

# Effectual versus causal logics in entrepreneurial decision-making:

Differences between entrepreneurially educated novices and  
expert entrepreneurs

Stephen Batley  
&  
Ingvi Hrannar Ómarsson



**LUND UNIVERSITY**  
School of Economics and Management

2014

MASTER THESIS IN ENTREPRENEURSHIP (MSc)

# Abstract

This study looks at effectual and causal logics in entrepreneurial decision-making. We have compared entrepreneurially educated novices with expert entrepreneurs using think-aloud protocols to determine differences in their effectual logics and expertise in general. Prior research suggests that experts are more likely to take an effectual approach when solving problems (Sarasvathy, 2008; Dew et al., 2009). We sampled three recently entrepreneurially educated novices and three expert entrepreneurs. Having them continuously think-aloud as they solved standard decision-making problems in creating a new venture compared their decision-making processes. Results showed that entrepreneurially educated novices were substantially more effectual than initially expected and more effectual than the experts in our study. These findings provide implications and a basis for further research as to whether effectual logic is something that entrepreneurship students naturally possess, learn during their studies, or whether this is a natural developmental stage for becoming an expert entrepreneur.

**Keywords:** *Effectuation, Causation, Expert entrepreneurs, Novice entrepreneurs, Entrepreneurship, Entrepreneurship education, Think-aloud protocols, Decision-making, Expertise in general, Entrepreneurial expertise.*

# List of content

<b>1. Introduction</b> .....	<b>4</b>
<b>2. Theoretical framework</b> .....	<b>8</b>
2.1 <i>Effectuation and causation</i> .....	8
2.2 <i>What is Entrepreneurship?</i> .....	10
2.3 <i>Expertise and expert entrepreneurs</i> .....	11
<b>3. Method</b> .....	<b>15</b>
3.1 <i>Design</i> .....	16
3.2 <i>Sample</i> .....	17
3.3 <i>Method of Analysis</i> .....	18
<b>4. Results</b> .....	<b>19</b>
4.1 <i>Differences due to expertise in general</i> .....	19
4.2 <i>Difference due to entrepreneurial expertise</i> .....	22
<b>5. Discussion</b> .....	<b>29</b>
5.1 <i>Expertise in general</i> .....	30
5.2 <i>Differences due to entrepreneurial expertise</i> .....	31
<b>6. Conclusion and implications</b> .....	<b>34</b>
<b>7. Results summary</b> .....	<b>35</b>
<b>8. Limitations and suggestion for further research</b> .....	<b>36</b>
8.1 <i>Limitations</i> .....	36
8.2 <i>Suggestion for further research</i> .....	37
<b>9. References</b> .....	<b>38</b>
<b>10. Appendix</b> .....	<b>43</b>
Appendix A. <i>Research instrument / The Case</i> .....	43
Appendix B. <i>Coding scheme</i> .....	47

# 1. Introduction

Around the turn of the millennium, Saras Sarasvathy (2001) introduced her framework on effectuation and causation, which has since gained ground as one of the fundamental theories in entrepreneurial research. An effectual process starts with someone looking at who one is, what one has, and what one knows before making a decision by choosing among the possible outcomes. Effectuators see the world as still in-the-making, and focus on making success happen rather than avoiding failure (Sarasvathy, 2008). A causal process involves setting a goal and modifying whom, what and how accordingly to achieve the goal. Moreover, Sarasvathy claimed that novices used causal reasoning to a higher degree, whilst experts leaned on their previously gained knowledge and made decisions in a more effectual manner, affecting the future rather than trying to predict it.

In recent years, extensive research comparing decision-making logics between expert entrepreneurs and other groups has been conducted (Sarasvathy, 2001; Sarasvathy, 2008; Dew et al., 2009). Dew et al. (2009) researched effectual and predictive logics in entrepreneurial decision-making by comparing expert entrepreneurs with novices who graduated from MBA programs. The researchers interviewed 64 subjects to find out the difference in their thought processes when solving a case about setting up an imaginary company, using think-aloud protocols. Their results showed a clear difference in the use of effectuation and causation between the two groups, with experts being much more effectual.

“Expert entrepreneurs, ... , under-weighted, ignored and even explicitly argued against taking predictions seriously, working instead with things within their control even if that meant effectuating, e.g., changing their initial goals and visions for the venture.... (while) the MBA students picked target segments based on predictive information given to them and followed textbook procedures in arriving at decisions on how to capture the target segments.”

(Dew et al., 2009. p.288)

In this study, we attempt to build on the research by Dew et al. (2009) titled: *'Effectual versus predictive logics in entrepreneurial decision-making: differences between experts and novices'*. We want to compare and analyze the decision-making logics of entrepreneurially educated novices (EENs) and experts when starting a venture. We have defined EENs as entrepreneurship graduates who have started their own venture in the last 3 years. This does not include students who have attended ad-hoc courses oriented towards self-employment and/or new venture creation but solely graduates from formal entrepreneurship programs at a Masters level. What characterizes these individuals as a distinct group of novice entrepreneurs is that they have all studied how to perform like entrepreneurs, and may have an edge on novices who have not formally studied entrepreneurship. EENs serve as an interesting replacement group for MBA students due to the polar goals of the programs. MBA programs are often designed more towards teaching students to run large companies (a more casual process), while entrepreneurship programs are designed to teach students how to start companies (a more effectual process). In our research, we expect that EENs will still be more causal in their decision-making than the experts, as novices tend to be more causal than experts (Sarasvathy, 2008). From this, we have identified the research gap as to determine where EENs sit on the causal to effectual logic scale compared to expert entrepreneurs.

It is important to fill this research gap for three reasons: Firstly, all experts were originally novices and it is important to see if entrepreneurship education brings EENs close to experts in their decision-making logics. This is important because there have been huge investments by government bodies, organizations and business leaders in educational programs to move people from beginners to experts (World Economic Forum, 2014). Secondly, we believe EENs are a good research group to see how they differ in their approach and reasoning to Dew et al.'s (2009) MBA students. Their study pointed out that MBA programs do not do a good job of educating entrepreneurs. This has been shown by both anecdotal wisdom, and the popular literature on entrepreneurship (Dew et al., 2009). Finally, we see the need to analyze the differences between novice and expert entrepreneurs to identify if there is a gap and how that affects aspiring entrepreneurs

Therefore, our research question is:

Do EENs and experts have similar decision-making logics when starting a new venture?

Our study is a comparison study with Dew et al.'s (2009) research. We had three expert entrepreneurs and three EENs solve a modified version of the case used in Dew et al.'s comparison study. The case was modified to fit a Swedish setting because all participants were located and worked in Sweden. Since expertise in entrepreneurship is contextual and specific to the domain of entrepreneurship (Ericsson and Smith, 1991), the case used was an attempt to be as unbiased as possible. This was done by entrepreneurship itself being the product for which the subjects had to identify/create a market for.

We expect EENs in this study to demonstrate less in every measure of the following effectual traits due to their lack of experience within the field of entrepreneurship when compared to our experts:

*Expertise in general:*

- The number of words they use (Analogical reasoning)
- How many new markets and segments they identify (Analogical reasoning)
- Do they look at and deal with the venture as a whole (Holistic and conceptual thinking)
- How much they question the given market research data (Weighting of *predictive* information)

*Entrepreneurial expertise:*

- How many times they draw on personal experience (Means vs. Goals)
- Their concerns regarding project affordability (Affordable loss vs. Expected returns)
- If they look for partnerships (Partnerships vs. Competition)

The paper proceeds as follows: Next we move to the theoretical framework and look into effectuation and causation, and especially effectual logic. Then we look at research on entrepreneurship, and specifically expertise in entrepreneurship and expert entrepreneurs before we look at entrepreneurially educated novices (EENs).

