used the line tape of the interaction, while the third observer used the TV edited version. Each observer completed his or her review before the outcome of the interaction was known. The most important consideration was the identification of a C grade in any factor that corresponded to a fatal flaw. A and B grades were combined mathematically (using the numeric factors listed in Table 2) and this number used to determine the combined average Critical Factor Assessment score. Average Critical Factor Assessment scores were rounded to correspond to a letter equivalent as part of the entrepreneur feedback process. When a particular factor score for an opportunity was not obtained - due to the absence of relevant information, these results were excluded from the averaging process.

Basic information was recorded about each opportunity: nature of the business, industry sector, revenue position, amount of money requested, and initial valuation, and the entrepreneur: sex, age, experience, and commitment. If the company received a funding offer, additional information was also recorded: valuation on funding, percentage ownership in the company taken by the investor/s and which specific BAs participated in the investment.

## 5. Results and analysis

Initial evidence was found that both confirmed and illuminated the findings of previous research. Overall, the ability to extract qualitative and quantitative data and re-examine it for analysis confirmed the benefits of using observational interaction techniques. Further, the quality of the analysis that could be performed addressed many concerns raised about context validity. Focusing the research on the early stage of the process allowed selection criteria to be identified, decision-making techniques observed and participant behaviours noted, in each case linked to either rejection or less frequently to a continued interaction. Observing the first stage of a complex process also allowed the identification of future opportunities for extending this research, both into considering other factors and to investigating decision-making techniques at future stages of the investment decision-making process.

The high failure rates of entrepreneurs looking for BA funding that had been noted by both Feeney et al. (1999) and Mason and Harrison (1994) was consistent with the results noted in this research. Out of 1500 entrepreneurs auditioned, only 150 met the investors and nine received funding offers. The staged nature of the process was also confirmed, and the change in the nature of the interaction as it continued observed, becoming more subjective and complex as the interaction progressed. The recent observations of Paul et al. (2007) and Riding et al. (2007), who noted the high rejection levels at each stage of the process were also confirmed as was the fact that on occasion the decision-making process was both non-linear and iterative, rather than the simpler staged approach originally modeled. In some cases, it was observed that a stage was revisited several times before progress to the next stage was allowed, in other times there were cases when a stage was completely skipped. It was also observed that as the interaction progressed the nature of the interactions between each individual entrepreneur and the investors could develop in different ways. The differences in how these interpersonal relationships

developed was quite dramatic - especially at the stage where valuation and shareholder agreements were discussed, echoing Gardner's (1992) observation that the process of raising finance is a dramaturgical process, with both the entrepreneur (actor) and investor (audience) interpreting the business plan (script) based on previous perceptions and experiences.

### 5.1 Hypothesis confirmation

Although 150 entrepreneurs met the Dragons, 100 of these were eliminated from the analysis as being of limited interest. There were two primary reasons for such eliminations –

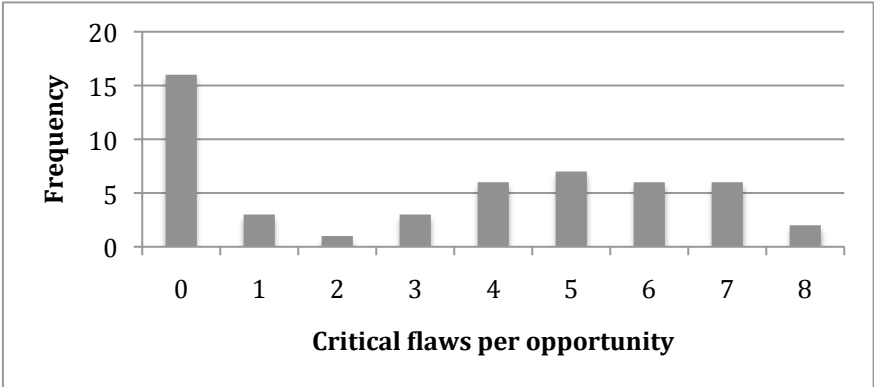
TABLE 3:  
Opportunity total factor scores, fatal flaw count and disposition

| Idea | Selected? | Flaws | Score | Invested? | Idea | Selected? | Flaws | Score | Invested? |
|------|-----------|-------|-------|-----------|------|-----------|-------|-------|-----------|
| 1    | No        | 1     | 43    |           | 26   | No        | 7     | 11    |           |
| 2    | No        | 5     | 15    |           | 27   | No        | 5     | 20    |           |
| 3    | No        | 1     | 41    |           | 28   | No        | 6     | 17    |           |
| 4    | No        | 7     | 13    |           | 29   | No        | 3     | 29    |           |
| 5    | Yes       | 0     | 53    | Yes       | 30   | No        | 5     | 17    |           |
| 6    | Yes       | 0     | 60    | Yes       | 31   | Yes       | 0     | 42    | Yes       |
| 7    | No        | 5     | 21    |           | 32   | No        | 4     | 29    |           |
| 8    | Yes       | 0     | 55    | No        | 33   | Yes       | 0     | 62    | No        |
| 9    | No        | 5     | 28    |           | 34   | No        | 4     | 23    |           |
| 10   | No        | 6     | 16    |           | 35   | Yes       | 0     | 51    | Yes       |
| 11   | No        | 7     | 8     |           | 36   | No        | 7     | 12    |           |
| 12   | No        | 5     | 19    |           | 37   | Yes       | 0     | 71    | No        |
| 13   | No        | 3     | 27    |           | 38   | No        | 6     | 14    |           |
| 14   | No        | 5     | 17    |           | 39   | Yes       | 0     | 65    | Yes       |
| 15   | No        | 2     | 30    |           | 40   | No        | 8     | 7     |           |
| 16   | No        | 6     | 14    |           | 41   | Yes       | 0     | 42    | No        |
| 17   | No        | 6     | 16    |           | 42   | No        | 7     | 15    |           |
| 18   | No        | 7     | 13    |           | 43   | No        | 3     | 31    |           |
| 19   | No        | 4     | 24    |           | 44   | No        | 1     | 39    |           |
| 20   | Yes       | 0     | 60    | Yes       | 45   | Yes       | 0     | 51    | No        |
| 21   | No        | 8     | 8     |           | 46   | Yes       | 0     | 46    | Yes       |
| 22   | Yes       | 0     | 46    | No        | 47   | Yes       | 0     | 53    | No        |
| 23   | No        | 4     | 22    |           | 48   | Yes       | 0     | 67    | Yes       |
| 24   | No        | 4     | 35    |           | 49   | No        | 4     | 25    |           |
| 25   | No        | 6     | 16    |           | 50   | Yes       | 0     | 47    | Yes       |