After the theoretical framework we turn our focus to the methodology of our research, the design of the study, samples and measures to clarify how the research was done. Results will follow where we go over our main findings and link them with existing research, adding to the discussion and offering our conclusions. Towards the end we look at limitations before suggesting opportunities for further research. We conclude with references and appendixes, including the case (Appendix A) and coding scheme (Appendix B).

## 2. Theoretical framework

### 2.1 Effectuation and causation

Read and Sarasvathy (2005) claim that the effectuation theory developed by Sarasvathy (Sarasvathy, 2001) was a first attempt to develop a foundation of entrepreneurial expertise. The effectuation process is the inversion of causal rationality, it is enactive and exaptive as opposed to the reactive and adaptive nature of causal and rationality (Read and Sarasvathy, 2005).

According to Sarasvathy (2001), the effectuation process does not begin with a specific goal, much like a cook who makes a meal based on what he has in the kitchen and his own cooking skills. A causal process is when the venture is envisioned from the beginning and all efforts are directed at achieving the pre-envisioned state (Chandler et al., 2011). Much like a chef who decides on the menu first before looking what he has in the kitchen.

“Causal strategies are useful when the future is predictable, goals are clear and the environment is independent of our actions; effectual strategies are useful when the future is unpredictable, goals are unclear and the environment is driven by human action.”

(Sarasvathy, 2008, p.73)

In real life settings, causal and effectual approaches are not necessarily an either or. In fact, Gustafsson (2004) found that expert entrepreneurs are capable of using both modes well depending on the circumstances. Both approaches can occur simultaneously and often overlap in different contexts of actions and decisions made by the entrepreneur every day (Sarasvathy, 2001). It is therefore impossible to be exclusively either effectual or causal, although experienced people tend to use more effectuation when solving a problem within their range of expertise. Sarasvathy (2008) found that experts prefer effectual actions when starting new ventures, and may not transition well into causal reasoning when the venture matures.

The effectuation theory developed by Sarasvathy (2001) was the first attempt to develop theories focusing solely on entrepreneurial expertise. Larkin et al. (1980)



found that experts tend to be forward thinking (*effectual reasoners*) taking information cues to make actions, while novices tend to be backward thinkers (*causal reasoners*) using information cues to validate the actions they took.

### **2.1.1 Causal and effectual positions**

As stated earlier, we intend to look at how expert entrepreneurs and EENs make decisions differently. Dew et al. (2009) showed that expert entrepreneurs were in fact more effectual than their less experienced counterparts. We intend to look at the elements of causal and effectual positions to see if our experts are more effectual than our EENs in their decision-making when starting a new venture. To do this we will focus on expertise in general and three positions of effectual logic.

#### **Means-driven vs. Goal-driven action**

The core of an effectual means-driven approach, or the bird-in-hand principle, is beginning with a given set of means. It is focusing on who I am, what I know, and whom I know (Sarasvathy, 2001; Dew et al., 2009). The effectual entrepreneur asks himself what effects he can create with the means he has, while the causal entrepreneur would ask himself what resources he ought to accumulate to achieve the desired goals (Sarasvathy and Dew, 2005).

For example, a company could build on a staff member's previous experience in a different industry and use his knowledge and networks as the starting point for a new project. A causal, goal-based company would form specific expectations derived from its predetermined roadmap (Brettel et al., 2012).

#### **Affordable loss vs. Expected returns**

Focusing on risking no more than you can afford to lose is an effectual view. It is common among successful expert entrepreneurs who limit the risk when building their venture. A causal entrepreneur is more likely to calculate the expected maximum return and choose between options to reach that objective (Sarasvathy and Dew, 2005; Brettel et al., 2012).

An example of this is the causal entrepreneur who doesn't leave his job until he sees an opportunity that he believes will pay more. In contrast, the effectual entrepreneur

invests some of his savings to pursue a project worth his time and money regardless of whether it will pay more than his current job (Dew et al., 2009).

### **Partnerships vs. Competitive analysis**

To reduce uncertainty, effectual entrepreneurs erect entry barriers and co-create the new market. They involve customers, suppliers and even prospective competitors to form strategic alliances (Sarasvathy, 2001; Sarasvathy and Dew, 2005; Brettel et al., 2012). A causal approach would be reducing the uncertainty through competitive market analysis (Brettel et al. 2012) and limiting relationships to what is absolutely necessary (Sarasvathy and Dew, 2005).

An example of this would be an effectual entrepreneur who invents a new soft drink and co-operates with 'big players' in the market to use their networks and marketing structure to promote it. A causal approach would be trying to exploit competitors' weaknesses and going alone.

## **2.2 What is Entrepreneurship?**

Perhaps the largest obstacle in creating a conceptual framework for the entrepreneurship field has been its definition, which has been difficult for scholars to agree on. Unlike chess or music the very definition of entrepreneurship has been unclear (Sarasvathy, 2008). Defining an entrepreneur as solely a person who starts new ventures, does not take into account the variation in the different opportunities people identify. This often leads to researchers not measuring opportunities in their research (Shane and Venkataraman, 2000). Chandler and Lyon (2001) say that one of the strengths of entrepreneurship is that it borrows freely from the "tool-kits" of other social sciences making it hard to agree on a strict definition.

Landes et al. (2010) said that entrepreneurs have always existed in human history and have been a major driving force for economic prosperity. However, there is no way to explain entrepreneurship without looking at the situations entrepreneurs find themselves in (Shane and Venkataraman, 2000). Dew et al. (2009) define entrepreneurship as the creation of new ventures, products and markets and we will, for the sake of our study, use the same definition.

Since the term is vague, it is important to point out that there are different types of entrepreneurs. For example, social or business entrepreneurs who range from novices to experts. But what is an expert and how can you become one? A certain number of years in the field does not make you an expert. If we compare experts in entrepreneurship to professional football players in the English Premier League, it is safe to say that all of the players are experts in their field, playing at the highest level. Although all experts, their skills vary greatly and the difference between the best, average and poor players is vast. Years of experience or number of games played don't necessarily indicate top performance. We argue that the same is true for entrepreneurs. The number of companies started or years of experience does not determine success. We feel that the difference in how experts and novices make decisions needs to be explored.

### **2.3 Expertise and expert entrepreneurs**

Read and Sarasvathy (2005) say that entrepreneurship can be seen as a form of expertise, where expert entrepreneurs have a certain set of skills, models and processes that they acquire with time and deliberate practice. An expert is someone who has attained a high level of performance in the domain as a result of years of experience (Foley & Hart, 1992) and deliberate practice (Ericsson et al., 1993). But expertise in entrepreneurship does not automatically equal success (Read and Sarasvathy, 2005). Experts can still fail and novices can succeed. This is probably more true in the context of entrepreneurship than anywhere else. For example, an entrepreneur's first company could be very successful but someone playing tennis for the first time is unlikely to beat a professional tennis player.

When we compare experts and novices in regards to entrepreneurial research, it is unanimous that most experts use effectual reasoning more than most novices (Sarasvathy, 2001; Sarasvathy, 2008; Dew et al., 2009). Dew et al. (2009) point out that experts draw from a larger mental database of actual experiences and have better access to this knowledge. According to Feltovich et al. (2006), novices often have their short-term memory overloaded, which makes it harder for them to access available knowledge relevant to the situation.

As entrepreneurship is a broad field with contextual expertise it must be investigated in entrepreneurial settings (Ericsson and Smith, 1991; Read and Sarasvathy, 2005) just like an expert athlete should be examined in their sport. However, experts often use their expertise in general to solve new issues in their ventures (Dew et al., 2009).

“Domain-specific experience is one key in the movement from novice to expert.”

(Schenk et al, 1998, p.12)

We look into three categories when analyzing differences due to expertise in general. The first is analogical reasoning, which refers to solving new problems by building on past experience. Analogical reasoning is a strategy when transferring existing knowledge from one domain to another (Gregan-Paxton, J. and Cote, J., 2000). Markman et al. (2011) claim that the key to analogical problem solving is finding known problems that have the same structure as the problem being solved. This can be measured by how much respondents talk, if they go beyond the data given and if they visualize alternative target segments. The second indicator is holistic and conceptual thinking, which refers to looking at the problem as a whole. Experts tend to solve problems more holistically than their novice counterparts. Klein (1998) found that expert firefighters look at the scene of a fire as a whole by examining its cause and likely evolution. The third way we evaluate expertise in general is by looking at the weighting of (predictive) information. Experts develop much of their knowledge in domain-relevant situations by trial and error. Paradoxically, most novices derive their knowledge from the context of practice problems, which are divorced from the real world (Schenk et al., 1998).

"Expert entrepreneurs achieve success, namely through *failure management*. Sustained performance over long periods of time requires that experts outlive failures, cumulate successes, and learn from both."

(Sarasvathy, 2008, p.14)

Since experts have often learned from failing, they should be more likely to doubt information given. They trust their gut in particular situations rather than relying on what the textbooks say.

### **2.3.1 Entrepreneurial expertise**

Expert entrepreneurs differ from their novice counterparts in their entrepreneurial expertise because of their deliberate practice in the field (Gustafsson, 2004). When attempting to explain entrepreneurial expertise, we look into the work of expert performance in chess, which began over 40 years ago (Chase and Simon, 1973; Simon and Chase, 1973). The first person to carry out extensive experiments on problem solving was Adriaan de Groot (1978) who used chess as the task for research. His subjects varied from novice chess players to chess grandmasters (experts). Groot found that the players' results were similar in every sense, except that experts usually chose the strongest move (Simon and Chase, 1973).

According to Dew et al. (2009) an expert entrepreneur has attained reliably superior performance in a particular domain within entrepreneurship, taken at least 1 venture public (IPO), started (on average) 7 ventures and has entrepreneurial experience of over (on average) 20 years. However, due to the context and constraints of our study our definition of an expert entrepreneur is someone who has significant knowledge in his field of work (with deliberate practice), has been involved in entrepreneurial activity for at least 10 years and started at least 3 ventures.

“Entrepreneurial knowledge ultimately derives from a mix of individual experience, connections within networks, learning from others, and blind variations.”

(Sarasvathy, 2008, p.8)

One of the skills expert entrepreneurs have acquired through their years of experience and growth of their ventures is knowing when to use the appropriate approach. Sarasvathy (2008) predicts that most enduring high-growth firms began effectually. Once they grow they have to become more causal to maintain their status and build long-term competitive advantages. She argues most enduring firms will not be run by their original founders due to the transition from effectual to causal approaches.

“The transition could happen in two ways: expert entrepreneurs, after one or more botched attempts, will realize they do not like or are incapable of using causal approaches, and so will either quit or pass the reins to more professional management; or they will be fired by venture capitalists or other major stakeholders and replaced with professional management.”

(Sarasvathy, 2008, p.133)

We believe Sarasvathy is missing a very important third way this transition could happen. The original founder could adapt to the company's transition, being forced to use more causal approaches when the venture matures, and choosing appropriate logics in different situations.

Greeno and Simon (1988) say that most experts learn by doing. Dewey (2004) and Mieg (2001) both argued that doing isn't enough and we don't learn from our experience but from reflecting on it and simply being in the field is not enough. Experience of at least 10 years is widely accepted to be the minimum amount of deliberate practice in a certain activity to be considered an expert (Ericsson et al., 1993). According to Ericsson and Lehmann (1996), deliberate practice is the immersion in the activity, which enables the cognitive adaptation for learning and skill acquisition. Ericsson et al., (1993) identify five necessary requirements of deliberate practice which superior expert performance is built on. These pillars are motivation, understandability, feedback, repetition and fit. However, experience or practice alone doesn't appear to lead to maximal performance but the level can be increased as a result of deliberate efforts to improve. Deliberate practice is, according to Ericsson et al. (1993) a highly structured activity where performance is monitored carefully, the process is not necessarily enjoyable but it has the explicit goal of improving ones performance.

These five key points are important in making the experts different from novices, regardless of whether the activity consists of playing chess or mastering an Olympic sport. It is the complete focus that is required for accumulation of expertise.

This doesn't fully explain how expertise is attained and how the bridge from being a novice to an expert is built. Is the entrepreneurial expertise attained through time, deliberate practice, education, or a mix of all three?

### 3. Method

Dew et al. (2009) compared 27 expert entrepreneurs with 37 MBA students who's primary experience were managerial roles in large and complex organizations. Their backgrounds spanned a wide range of occupations with 87% never having founded a firm.

With the increased supply and demand for entrepreneurship education at university level, more and more people are graduating with degrees in entrepreneurship. When we mention EENs, we refer to entrepreneurship graduates from programs at a Masters level who have started their own venture in the last 3 years.

Experts are overall more effectual than novices in their decision-making. According to Sarasvathy (2008) 89% of experts prefer an effectual approach, while novices prefer causal approaches 81% of the time.

In sum, we expect expert entrepreneurs to be more effectual in their decision-making than EENs.

We have chosen to conduct think-aloud protocols on two groups, using the coding scheme first developed by Dew et al. (2009). We will then add to our protocols by using qualitative research methods to back up the data. This proved running a quantitative study akin to Dew et al.'s (2009) invalid due to problems associated with between and within group differences. To overcome these restraints, the think-aloud protocols were coupled with qualitative content analysis on our participants' answers. We believe this qualitative approach will help us develop a deeper understanding and discussion over our results than that of Dew et al.'s (2009) work. We modified the case by changing the currency from USD to SEK and company names to fit the Swedish context.

## **3.1 Design**

In all six interviews the investigators presented a case with detailed description of the imaginary product ‘*Venturing*’ to the subjects (See Appendix 1 for the actual instrument given). *Venturing* is an imaginary game of entrepreneurship where participants must make decisions after receiving realistic information about the company and environment. First, our participants were asked to read aloud the information presented and then describe how they would build on this information to create their venture. Secondly, the participants were provided with market research, and asked specific questions in regards to building the venture. Both experts and EENs worked on the same case. The participants were asked to think-aloud during this entire process and were recorded. Interactions between the investigators and subjects were kept to a minimum. The study took 30-45 minutes to complete, without time pressure. It was then transcribed and coded using think-aloud protocols (the complete coding scheme can be found in Appendix B).