either the entrepreneur was primarily selected for his or her entertainment value (noted during the audition) or he or she was eliminated from serious consideration by the investors early in the interaction. Only the 50 entrepreneurs who had longer intensive interactions were selected for the actual broadcast. Each interaction was edited for TV to between three and six minutes, while 36 shorter opportunities were also aired in 10 to 20 second slots for their "TV entertainment" value. These were excluded from the data sample. All 50 opportunities that aired are included in the data sample, a summary is provided in Table 3 with full details in the Appendix, which includes every opportunity that passed the selection stage, and all that received funding offers.

The three Canadian Innovation Centre trained assessors completed the Critical Factor Assessment score for each of the 50 opportunities in the data set. Scores were converted to a numerical value, averaged and rounded. Inter-category rater reliability was high (95%) confirming the objective nature of these eight factors. The presence of at least one fatal flaw in 34 of the opportunities was noted and all of these opportunities rejected during the selection stage. No fatal flaw was noted in 16 of the opportunities, this allowed them to proceed passed the selection stage of the process - although only nine of these opportunities would go on to attract funding.

TABLE 4:  
Frequency distribution of fatal flaws by opportunity



As shown in Table 4 the distribution of fatal flaws in each opportunity shows that 79% of the 34 rejected opportunities had four or more fatal flaws based on the observers' assessment. This validated the predictive accuracy of the Critical Factor Assessment tool and was confirmed by the Dragons who in each case identified the same fatal flaws as reason for rejection (noting that the Dragons missed some flaws as some opportunities were rejected before the Dragons had chance to review every factor). Other factors were also linked to an investor losing interest, such as an unrealistic valuation by the entrepreneur. However, this was rarely a reason for early rejection. Instead, either the Dragons identified an alternate fatal flaw or valuation became an issue at a later stage in the process.

As shown in Table 5, the Dragons rejection every opportunity that contained a fatal flaw confirming that this was a 100% reliable technique for predicting whether or not an opportunity would be rejected at the selection stage of the process. This provided initial confirmation of hypothesis one - the presence of a fatal flaw would stop an investment from proceeding, while the absence of a fatal flaw would allow an opportunity to continue to the next stage of the process.

TABLE 5:  
 Predictive accuracy of fatal flaw and Critical Factor Assessment in continuing to next stage

| Fatal flaws |                | Predicted      |          |          |
|-------------|----------------|----------------|----------|----------|
| Observed    | Don't continue | Don't continue | Continue | Accuracy |
|             | Don't continue | 34             | 0        | 100%     |
|             | Continue       | 0              | 16       | 100%     |
| Overall     |                |                |          | 100%     |

Before confirming the use of Elimination-By-Aspects as the investor’s decision-making technique, it is important to verify that compensatory decision-making techniques do not produce the same result. As the Critical Factor Assessment is a compensatory decision-making technique that has previously been validated and correlated to business success, using the positive scores derived from the assessment should also be an indicator of whether or not a specific opportunity can pass the selection stage of the decision-making process. However, as the Critical Factor Assessment score is a compensatory decision-making technique, where low marks in one factor can compensate for higher marks in another, our first hypothesis would suggest that using it in this way, rather than looking for the presence of fatal flaws, would be less accurate.

TABLE 6:  
Comparison of CFA score with continuing to assessment stage

|         |                | Predicted      |          |          |
|---------|----------------|----------------|----------|----------|
|         |                | Don't continue | Continue | Accuracy |
| Observe | Don't continue | 33             | 1        | 97%      |
|         | Continue       | 2              | 14       | 88%      |
| Overall |                |                |          | 92%      |

The compensated Critical Factor Assessment score for each opportunity was correlated against the stage at which each was terminated. As shown in Table 6, although this assessment was found to be 94% accurate, it was less accurate than the EBA technique using the same critical factors. The compensatory technique was more accurate at predicting when the Dragons decided not to allow a specific opportunity to proceed to the next stage of the interaction (97%) than when they chose to allow it to continue (88%). This is in part due to the high negative correlation between the Critical Factor Assessment scores and the presence of multiple fatal

flaws. The 100% reliability of the EBA fatal flaw technique confirms our first hypothesis that at the selection stage of the process, the non-compensatory EBA technique is used.

The purpose of this research was to identify the nature of the decision-making process undertaken by investors during the selection stage of the decision-making process. An existing Critical Factor Assessment was used to confirm the use of EBA as the decision-making technique used based on the identification of fatal flaws. However, it is not clear that the eight factors that from the Critical Factor Assessment are all required. Given the high incidence of multiple fatal flaws in a single opportunity, identified in Table 4, there is a high likelihood of redundancy between these factors. A more detailed test of independence was undertaken, to see if the presence of one fatal flaw could predict the presence of another and found that none of the factors are completely independent.