### **3.1.1 Think-Aloud Protocol Analysis**

Think-aloud protocols (TAP) were coded to analyze the data. TAP has emerged as a practical tool and gained acceptance as a viable method for studying thinking and decision-making (Crutcher, 1994; Payne, 1994; Wilson, 1994; Ericsson and Simon, 1998; Ericsson, 2006). TAP is widely accepted as the best method for exploring the connection between actual thoughts and verbal reports (Ericsson, 2006). It calls for participants to concurrently verbalize their thought processes as they make decisions (Ericsson and Simon, 1980). Since expert entrepreneurs are usually good storytellers (Lounsbury and Glynn, 2001), studies based on their stories may be subject to retrospective bias, which we wanted to avoid. TAP allows researchers a real-time look into the black box of cognitive processing because of the structure of the brain’s short term memory system, as opposed to only analyzing decision outcomes (Ericsson and Simon, 1980; Sarasvathy, 2008).



## 3.2 Sample

Protocols were collected from three expert entrepreneurs and three entrepreneurially educated novices (EENs). Table 1: Descriptive statistics of individual subjects, provides descriptive statistics of individual subjects, while Table 2: Descriptive statistics of the expert and EEN samples, provides descriptive statistics of the expert and EEN samples.

The experts in our study (see Table 1: Descriptive statistics of individual subjects) were between the ages of 36 and 53, have all worked for their ventures for more than 10 years and have all sold more than one of their ventures. The comparison group of EENs (see Table 1: Descriptive statistics of individual subjects) were between the ages of 26 and 31 and have all received a M.Sc. in Entrepreneurship in the past 3 years. They have started 1 to 3 ventures, are currently involved with running their own and have not sold any. Our definition of EENs was advantageous as we were able to set a benchmark of education level amongst our novices. There are many courses that novice entrepreneurs are subjected to, so by taking EENs, we hope to achieve a more level playing field. A sample of random novice entrepreneurs was deemed to have too much variation in their experience and education.

For the purpose of this study and to protect the identity of our subjects we have replaced their names. The experts in our study were given names that start with the letter E (for expert) while our EENs were given names with the letter N (for novice).

*Descriptive statistics of individual subjects*

Name	Age	Years since graduation/ Univ. academic background	Years worked for ventures	Ventures started	Ventures sold
<i>EENs:</i>					
Nick	26	1	N/A	1	0
Nathan	31	3	N/A	3	0
Nolan	26	1	N/A	2	0
<i>Experts:</i>					
Edward	56	2 years of engineering	23	3	2
Eric	36	M.Sc Computer Science	13	3	2
Ethan	53	English maj./Psychology min.	33	7	3

Table 1

*Descriptive statistics of the expert and EEN samples*

Variable	Mean	S.D.	Minimum	Maximum
<i>Entrepreneurially educated novice subjects (N=3)</i>				
Year of birth	1986	2.89	1988	1983
Ventures created	2	1	1	3
Years since graduation	1.67	1.15	1	3
<i>Expert entrepreneurs subjects (N=3)</i>				
Year of birth	1967	9.8	1978	1961
Ventures created	4	2.3	3	7
Years worked for those ventures	23	10	13	33

Table 2

### 3.3 Method of Analysis

To stay in line with the previous research we adopted the same coding scheme as used in Dew et al.'s (2009) work. The coding scheme has the ability to extract relevant variables and counts into three desired categories. Namely, expert-EEN differences in general, domain specific differences in regards to marketing, and domain specific differences in starting new ventures. General differences were focused around the number of words spoken and theorizing from previous experience. Marketing variables involved the selection of different market segments, channels, prices and so on. New venture differences focused on factors such as resource constraints when pursuing opportunities in the case. After the interviews were transcribed, both researchers coded the TAP independently. Results were compared and any inconsistencies resolved.

## 4. Results

We expected our EENs to be less effectual than our expert entrepreneurs in each of the six categories (analogical reasoning, holistic and conceptual thinking, weighting of *predictive* information, means driven approach, affordable loss and developing partnerships). The following results do not follow a chronological stream of thought from the participants but are organized as the authors best see fit.

### 4.1 Differences due to expertise in general

The table below (Table 3: Variable description and analyses: Differences due to expertise in general) shows the raw data of the three constructs to better clarify if there is in fact a difference in the thought process between our expert entrepreneurs and EENs.

*Variable description and analyses: Differences due to expertise in general.*

Construct	Variable description	Descriptive Statistics	Experts Mean	EENs Mean
Analogical reasoning	Total number of words the participants used to complete the scenerio	Expert: Max: 3346 Min: 1114 EENs: Max: 3345 Min: 1568	2190	2561
Analogical reasoning	Number of markets identified by each subject	Expert: Max: 2 Min: 1 EENs: Max: 5 Min: 2	1.33	3.33
Analogical reasoning	Subjects articulated an alternative segment during the scenario (Y/N)	Expert: 1Y, 2N EENs: 3Y, 0N		
Holistic and conceptual thinking	Number of thoughts relating to the business but outside scenario	Expert: Max: 0 Min: 0 EENs: Max: 4 Min: 0	0	2
Weighting of ( <i>predictive</i> ) information	Subjects believed and accepted the market research numbers in the scenario (Y/N)	Expert: 2Y, 1N EENs: 3Y, 0N		
Control variable	Count of times subjects uses intuition or gut feel to make decisions	Expert: Max: 1 Min: 0 EENs: Max: 4 Min: 1	0.33	2.33

Table 3

#### **4.1.1 Analogical reasoning**

The empirical results show that in fact EENs demonstrated more analogical reasoning in every construct than their expert counterparts. EENs spoke a combined 2115 more words (7684 words in total versus 5569) to complete the scenario. As can be seen in the above table (Table 3: Variable description and analyses: Differences due to expertise in general) experts spoke an average number of 2190 words compared to EENs with 2561 words, that is an average difference of 371 words between the two groups. EENs found 10 distinct markets for this product while experts found 4. This gives us an average of 3 identified markets for EENs and only 1 for experts. As in Table 3: Variable description and analyses: Differences due to expertise in general,

the maximum number of markets found by any one participant was 5, as identified by a novice, Nathan. In comparison, experts Eric and Ethan both identified only one market. When solving the case, all three EENs visualized alternative target market segments, finding a total of 4 while only one expert found a single alternative target market/segment.

#### **4.1.2 Holistic and conceptual thinking**

Holistic and conceptual thinking was analyzed by investigating to what extent the subjects viewed this project as a complete business as opposed to a one off project. Insufficient data was generated to draw valid results on holistic and conceptual thinking. Only one expert, Ethan, dealt with the business as a whole mentioning his concerns for numbers and his personal finances. This will be discussed later in regards to *affordable loss versus expected returns*, with the data in Table 4: Variable description and analyses: Differences due to entrepreneurial expertise, showing a maximum of 4 mentions. Paradoxically, all other subjects thought of the business more as a project, giving insufficient data about their holistic and conceptual thinking.

#### **4.1.3 Weighting of (predictive) information**

All EENs trusted the market research given and believed the numbers presented. One expert, Ethan, discounted the predictive information and felt that doubling the numbers would be more accurate. Ethan's result be seen in Table 3: Variable description and analyses: Differences due to expertise in general, as the single 'No' value under weighting of (predictive) information. Ethan felt that he would need to conduct new research himself as opposed to believing what he read in the study, however he was the only expert to feel this way.

EENs were almost 7 times more likely than experts to draw on intuition. Only one expert referred to a gut feeling once, when compared to EENs averaging 2.33 times each. This can be demonstrated in the coding scheme as using specific keywords such as; "gut feeling", "intuition", "opinion" or "personal experience" when solving the case. This is demonstrated in Table 3: Variable description and analyses: Differences due to expertise in general, with Nolan representing the maximum score of 4 times, whereas experts Edward and Ethan did not refer to their intuition at all.

## **4.2 Difference due to entrepreneurial expertise**

We now turn our attention to the empirical findings regarding possible differences due to entrepreneurial expertise between the two groups. Our experts have over 20 years more experience in entrepreneurship on average than their EEN counterparts, as can be seen in Table 2: Descriptive statistics of the expert and EEN samples. It is worth exploring how or if our groups differ in regards to the use of means-driven or goal-driven actions, do they focus on affordable loss rather than expected returns and what their views are on building partnerships when starting a new venture.

*Variable description and analyses: Differences due to entrepreneurial expertise*

Construct	Variable description	Descriptive Statistics	Experts Mean	EENs Mean
Means-driven as opposed to goals-driven action	Number of times a subject drew on personal experience	Expert: Max: 1 Min: 0 EENs: Max: 4 Min: 1	.33	2.33
Affordable loss as opposed to expected return	Times a subject mentioned the availability of money or cost of an option	Expert: Max: 4 Min: 0 EENs: Max: 2 Min: 0	1.67	.67
Affordable loss as opposed to expected return	Total number of segments chosen by subject (2 <sup>nd</sup> priority segments count as .5 of a choice)	Expert: Max: 1 Min: 1 EENs: Max: 3 Min: 1	1	1.5
Partnerships as opposed to competitive analysis	Times subjects mentioned partnerships activities	Expert: Max: 9 Min: 1 EENs: Max: 9 Min: 1	4.33	3.67
<i>Control variable for:</i> Partnerships as opposed to competitive analysis	Subjects choice of direct sales as a channel scenario (Y/N)	Expert: 3Y, 0N EENs: 3Y, 0N		
Partnerships as opposed to competitive analysis	Subjects choosing direct channel and personally approaching customers (Y/N)	Expert: 3Y, 0N EENs: 3Y, 0N		

Table 4

### **4.2.1 Means-driven vs. goal-driven action**

An effectual approach is to focus on means-driven action as opposed to goal-driven action. Experts were less likely to mention their personal experience when making decisions. EENs mentioned how they had done things in the past in total 7 times, with Nolan referring to his experience while making decisions 4 times as represented by the maximum score in Table 4: Variable description and analyses: Differences due to entrepreneurial expertise. Only one expert, Eric, mentioned past experience when making decisions during the case, while Ethan and Edward represent the minimum score of 0 in Table 4: Variable description and analyses: Differences due to entrepreneurial expertise, by not mentioning it at all.

“I would do what I’ve done in the past ... and look at where I was standing today.” –Eric

Experts were more likely to use their current network to sell to (whom I know?) while EENs talked about creating a network. As can be seen by the above quote from Eric, a common theme throughout the experts’ decisions was leveraging their established network they had built up through their experience. In contrast to this, EENs were more likely to talk about creating a network in order to achieve their goals.

There wasn’t sufficient data from the instrument to analyze how our participants viewed their use of resources (who am I?). Both groups mentioned that they would start with what they had. In particular, EENs talked more about using universities to both sell and promote the product, because:

“...that specific group spreads the word much faster.” -Nolan

This was an extension of EENs building on their previous experience of being at university where they were familiar. It is important to note that they did not mention an established network at the university, instead they felt more comfortable creating one in this environment and could more clearly see the benefits due to their experience in this area, as can be seen in the above quote.



### **4.2.2 Affordable loss vs. Expected returns**

An effectual approach is to focus on affordable loss rather than expected returns. The difference between the two groups was fairly wide in regards to looking at what they could afford to lose rather than the possible expected returns. Experts were more concerned about the availability of money or how much it would cost. Experts mentioned their concerns, on average almost twice, while EENs less than once each. As can be seen in Table 4: Variable description and analyses: Differences due to entrepreneurial expertise, the maximum value of 4 was from Ethan who was concerned about how much he could afford to lose. In contrast to this, none of the EENs expressed any concern at all about loss, as represented by the minimum figure in Table 4: Variable description and analyses: Differences due to entrepreneurial expertise.

Experts only chose 3 market segments, which is half of what the EENs chose (6 in total). Experts were more careful to choose their segments in regards to the ‘low hanging fruits’, what they could afford to lose and their expected returns on investment.

“Before taking on big investments, that includes before attracting any venture capital, I would try to identify what strategy is the quickest possible way to make this break even.” -Eric

As can be seen in the above quote, experts were more cautious and took a narrower scope strategy. They wanted to take their time building the venture, break even as soon as possible while not taking as many risks. They took on more of a slow and steady approach to build upon, as opposed to the EENs who were comfortable to take on heavy investments and go for rapid, aggressive growth.

EENs were more focused on expected returns without regard to losses. Nolan suggested that this game could:

“...become the new standard for getting investments by showing investors your score in the game.”  
-Nolan

He went further to state that your score in this game would be similar for investors as to what the TOEFL test results are to universities. This view of aggressive growth was

consistent amongst our EENs who were more concerned with how big their possibilities were, and not concerned with the risk it would take to get there.

EENs mentioned and identified more markets and segments. As represented in Table 4: Variable description and analyses: Differences due to entrepreneurial expertise, with the EENs max value of 3 compared to the max value of experts of 1. Nolan mentioned a maximum of 4 new markets (2<sup>nd</sup> priority segments warrant .5 of a value in the table), while experts Eric and Ethan both did not identify any.

EENs saw this product as a bigger opportunity than their expert counterparts.

“There is no reason for the kids not to play this game because they’re smart. So growth possibilities are huge.” –Nathan

EENs view of the product is shown well in the quote above. Experts wanted to take more time in researching before acting while EENs wanted to dive right in. The EENs were generally more excited by the opportunity and were blindfolded to any drawbacks or limitations. In contrast to this, as seen in the first quote of this section by Eric, experts were very skeptical and wanted to move slower before becoming too involved.

### **4.2.3 Partnerships vs. competitive analysis**

An effectual approach is to build partnerships rather than focus on competitive analysis. Both groups mentioned partnerships activities, with experts mentioning it slightly more often than EENs. This can be seen in Table 4: Variable description and analyses: Differences due to entrepreneurial expertise with Experts mentioning partnerships an average of 4.33 times compared to EENs 3.67 times. As shown in Table 4: Variable description and analyses: Differences due to entrepreneurial expertise, with all responses as ‘Yes’, there was absolutely no difference in subject’s decisions to sell directly and all chose to personally contact customers.

“So I would sell this product initially into a market segment that already had databases of potential customers for the end product... rather than trying to sell it directly from my own website. I think I would look for strategic partners that have got databases.” –Edward

The above quote shows the most indirect route of market entry chosen by any participant in the study. Despite the distanced selling method, it still involved direct selling and extensive work with customers.