It is possible that some of the eight factors might be redundant, and a model with fewer factors would be just as successful in predicting selection. This is suggested by a number of follow up analyses on the data. First, the individual scores on each factor are highly correlated as portrayed in Table 7. Redundancy is also suggested by the fact that there is usually more than one fatal flaw in an idea as highlighted in Table 3, which shows, by idea, whether or not the idea was selected to move beyond the first stage and how many fatal flaws that idea had. Finally, tests of independence show that almost none of the factors are completely independent of the others.<sup>3</sup> These analyses all suggest that a smaller set of critical factors may be sufficient in predicting success in the selection stage. However, as the sample is small ( $n = 50$ ), these tests of independence do not have as much power as they would have in a larger sample. It is therefore too early to claim that fewer than the full eight factors would be sufficient. In addition, there may be other factors, that should also be considered, that did not emerge because of the small sample

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<sup>3</sup> Independence of factors would be shown by the likelihood of occurrence of one fatal flaw not be affected by the presence of another flaw. For all factors except factor 3, the hypothesis of independence of factors is rejected.



size.

The correlation of factors, shown in Table 7, also provided some insights into fatal flaws that were often linked. The most obvious of which was that the absence of previous entrepreneurial experience was significantly correlated to multiple fatal flaws, and highly correlated to financial projections (0.86). This indicates that prior experience – whether successful or not\_ - helps entrepreneurs avoid some of the basic business flaws identified.

TABLE 7:  
Correlations of factors within the Critical Factor Assessment

|                          | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |
|--------------------------|------|------|------|------|------|------|------|------|
| 1. Adoption              | 1.00 |      |      |      |      |      |      |      |
| 2. Product Status        | .68  | 1.00 |      |      |      |      |      |      |
| 3. Protectability        | .53  | .56  | 1.00 |      |      |      |      |      |
| 4. Customer engagement   | .62  | .59  | .58  | 1.00 |      |      |      |      |
| 5. Route to market       | .60  | .60  | .61  | .68  | 1.00 |      |      |      |
| 6. Market potential      | .78  | .71  | .64  | .74  | .73  | 1.00 |      |      |
| 7. Management experience | .55  | .68  | .57  | .45  | .55  | .70  | 1.00 |      |
| 8. Financial model       | .67  | .75  | .59  | .53  | .66  | .77  | .86  | 1.00 |

To confirm the second hypothesis it was necessary to show that factors considered during the selection stage of the process cannot predict the final investment decision. The Critical Factor Assessment score for each opportunity was used to study if there was a correlation between these scores and the final investment decision. The Critical Factor Assessment tool’s reliability as a predictive tool for the final funding decision, as seen in Table 8, drops to 84%, and its ability to predict successful outcomes is only 44%. The high accuracy levels to not fund are mainly due to the high negative correlation between the Critical Factor Assessment score and the presence of fatal flaws.

TABLE 8:  
Comparison of Critical Factor Assessment score with funding

|          |            | Predicted  |      |          |
|----------|------------|------------|------|----------|
| Observed | Don't fund | Don't fund | Fund | Accuracy |
|          |            | 38         | 3    | 93%      |
|          | Fund       | 5          | 4    | 44%      |
|          | Overall    |            |      | 84%      |

To eliminate the opportunities already rejected at the selection stage from our analysis a logistic regression was performed to establish the correlation between the Critical Factor Assessment score for those remaining opportunities and the funding decision. The correlation at 0.004 is statistically non-significant<sup>4</sup>. It is therefore possible to confirm that each Dragon must consider alternate factors before making his or her final investment decision.

## 5.2 Additional observations

The use of observational interaction as a research technique facilitated the capture of additional qualitative insights. On several occasions the negative effect on the investor if the entrepreneur provided an unrealistic valuation was observed. In addition if the entrepreneur presented certain information during the interaction that he or she either contradicted later or the BA knew to be incorrect, then the likelihood of investment seemed to be reduced. BAs also seemed more interested in products they could use or relate to, and also had a preference for businesses that had large market potential. In many cases, existing customers seemed to be a pre-

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<sup>4</sup> To confirm the inappropriateness of the Critical Factor Assessment as a predictor of the final investment decision a Hosmer and Lemeshow test showed a very poor fit,  $\chi^2(5) = .45$ ,  $p = .994$ .

requisite for gaining investment. Certain entrepreneurial attributes created a favourable disposition in one or more investors with specific BAs relating more easily to an entrepreneur because of a similar background or life experience. The importance of first impressions was also noted - based on the entrepreneur's appearance or the quality of the presentation: confirming Clark's (2008) observations on the importance of impression management.

Observations were also made that might illuminate some of the conflicting data obtained in prior research, specifically around the role of investor's domain expertise (McMullen and Shepherd, 2006) and the importance of the entrepreneur's commitment (Prasad et al., 2000). There is conflicting evidence that shows investors more likely to invest in areas in which they have domain expertise. From the observations obtained in this research, I noted that an investor with specific domain expertise took a higher level of interest in opportunities in his or her domain. This led to him or her initially being more critical of an opportunity in this domain, and thus more willing to reject these ventures. However, if, after his or her critical appraisal, he or she found a venture he or she liked he or she became more willing to invest in it. On these occasions, other Dragons were heavily influenced in their decisions by the actions of the BA with perceived domain expertise.

Entrepreneurial characteristics such as commitment (approximated as the percentage of the entrepreneur's net worth invested in the business) were noted as being of interest to Dragons. Although there is research that entrepreneurial commitment is of importance in the investment decision, high levels of commitment seemed to be present in most of the entrepreneurs seeking funding. However, there was no evidence that higher levels of commitment were linked to success in obtaining investment; in fact, high levels of commitment could also be correlated to failure. On several occasions, entrepreneur's commitment was perceived negatively, with Dragons instructing them to "Stop the madness" or "I forbid you to continue in the business".

Commitment cannot be used as a diagnostic tool as it can not predict the difference between success and failure.