Although both groups were focused on building partnerships, we found a fundamental difference in their approach. EENs were not worried about competitors at all and looked to build partnerships where they themselves got more out of the cooperation than the other party. EENs looked into partnering with universities to promote, sponsor and use the product. Nolan wanted to take 10 minutes from a university lecture to promote the product to students, while Nathan wanted schools to finance the development of the product and they would take the risk. Experts had a very different approach from EENs:

“When I am analyzing the competitors, questions asked could be related to the market size, number of customers, how much they are paying, and what kinds of services? Understand the competitors views of their customers. What kind of problems are they solving? Asking competitors what are their plans ahead? And what kind of products are they designing? Have they tried out different products? Different services in the past that did not succeed? ... Try to identify patterns and see if you can arrange the competitors into different categories... read their financial data and stuff like that.” -Eric

As can be seen, experts focused on extensive competitive analysis and felt that finding out what, why and how the competitors were acting would help them to strategically build their approach. They went so far as to use specifics such as SWOT analysis (strengths, weaknesses, opportunities and threats) to determine what their competitive advantages would be.

Experts were focused on creating a balanced partnership, creating ‘win-win’ situations for both parties and turning potential competitors into partners:

“I think it could be one of those situations where potential competitors could be turned into potential customers once they realize how it can be used and what the value of the product is.” -Edward

This approach was very different to EENs who were interested in forming rather one-sided partnerships, expressing almost no intentions in adding value to the potential partners.

Experts looked at the whole picture, even if that meant being a small partner in something bigger rather than being a majority owner in something of a higher uncertainty:

“The best way to get in is there’s this company building this rocket ship simulator and they are already known to the school board. Why don’t I just go and sell my idea to them or join forces ... merge or something and I could add this to their portfolio. It competes but it gives them an alternative to go to school boards with. Together we could probably make more money than if I started from scratch. So that is a definite thing I would go for.” –Ethan

As mentioned in the affordable loss results, experts were interested in targeting the “low hanging fruits”. As can be seen in the above quote, they wanted the best market strategy even if that meant giving up some of the ownership. They wanted to use strategic partners wherever they could to leverage existing channels. In contrast, EENs strategies were more selfish and they showed more resistance in giving up anything in return for the partnership.

## 5. Discussion

Our empirical results show a distinct difference in how EENs and expert entrepreneurs solved the case. Our findings suggest that EENs are not as causal as we initially expected, but are in fact more effectual than their expert counterparts. Karlsson and Moberg (2013) pointed out that entrepreneurship has a trait-based view where some believe you are either born with the necessary traits or not. Drucker (1985) found that entrepreneurship is neither magic nor has anything to do with genes but a discipline and as such it can be learned. Kuratko (2005) argued that certain aspects of entrepreneurship can be learned, and according to Sarasvathy (2008) effectuation is one of them. Based on our results, we found that expert entrepreneurs were able to choose between causal and effectual logics as the situation saw fit. EENs, however, were only able to draw from effectual logics. This is in line with Sarasvathy's (2008) findings that suggest effectual approaches are used when entrepreneurs have limited resources.

“as ... entrepreneurial expertise grows, one would expect them to become more discerning in their use of appropriate logics for any given situation.”

(Sarasvathy, 2008, p.132)

Sarasvathy (2008) claims that experts prefer effectual actions when starting new ventures. Based on this, we believe our experts successes and failures have taught them how and when it is appropriate to use causal approaches. Due to our EENs lack of experience with developing a venture to a point of causation they do not have the level of expertise to choose between the two approaches. Because of this, experts are more adaptive to new situations.

From this, our results lead us to wonder if the emphasis on effectuation has gone too far in entrepreneurship education. Are our EENs more effectual because of their education? Have they never had to develop a causal logic due to the immaturity of their ventures? Or could it simply be their young age or naivety as entrepreneurs?

We will now look more closely at both expertise in general as well as differences due to entrepreneurial expertise to further elaborate on the results.

## **5.1 Expertise in general**

### **5.1.1 Analogical reasoning**

As shown in our empirical results, EENs were more inclined to look beyond the information given, identified more distinct markets and even articulated more alternative market segments during the scenario. This is in stark contrast to what Dew et al. (2009) found in their study where only 5% of novices visualized alternative target market segments. Our EENs saw bigger opportunities, talked more and never doubted that the opportunity presented in the case would be a success. We believe this can be attributed to the experience of our experts. The caution shown by our experts to move slowly and start with fewer market segments may be because they have failed in their past experiences. In contrast to this, the EENs limited experience with failure and hardship leads to their confidence. Our results suggest that we can expect EENs to be more aggressive and confident in the early stages of venture creation, and these traits to be less apparent as their experience develops.

### **5.1.2 Holistic and conceptual thinking**

Insufficient data was drawn to make any conclusions about experts and EENs holistic and conceptual thinking. Our results do show that experts were more likely to look at the business venture as a whole and establish a brand while EENs perceived it as a one-time opportunity for quick profit. Unfortunately, there was not enough discourse on the subject to develop any further conclusions.

### **5.1.3 Weighting of (predictive) information**

All EENs believed and accepted the market research given, while some experts in our sample doubted it. This suggests that EENs lack the business experience of working with real data. Our EENs have learned many of their entrepreneurial skills in the classroom through case studies. Since the data in these studies is most often given, it must simply be believed and is rarely doubted. Experts made strategic decisions to doubt the data given, likely because they have been presented with unreliable data in their entrepreneurial experience. Hodgkinson et al. (1999) claim that strategic decision-makers employ the 'rule of thumb' principle to cope with complex and

uncertain decisions. They simplify assumptions to reduce the burden of processing the information.

As well as accepting the data given, EENs were seven times more likely to use their “gut feeling”, “intuition” or “opinion” when solving the case. We believe that EENs have to rely on their ‘gut feeling’ rather than actual experience in their decision-making since they have less experience to build from. Experts seemed more confident in how they solved the case and expressed their thoughts without specifically mentioning that it was their “gut feeling”, “intuition” or “opinion” but rather something they would just do. This can be seen by fewer words spoken and mentioning fewer distinct market segments.

Moreover, the weighting of information differently could be related to the experts’ scrutiny of the data. The experts may have been more discerning towards the data given as they were basing their decisions more solidly on it, as apposed to the EENs who took the data at face value and then went with their ‘gut’ decision. This could have led to the higher scores of experts doubting the data, and then higher scores of EENs going with their ‘gut’ decisions.

The different weighting of information can have drastic effects on entrepreneurs. As EENs and experts treated the data differently, this could lead to very different decisions and outcomes. From our results, we can expect experts to be more discerning when it comes to information. As experts are more experienced, they can more easily see when something is off, enabling them to know when to believe the numbers and when not. This small factor can be a major factor in the difference between a novice and an expert as Dew et al. (2009) put it, the ability to achieve superior performance over time.

## **5.2 Differences due to entrepreneurial expertise**

### **5.2.1 Means vs. goals**

As our empirical results show, to much of our surprise, the younger and less experienced EENs were more likely to draw on personal experience when solving the case. This finding may be due to the fact that EENs have more recently started a

company and have more experience with solving entrepreneurial cases in a classroom setting. Solving a case in a classroom setting as a part of entrepreneurial education is a well known process. Ronstadt (1987) proposed that programs in entrepreneurship should include case studies. Cases tend to address various methods of transferring expertise and information (Kuratko, 2005). Both groups wanted to sell directly to customers but they differed in their use of network. Experts wanted to sell to their current network, possibly due to their age and experience in the field, while EENs felt the need to create one.