### 5.3 Limitations and validity concerns

The use of a reality TV show creates questions about the validity of the data and its subsequent analysis (Hight, 2001). The main validity concerns in comparison to standard entrepreneur – investor interactions are that the context was unrealistic, interaction timescales were compressed, deal structures were inflexible and external references could not be verified during the interaction. While all these concerns affect the validity, I believe that their overall impact was limited. For example, while the context was somewhat artificial, none of the interactions were predetermined or the outcomes scripted. In fact, the Dragons had no knowledge of an opportunity until the entrepreneur walked into the “Den”. The intent of the negotiation was for investors to fund presenting opportunities and the interaction dynamics that were observed between the parties were similar to other investor – entrepreneur interactions in less public domains<sup>5</sup>.

The compressed time-scale meant that a final investment decision was reached in less than an hour, whereas normal investment processes usually take a series of meetings. In the traditional investment process, entrepreneurs are only invited to a subsequent meeting if they pass through the previous stage of the process (Mason and Harrison, 2003). In examining the selection stage of the process, I found that the interactions replicated accurately the normal time allowed for selection stage meetings, allowing us to draw meaningful conclusions for this part of the process. I believe that the compression of time-scales could be more of an issue when studying subsequent stages of the interaction. However, if the compressed time scales is seen as the

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<sup>5</sup> Although TV did seem to exaggerate certain behaviours, especially when Dragons did not like a specific opportunity – the content of the feedback usually provided a legitimate insight into reasons for non-investment.

imposition of a crisis into the investment decision-making process, I can concur with the insights of Mishra (1996) who suggests that viewing this interaction in a crisis-situation allows us to obtain valuable insights into underlying behaviours.

Although limits on deal structures reduced the number of ventures funded - for example debt investments were not allowed, the need to agree valuation, investment amount and post-investment control, created a valuable dynamic between the entrepreneur and the investor that highlighted many of the challenges of BA investing. The generally high levels of risks in the investment decision were exacerbated by the investor's inability to access referrals and references before making their decisions (Amatucci and Sohl, 2004). As a result, each Dragon had a tendency to rely more on his or her prior experience and only to use third party validation to verify information once the deal had been concluded in the "Den". This subsequent stage in the process had the effect of causing a few deals that had been completed in the "Den" to be revoked after proper diligence. On balance, I conclude that the observed interactions mirror normal BA – entrepreneur interactions in less public environments, and provide a depth of insight and examples that would otherwise be unavailable.

## **6 Conclusions**

The research methodology and unique sample set allowed me to observe behaviours of entrepreneurs and investors involved in a funding negotiation that involved both risk and the intent to develop a long-term relationship. The use of objective real-time measurement techniques, with no knowledge of outcomes at the time of coding, allowed some of the constraints and biases of prior research to be reduced. This facilitated an improved understanding of the investment decision-making process, allowing me to identify opportunities for process improvement. When observing the whole process its staged nature became apparent, allowing me to focus in detail on the selection stage of the process.

Hypothesis one was confirmed; that the presence of a single fatal flaw in a venture seeking funding causes the investor to reject it as a potential investment opportunity. This allowed me to suggest that the non-compensatory EBA decision-making technique was used, and validate the use of the eight factors from the Critical Factor Assessment technique as being appropriate to identify the presence of fatal flaws. Given our small sample size and the correlation between factors I am not in a position to suggest that the number of factors should be reduced, although there was, without doubt, a level of redundancy in the eight factors used. This confirmed some general observations about the importance of these factors, for example that limited entrepreneurial experience would also be linked to the presence of other fatal flaws.

Hypothesis two was also confirmed; that for those opportunities not rejected at the selection stage - there was no correlation between their Critical Factor Assessment score and the final investment decision. This both confirmed that a non-compensatory technique was used at the selection stage and that the absence of fatal flaws alone could not predict a positive investment decision. It thus appears, additional factors to those analyzed using the Critical Factor Assessment, are considered by the investor when making their final investment decision.

These findings bring several important insights to the BA investment decision-making process. I confirmed the staged nature of the process and the use of different noted decision-making techniques at each stage. Importantly the elimination process is used at the selection stage of the process, to reduce the number of opportunities to a more manageable number for further investigation. The identification of several critical factors that can lead to fatal flaws provides specific insights to entrepreneurs seeking investment. Some ideas on how entrepreneurs can address the presence of each of the flaws is provided in the Appendix.

### 6.1 Theoretical implications

I hope that those interested in understanding investment decision-making will appreciate the benefits of using trained observers and real-time observational techniques to break down a complex process into stages. The use of this technique provided unbiased data that leads to qualitative and quantitative insights on the decision-making process without affecting the interaction. It provides an interesting technique that can be used to further explore the investment decision-making process and other issues in behavioural economics. Confirmation of the staged model of the investment process will facilitate the development of a common process framework that will help address the need to understand “the nature of the investment process itself” and the “various decision criteria” (Riding et al., 2007, page 336).

I believe that paying more attention to causes of failure, will allow researchers to identify opportunities for process improvement that will be easier to implement than simply replicating success factors. Learning from failures is a classic quality improvement approach can be applied to complex decision-making processes in an effort to increase interaction efficiencies and the percentage of successful outcomes. I believe that much previous research in this area has noted causes of failure, but not fully appreciated how these insights can be used.

## 6.2 Practical implications

My research findings also have practical implications. I identified the eight critical factors that lead to early rejection. I suggest that an entrepreneur's awareness of each factor can help her address potential fatal flaws and identify specific remedial action. In addition, simply by understanding specific factors of concern to investors, he or she will focus appropriate attention on communicating relevant information on these factors to potential investors.

To confirm the value of understanding these fatal flaws, I organized a training session with participants in season three of Dragons' Den - taped in June 2008. I provided participating entrepreneurs three webinars that identified and explained the eight critical factors and made suggestions how to address each one. In addition, as noted in the Appendix, I was also able to provide guidance on how to address some of the overall negative factors that had been observed to cause failures at each stage of the process. During the subsequent taping of season three of Dragons' Den, while 30% more entrepreneurs participated, I noted that the number of entrepreneurs who received funding offers more than doubled and the amount proposed to be invested tripled. When surveyed by Canadian Innovation Centre staff, 85% of the successful entrepreneurs confirmed that the content of the webinars had been helpful in structuring their presentations and understanding the needs of the Dragons.

The use of the Critical Factor Assessment tool can be extended into other areas. Its use as a teaching tool for entrepreneurs has been observed, it can also be used in a classroom environment for courses in entrepreneurship, where the role of BAs and his decision-making processes is not well understood. In addition, due to its objective nature and the ease an individual can be trained in its use, it can be used as an online filtering tool for those applying for funding to BA networks or early stage VCs.



### 6.3 Suggestions for future research

I used observational interaction methodologies and a rich data set to draw lessons from the selection stage of the investment decision-making process. I believe that I can use this research methodology to investigate subsequent stages in the decision-making process as well as the final investment decision. Importantly I believe that this approach not only provides insights on other factors that are considered during the interaction but also how the relationship between the entrepreneur and the investor develops to facilitate a positive investment decision. This technique can also be used to answer related questions raised in other research in more detail, such as the role of expertise, personality and experience in both the entrepreneur and investor. I am aware of the importance of procedural justice, trust and culture in negotiations. I believe that using alternate analysis tools I can investigate these issues in more detail – for example, Dragons' Den is now syndicated in ten countries some of which have expressed an interest in co-operating on our research. It might be interesting to explore the differences in information exchanges and observed behaviours and the outcomes of the decision-making process in countries with different cultures.

I hope that others will join us in using observational interaction to gather and share data about investment decision-making in the context of a staged model so that further improvements can be made overall process understanding. It is expected that this improved understanding will identify further opportunities to increase the efficiency of the investment interaction and reduce the high current rates of failure. It is hoped that these improved insights will also identify structural ways policy makers can improve interaction efficiencies. This will lead directly to more outcomes that are positive for entrepreneurs and investors, both during the funding interaction and as partners in long term venture success.

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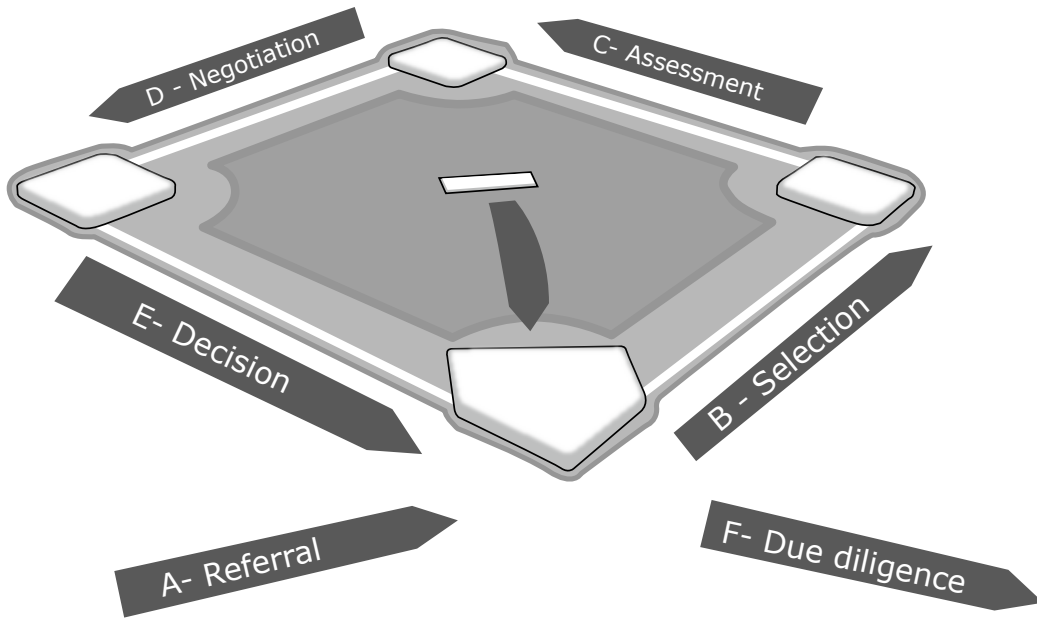
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**Appendix**

**FIGURE II**

Proposed model of the stages of the investment decision-making process



## Adaptive Decision Making Techniques (Summary of Payne et al., 1988)

In their paper on adaptive decision-making Payne et al., (1988) identify ten basic decision-making strategies that vary substantially in the amount of information used and in the way it is used to make a choice.

### 1. Weighted Added Compensatory Process

The most information intensive strategy examined was a version of a weighted additive (WADD) compensatory process, which can be thought of as a version of expected value maximization. The strategy considers the values of each alternative on all of the relevant attributes (outcomes) and all of the relative importances (weights or probabilities) of the different attributes (outcomes) to the decision maker. The rule develops a weighted value for each attribute by multiplying the weight (probability) by the value and sums over all attributes to arrive at an overall evaluation of an alternative. The rule selects the alternative with the highest evaluation. It is often used as a criterion for decision effectiveness in multi-attribute choice (Zakay & Wooler, 1984).

### 2. Random Choice Rule

The random (RAN) choice rule, in contrast, chooses an alternative at random with no search of the available information, providing a minimum baseline for measuring both accuracy and effort.

In addition to these two baseline rules, six choice heuristics and two combination strategies are available.



### 3. Equal weighted

The equal weight (EQW) rule examines all alternatives and all attribute values for each alternative. However, the rule ignores information about the relative importance (probability) of each attribute. In some contexts, the equal weight rule has been advocated as a highly accurate simplification of the risky choice process (Thorngate, 1980).

### 4. Elimination By Aspects

Elimination by aspects (EBA) (Tversky, 1972) begins by determining the most important attribute (the outcome with the highest weight [probability]). Then, the cutoff value for that attribute is retrieved, and all alternatives with values for that attribute below the cutoff are eliminated. The process continues with the second most important attribute, then the third, and so on, until one alternative remains.