### **5.2.2 Affordable loss vs. expected return**

When solving the case, experts were more concerned with the money available to them while EENs were more likely to look at the expected returns. We found EENs more naive in their view of the case while experts were more concerned about breaking even and ensuring the long-term health of the venture. The naivety of EENs was demonstrated through their lofty expectations and their vague and disjointed approach to reach these goals. Alternatively, we found experts to be systemic in their approach where they demonstrated the steps they would take in the process. EENs chose twice as many market segments than experts and were more inclined to risk-taking behaviors. We believe this is in part due to their naivety as entrepreneurs and irresponsible attitude often linked with younger people. For example, Hodgdon et al. (1981) found an overrepresentation of young driver accident involvement that could not be explained by their driving experience or skills. The reason they got into more accidents was the way they drove, speeding more frequently, unlikelier to wear seat belts and drove through yellow lights more often. Young drivers took more risk than older drivers and were therefore involved in more accidents (Finn and Bragg, 1986). We argue that the same thing could apply to young entrepreneurs who look at the upside of getting it all, disregarding the associated risks.

### **5.2.3 Partnerships vs. competitive analysis**

If we look strictly at the counts in our empirical results the two groups were very similar in how many times they mentioned partnerships when developing their ventures (Table 4: Variable description and analyses: Differences due to entrepreneurial expertise: experts 4.33 times on average and EENs 3.67 times).



However, when we look at the results in more detail, taking into account how the two groups intended to use their partnerships we see a distinct difference in their approach. Experts wanted to create 'win-win' partnerships where both parties benefited from the collaboration. EENs were more inclined to develop partnerships by using the other party for their own benefit and never mentioned how others would benefit from working with them. 'Win-win' partnerships are a way to compete in the market and we have seen many previous competitors partner together to form strong alliances. For example, technology giants Intel and Apple have worked together for several years utilizing each other's strengths. Johnston and Lawrence (1988) argued that an integral part of these relationships is to understand that all players in the value-added chain need to be as strong as possible and have a stake in each other's success for it to work.

## 6. Conclusion and implications

In this paper, we wanted to compare if EENs make similar decisions to expert entrepreneurs in regards to effectuation and expertise in general. We expected EENs to demonstrate less effectuation in each of the six categories. Our results show however that our EENs are in fact even more effectual than our experts, contradicting our expectations.

Out of the twelve counts measured, experts were only more effectual in terms of affordable loss rather than expected returns. The two groups were equally as effectual in five counts, whereas EENs were more effectual in the remaining six counts. These results were not expected and could imply that EENs use extreme effectual logics because they have never failed and not yet learned from their experience.

The second aspect that we would like to address is how EENs expressed a more exploitive nature throughout their partnerships. They were interested solely in what they could gain from the partnership and not the value that could be created for both. Additionally, experts expressed more appreciation towards the questions, structure, depth and realism of the case. Moreover, they were more dynamic and strategic in their thought processes while EENs were more reactive, linear and compartmentalized. We see this relating back to the EENs inexperience as entrepreneurs.



# 8. Limitations and suggestion for further research

## 8.1 Limitations

The major limitation of our study is the limited sample size of both groups. This was taken into account when our results were interpreted. Generalizing should be done with caution since the three participants in each group could be unique and not representative of the EEN or expert population as a whole. Due to the small sample size we cannot rule out that between and within group differences might have affected our results and a bigger sample of at least 30 participants in each group is needed to verify our findings. In addition, expertise in a field related to the one presented in the case, such as simulation or education gaming, could further affect the outcome of this study. This is due to the limited sample size and respondents not being ruled out nor chosen due to their particular industry experience within entrepreneurship.

Jaaskelainen (2010) has pointed out that think-aloud protocols do have their limitations as only information in working memory can be verbalized, leaving unconscious processing unanalyzed. The researchers lack of experience in conducting, transcribing and coding should also be taken into consideration.

Using EENs as a comparison group does indeed have its limiting effect on the results, as they are considerably younger. Age, as argued by Schaie and Willis (2002) could lead to our findings since it can influence cognitive processes over time. This limitation is not easy to avoid considering the parameters we set for each group. Experts had to have ten years of entrepreneurial experience, started at least three ventures and sold at least one of them. Novices on the other hand were recent graduates from university and have started their own venture in the past three years. Based solely on this definition alone, we could immediately expect an age difference of at least seven years.

Since the case itself was solved in a “classroom” setting we can expect EENs to be more comfortable and familiar with solving such cases due to their entrepreneurial studies. In contrast to this, solving a case on paper is something our experts might not have experienced and could limit their performance.

## **8.2 Suggestion for further research**

Based on our findings, we feel that several aspects merit further research. A similar study with a larger sample would be needed to verify our results, and a longitudinal study of how entrepreneurs acquire expertise over time would shed more light on the process. To see the effect entrepreneurship education has on the thought processes of students, it would be relevant to have new students in entrepreneurship programs solve a case both at the start and end of their studies. This would give researchers a glimpse into how effectual/causal the students were when they started and if in fact the studies made them more effectual.

Another area for further research would be to verify if students who enter programs in entrepreneurship are more risk seeking compared to a comparison group. This would help determine whether entrepreneurship students are more risk seeking than average before embarking on their studies or if it is something they learn during their education. Lastly, it would be interesting to compare failure in young entrepreneurs. That is, to see if studying entrepreneurship actually saves you time in the long run when building a successful venture or if that time would have been better utilized out in the field.

## 9. References

- Brettel, M., Mauer, R., Engelen, A. and Küpper, D. (2012). Corporate effectuation: Entrepreneurial action and its impact on R&D project performance. *Journal of Business Venturing*. 27, 167-184.
- Burns, R. (2008). *Business Research Methods and Statistics Using SPSS*. London: SAGE Publications Ltd. 122 – 150.
- Chandler, G., DeTienne, D., McKelvie, A., Mumford, T. (2011) Causation and Effectuation Processes: A validation Study. *Journal of Business Venturing*. 26 (3). 375-390.
- Chandler, G., Lyon, D. (2001). Issues of research design and construct measurement in entrepreneurship research: the past decade. *Entrepreneurship Theory and Practice*. 25 (4). 101–113.
- Chase, W., Simon, H. (1973). The mind's eye in chess. In: Chase, W. *Visual Information Processing*. New York: Academic Press. 215-281.
- Crutcher, R. J. (1994). Telling what we know: The use of verbal report methodologies in psychological research. *Psychological Science*. 5. 241-244.
- de Groot, A. (1978). *Thought and Choice in Chess*. The Hague: Mouton.
- Dew. N., Read, S., Sarasvathy, S., Wiltbank, R. (2009). Effectual versus predictive logics in entrepreneurial decision-making: differences between experts and novices. *Journal of Business Venturing*. 24. 287-309.
- Dewey, J. (2004). *Democracy and Education*. New York: Courier Dover Publication.
- Drucker, P. (1985). *Innovation and entrepreneurship*. New York: Harper & Row.

Ericsson, K. (2006). Protocol analysis and expert thought: concurrent verbalizations of thinking during experts' performance on representative tasks. *In: Ericsson, K., Charness, N., Feltovich, P., Hoffman, R. The Cambridge handbook of expertise and expert performance.* Cambridge: Cambridge University Press. 223 – 242.

Ericsson, K., Krampe, R., Tesch-Römer, C. (1993). The role of deliberate practice in the acquisition of expert performance. *Psychological Review.* 100(3). 363-406.