### 5. Majority of Confirming Decisions

The majority of confirming dimensions (MCD) rule (Russo & Doshier, 1983) involves processing pairs of alternatives. The values for each of the two alternatives are compared on each attribute, and the alternative with a majority of winning (better) attribute values is selected. In the case of an equal number of winning values for the two alternatives, one version of this rule retained the alternative winning the comparison on the last attribute. The retained alternative is then compared to the next alternative among the set of alternatives. The process of pair-wise comparison repeats until all alternatives have been evaluated and the final winning alternative identified.

## 6. Satisficing

The satisficing (SAT) rule (Simon, 1955) considers alternatives one at a time, in the order they occur in the set. Each attribute of an alternative is compared to a cutoff value. If any attribute value is below the cutoff value, that alternative is rejected. The first alternative, which passes the cutoffs for all attributes is chosen, so a choice can be made before all alternatives have been evaluated. In the case where no alternative passes all the cutoffs, a random choice is made.

There are two versions of the lexicographic choice rule:

## 7. Lexicographic

For the strict lexicographic (LEX) rule, the most important attribute is determined, the values of all the alternatives on that attribute are examined, and the alternative with the best value on that attribute is selected. If there are ties, the second most important attribute is examined, and soon, until the tie is broken. Because the simulation generates attributes as continuous random variates, ties almost never occur.

## 8. Lexicographic Semi Order

The lexicographic semi-order (LEXSEM) rule (Tversky,1969) is similar to the strict lexicographic rule, but introduces the notion of a just-noticeable difference (JND). If several alternatives are within a JND of the best alternative on the most important attribute, they are considered to be tied. The potential advantage of the LEXSEMI rule is that it ensures that an option that is marginally better on the most important attribute but much worse on other

attributes will not necessarily be selected.

There are also two combined strategies that are commonly observed in studies (Bettman & Park, 1980):

9. Elimination-by-aspects plus weighted additive (EBA+WADD) rule.

This rule uses an EBA process until the number of available alternatives remaining was three or fewer, and then uses a weighted additive rule to select among the remaining alternatives.

10. Elimination- by-aspects plus majority of confirming dimensions (EBA+MCD) rule.

This rule uses an elimination-by-aspects process to reduce the problem size, and then a majority of confirming dimensions heuristic to select from the reduced set.

These choice strategies differ on a number of aspects, such as the degree to which the amount of processing is consistent or variable across attributes or alternatives, the pattern of processing (alternative based or attribute based), and the total amount of processing. The various strategies represent different combinations of these aspects. The weighted adding strategy uses consistent and alternative-based processing and examines all available information. The equal weight strategy uses consistent and alternative-based processing but uses a subset of the available information. The MCD rule is consistent, attribute-based, and ignores weight information. The EBA rule implies a variable (selective) pattern of processing that is attribute based. The total amount of information processed by EBA depends on the particular values of the alternatives and cutoffs. The lexicographic strategies are also selective and attribute based, and the satisficing strategy is selective and alternative based. The total amount of information

processed is also contingent upon the particular values of the alternatives for these strategies. As illustrated in the figure below, each of these alternative decision-making techniques requires different levels of effort. It is noted that increasing levels of effort in decision-making result in greater levels of accuracy in the decision.

TABLE X:  
Decision making accuracy versus effort required (Payne et al., 1988).

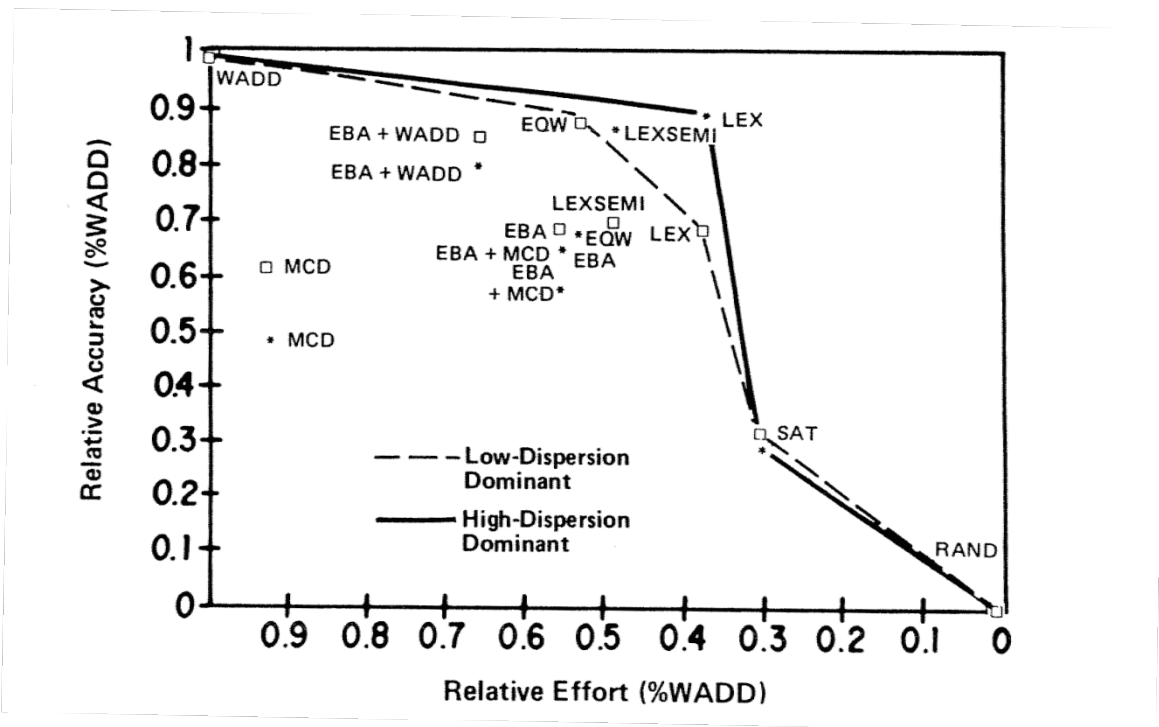


TABLE XI

Recommendations to entrepreneurs to increase chance of obtaining financing

|    | Category                    | Specific Recommendation   |
|----|-----------------------------|---|
| 1  | <i>Reference</i>            | Identify a trusted referrer who can facilitate investor introduction and provide them with some guidance of venture and entrepreneurial quality             |
| 2  | <i>Reference</i>            | Ensure that you understand the investment preferences and prior investment experience of the Business Angel before a meeting.                               |
| 3  | <i>Impression</i>           | Ensure that initial impression created builds credibility and reinforces the opportunity  |
| 4  | <i>Critical Factors</i>     | Ensure business addresses each of the critical factors identified – if there are critical flaws develop a specific strategy to overcome them                |
| 5  | <i>Exit strategy</i>        | Demonstrate how the investor will make their ROI and identify liquidity event - for example identify potential acquirers.                                   |
| 6  | <i>Expected Value</i>       | Be prepared to show forecast revenues and profit can be reached to justify venture valuation  |
| 7  | <i>Performance risk</i>     | Show BA participation in the venture can reduce performance risk - through their complementary assets or domain expertise                                   |
| 8  | <i>Relationship risk</i>    | Identify how interests of investor and entrepreneur can be aligned and the existence of successful prior relationships                                      |
| 9  | <i>Equity participation</i> | Show how the invested money will be used, the logic behind your valuation and flexibility but not weakness in the negotiation. Value the BA's contribution. |
| 10 | <i>Focus on Fit</i>         | Show an understanding of how the relationship will develop and the importance of fit.   |

TABLE XII  
Observations of critical factors, outcomes and commitment

| Item | Inventor          | Opportunity                     | Product Interest | Product Status | Protectability | Customer | Distribution | Market | Management | Financial | First base | Deal | Grade | Commitment | Red-light |
|------|-------------------|---------------------------------|------------------|----------------|----------------|----------|--------------|--------|------------|-----------|------------|------|-------|------------|-----------|
| 1    | Sue Arkinsawla    | Xmas tree holder                | 10               | 9              | 1              | 4        | 4            | 5      | 5          | 5         | No         |      | 43    | 10         | 1         |
| 2    | Terry             | Email 2                         | 1                | 1              | 5              | 0        | 0            | 1      | 6          | 1         | No         |      | 15    | 8          | 5         |
| 3    | Chris Nellum      | Lettuce                         | 5                | 5              | 2              | 5        | 4            | 8      | 6          | 6         | No         |      | 41    | 8          | 1         |
| 4    | Matt Stanson      | Xmas light switch               | 1                | 4              | 1              | 2        | 2            | 1      | 1          | 1         | No         |      | 13    | 7          | 7         |
| 5    | Theresa Hill      | Horse treat                     | 9                | 9              | 6              | 5        | 8            | 6      | 5          | 5         | Yes        | Yes  | 53    | 10         | 0         |
| 6    | Jessica Borsons   | Atomic tea                      | 9                | 9              | 5              | 8        | 9            | 9      | 6          | 5         | Yes        | Yes  | 60    | 10         | 0         |
| 7    | Mikeli Eronka     | Arctic snow shovel              | 5                | 4              | 1              | 5        | 2            | 2      | 1          | 1         | No         |      | 21    | 9          | 5         |
| 8    | Andrew Appelbarn  | Cereal bar                      | 6                | 8              | 4              | 8        | 9            | 8      | 6          | 6         | Yes        | No   | 55    | 10         | 0         |
| 9    | David Tonkin      | Takeover plan                   | 1                | 9              | 1              | 1        | 1            | 1      | 9          | 5         | No         |      | 28    | 5          | 5         |
| 10   | Yuri Paresavich   | Swing ball                      | 5                | 4              | 1              | 1        | 1            | 2      | 1          | 1         | No         |      | 16    | 6          | 6         |
| 11   | Erin Brodep       | Homeless sign                   | 0                | 5              | 0              | 1        | 1            | 1      | 0          | 0         | No         |      | 8     | 5          | 7         |
| 12   | Michael Labraque  | Bottle water                    | 5                | 5              | 1              | 0        | 1            | 2      | 1          | 4         | No         |      | 19    | 7          | 5         |
| 13   | Chath. Hiscocks   | Baby carrier                    | 4                | 4              | 1              | 6        | 5            | 4      | 1          | 2         | No         |      | 27    | 7          | 3         |
| 14   | Jodi Sendon       | Homebox                         | 4                | 2              | 0              | 4        | 1            | 4      | 1          | 1         | No         |      | 17    | 9          | 5         |
| 15   | Lynden Slandy     | Seat cover etc.                 | 5                | 4              | 0              | 6        | 4            | 5      | 4          | 2         | No         |      | 30    | 8          | 2         |
| 16   | Karen             | Note cards                      | 1                | 4              | 1              | 4        | 1            | 1      | 1          | 1         | No         |      | 14    | 8          | 6         |
| 17   | Christopher Doors | Fruit-picking                   | 2                | 2              | 1              | 4        | 4            | 1      | 1          | 1         | No         |      | 16    | 6          | 6         |
| 18   | Felix family      | Sweet tomato jam                | 1                | 4              | 2              | 2        | 1            | 1      | 1          | 1         | No         |      | 13    | 8          | 7         |
| 19   | Uncle D           | Ad.content website              | 5                | 5              | 1              | 4        | 4            | 2      | 1          | 2         | No         |      | 24    | 8          | 4         |
| 20   | Jim Edison        | Pylon                           | 9                | 8              | 9              | 9        | 6            | 8      | 6          | 5         | Yes        | Yes  | 60    | 9          | 0         |
| 21   | Louis Pevartte    | Rocket skate                    | 1                | 2              | 1              | 1        | 1            | 1      | 1          | 0         | No         |      | 8     | 6          | 8         |
| 22   | Doug Stables      | Underwater vehicle              | 9                | 8              | 9              | 5        | 4            | 4      | 3          | 4         | Yes        | No   | 46    | 7          | 0         |
| 23   | Al Daline         | Dog trailer                     | 1                | 6              | 1              | 4        | 4            | 1      | 1          | 4         | No         |      | 22    | 8          | 4         |
| 24   | Trent Kitch       | Underwear                       | 8                | 8              | 2              | 6        | 2            | 6      | 2          | 1         | No         |      | 35    | 10         | 4         |
| 25   | John Korish       | Steel monument                  | 1                | 4              | 6              | 1        | 1            | 1      | 1          | 1         | No         |      | 16    | 7          | 6         |
| 26   | Victor Pachenko   | Stem clearing house             | 1                | 0              | 2              | 4        | 2            | 1      | 0          | 1         | No         |      | 11    | 6          | 7         |
| 27   | Jason Pete        | Aerotag                         | 6                | 5              | 0              | 4        | 1            | 1      | 1          | 2         | No         |      | 20    | 8          | 5         |
| 28   | Peter Ranking     | Gold digging                    | 1                | 1              | 4              | 1        | 9            | 1      | 0          | 0         | No         |      | 17    | 7          | 6         |
| 29   | Sandy Adelson     | Golf-sucker                     | 1                | 5              | 4              | 9        | 4            | 4      | 1          | 1         | No         |      | 29    | 8          | 3         |
| 30   | Myrin Garscho     | Screen for garage<br>Children's | 4                | 4              | 0              | 2        | 1            | 4      | 1          | 1         | No         |      | 17    | 5          | 5         |
| 31   | Noami Berlis      | literature                      | 8                | 6              | 4              | 6        | 5            | 5      | 4          | 4         | Yes        | Yes  | 42    | 8          | 0         |

| Item | Inventor        | Opportunity         | Product Interest | Product Status | Protectability | Customer | Distribution | Market | Management | Financial | First base | Deal | Grade | Commitment | Red-light |
|------|-----------------|---------------------|------------------|----------------|----------------|----------|--------------|--------|------------|-----------|------------|------|-------|------------|-----------|
| 32   | Daniel Warren   | Party website       | 9                | 4              | 0              | 8        | 5            | 1      | 1          | 1         | No         |      | 29    | 9          | 4         |
| 33   | Jay Warren      | Dog biscuit         | 8                | 10             | 6              | 10       | 8            | 9      | 5          | 6         | Yes        | No   | 62    | 8          | 0         |
| 34   | Daniel Foyer    | Customized jeans    | 4                | 4              | 1              | 1        | 1            | 2      | 5          | 5         | No         |      | 23    | 9          | 4         |
| 35   | Janet Colborne  | Support bra         | 5                | 10             | 8              | 10       | 5            | 5      | 4          | 4         | Yes        | Yes  | 51    | 8          | 0         |
| 36   | Robin Round     | Menopausal          | 2                | 1              | 1              | 4        | 1            | 1      | 1          | 1         | No         |      | 12    | 8          | 7         |
| 37   | Chris Holden    | Pizza box           | 9                | 9              | 9              | 9        | 9            | 9      | 9          | 8         | Yes        | No   | 71    | 10         | 0         |
| 38   | Ken Gone        | Fishing funnel      | 1                | 4              | 1              | 4        | 1            | 1      | 1          | 1         | No         |      | 14    | 6          | 6         |
| 39   | Dan Izner       | Mortgage broker     | 8                | 9              | 5              | 8        | 9            | 8      | 9          | 9         | Yes        | Yes  | 65    | 10         | 0         |
| 40   | Shawn Alexander | Hairdresser website | 1                | 1              | 0              | 2        | 1            | 0      | 0          | 2         | No         |      | 7     | 6          | 8         |
| 41   | Fred Day        | Rifle scope         | 4                | 6              | 6              | 8        | 6            | 4      | 4          | 4         | Yes        | No   | 42    | 9          | 0         |
| 42   | Todd Kelly      | Cutlass razor       | 1                | 4              | 1              | 6        | 1            | 1      | 1          | 0         | No         |      | 15    | 7          | 7         |
| 43   | Laksh. Sinderan | Spice mixers        | 4                | 7              | 2              | 4        | 5            | 5      | 2          | 2         | No         |      | 31    | 8          | 3         |
| 44   | Jody Uttriuion  | Shimmer             | 6                | 6              | 2              | 8        | 4            | 5      | 4          | 4         | No         |      | 39    | 8          | 1         |
| 45   | Joe Demar       | Packaging           | 9                | 5              | 8              | 9        | 4            | 8      | 4          | 4         | Yes        | No   | 51    | 8          | 0         |
| 46   | Steve Kingsbery | Exercise mat        | 8                | 8              | 6              | 6        | 5            | 5      | 4          | 4         | Yes        | Yes  | 46    | 10         | 0         |
| 47   | Elduado Kotch   | Core training -     | 8                | 8              | 7              | 8        | 6            | 7      | 4          | 5         | Yes        | No   | 53    | 6          | 0         |
| 48   | Randy Ones      | Rhinno bag          | 9                | 9              | 8              | 9        | 8            | 8      | 8          | 8         | Yes        | Yes  | 67    | 10         | 0         |
| 50   | Patel children  | Tomato soup         | 9                | 6              | 5              | 6        | 4            | 7      | 4          | 6         | Yes        | Yes  | 47    | 8          | 0         |

#### Numerical Equivalence of CFA ranking

| CFA Ranking | Numeric Score | CFA Ranking | Numeric Score | CFA Ranking | Numeric Score |
|-------------|---------------|-------------|---------------|-------------|---------------|
| A+          | 10            | B+          | 6             | C+          | 2             |
| A           | 9             | B           | 5             | C           | 1             |
| A-          | 8             | B-          | 4             | C-          | 0             |