Ericsson, K., Lehmann, A. (1996). Expert and exceptional performance: evidence on maximal adaptations on task constraints. *Annual Review of Psychology*, 47: 273-305.

Ericsson, K., Simon, H. (1980). Verbal reports as data. *Psychological Review.* 87 (3). 215–251.

Ericsson, K., Simon, H. (1998) How to Study Thinking in Everyday Life: Contrasting Think-Aloud Protocols With Descriptions and Explanations of Thinking. *Mind, Culture, and Activity.* 5(3). 178-186.

Ericsson, K., Smith, J. (1991). Prospects and limits of the empirical study of expertise: An introduction. *In: Ericsson, K., Smith, J. Toward a general theory of expertise : prospects and limits.* Cambridge; New York: Cambridge University Press. 344

Feltovich, P., Prietula, M., Ericsson, K. (2006). Studies of expertise from psychological perspectives. *In: Ericsson, K., Charness, N., Feltovich, P., Hoffman, R. The Cambridge handbook of expertise and expert performance.* Cambridge: Cambridge University Press. 41 – 68.

Finn, P., Bragg, B. (1986). Perception of the risk of an accident by young and older drivers. *Accident Analysis and Prevention. Pergamon Journals.* 18. 289 - 298.

Foley, M., Hart, A. (1992). Expert Novice Differences and Knowledge Elicitation. In R. R. Hoffman (Ed.), *The Psychology of Expertise: Cognitive Research and Empirical AI*. Mahwah NJ: Springer-Verlag. 233-269.

Greeno, J., Simon, H. (1988). Problem solving and reasoning. In: Atkinson, R. *Steven's handbook of experimental psychology*. 2<sup>nd</sup> ed. New York: Wiley. 589-639

Gregan-Paxton, J., Cote, J. (2000). How do investors make predictions? Insights from analogical reasoning research. *Journal of Behavioral Decision Making*. 13. 307 – 327

Gustafsson (2004). *Entrepreneurial decision-making: individual, tasks and cognitions*. Sweden: Jonkoping International Business School.

Hodgdon J., Bragg B., Finn P. (1981). *Young Driver Risk-Taking Research: The State of the Art. Report to the National Highway Traffic Safety Administration*. Springfield: National Technical Information Service.

Hodgkinson, G., Brown, N., Maule, A., Glaister, K., Pearman, A. (1999). Breaking the frame: An Analysis of strategic cognition and decision making under uncertainty. *Strategic Management Journal*. 20. 977 - 985.

Jaaskelainen, R. (2010). *Think-aloud protocol. Handbook of Translation Studies*. Amsterdam: John Benjamins Publishing. 371 - 373.

Johnston, R., Lawrence, P. (1988). Beyond Vertical Integration: The Rise Of The Value Adding Partnership. *Harvard Business Review*. 88. 94 – 101.

Karlsson, T., Moberg, K. (2013). Improving perceived entrepreneurial abilities through education: exploratory testing of an entrepreneurial self efficacy scale in a pre-post setting. *The international Journal of Management Education*. 11(1). 1 - 11.

Kuratko, D. (2005). The Emergence of Entrepreneurship Education: Development, Trends, and Challenges. *Entrepreneurship Theory & Practice*. 29 (5). 577 - 598.



Klein, G (1998). *Sources of power: how people make decisions*. Cambridge: MIT Press.

Landes, D., Mokyr, J., Baumol, W. (2010). *The invention of enterprise: Entrepreneurship from ancient Mesopotamia to modern times*. Princeton: Princeton University Press.

Larkin, J., McDermott, J., Simon, D. P., Simon, H. A. (1980). Expert and novice performance in solving physics problems. *Science*. 208. 1335 - 1342.

Lounsbury, M. and Glynn, M. (2001). Cultural entrepreneurship: stories, legitimacy, and the acquisition of resources. *Strategic Management Journal*. 22 (6/7). 545 – 564.

Markman, A., Wood, K., Linsey, J., Murphy, J., Laux, J. (2011). *Supporting Innovation by Promoting Analogical Reasoning*. Toronto: Rotman School of Management. 65 – 69.

Mieg, H. (2001). *The Social Psychology of Expertise: case studies in research, professional domains, and expert roles*. New Jersey: Lawrence Erlbaum Associates. 1 – 13.

Payne, J. (1994). Thinking aloud: Insights into information processing. *Psychological Science*. 5. 241 - 248.

Read, S., Sarasvathy, S. (2005). Knowing what to do and doing what you know: Effectuation as a form of entrepreneurial expertise. *Journal of Private Equity*. 9(1). 45 – 62.

Ronstadt, R. (1987). The educated entrepreneurs: A new era of entrepreneurial education is beginning. *American Journal of Small Business*. 11(4). 37 – 53.

Sarasvathy, S. (2001). Causation and effectuation: Toward a theoretical shift from economic inevitability to entrepreneurial contingency. *The Academy of Management Review*. 26(2). 243 - 263.

Sarasvathy, S. (2008). *Effectuation: Elements of entrepreneurial expertise*. Northampton, MA and Cheltenham: Edward Elgar.

Sarasvathy, S., Dew, N., (2005). Entrepreneurial logics for a technology of foolishness. *Scandinavian Journal of Management*. 21. 385–406.

Schaie, K., Willis, S. (2002). *Adult development and aging*. 5th edn. New York: Prentice-Hall

Schenk, K., Vitalari, N., Davis, K., (1998). Differences between novice and expert systems analysts: what do we know and what do we do? *Journal of Management Information Systems*. 15 (1). 9 – 51.

Shane, S., Venkataraman, S. (2000). The promise of Entrepreneurship as a field of research. *Academy of Management*. 25. 217 – 226.

Simon, H., Chase, W. (1973). Skill in chess. *American Scientist*. 61 (4). 394 – 403.

Wilson, T. (1994). The proper protocol: Validity and completeness of verbal reports. *Psychological Science*. 5. 249 - 252.

World Economic Forum. (2014). *Education*. Available: <http://www.weforum.org/issues/education>. Retrieved May 20th 2014.

# 10. Appendix

## Appendix A. Research instrument / The Case

As our study is to follow up on the research done by Dew et. al. (2009) we have used their research instrument and slightly modified it to fit our context and needs by changing the currency from \$ to SEK and the names of stores in the US to a Swedish brands. It is almost the exact same case as presented by Dew et.al (2009) so we can better compare our results with those in that study. However we will focus more on seeing how novices act differently from experts and looks specifically at entrepreneurial expertise.

### *Introduction*

In the following experiment, you will solve two decision problems. These problems arise in the context of building a new company for an imaginary product. A detailed description of the product follows this introduction.

Although the product is imaginary, it is technically feasible and financially viable. The data for the problems have been obtained through realistic market research - the kind of market research used in developing a real world business plan.

Before you start on the product description and the problems, We need one act of creative imagination on your part. **We request you to put yourself in the role of the an entrepreneur building a company — i.e., you have a little money of your own to start this company, and whatever experience you have to date.**

Throughout the experiment you should talk aloud the thoughts you are having. This is merely for us to record your thought process. Please start by reading aloud the following instructions and the rest of the case.

### *Description of the product*

You have created a computer game of entrepreneurship. You believe you can combine this game with some educational material and profiles of successful entrepreneurs to make an excellent teaching tool for entrepreneurship. Your inspiration for the product came from several reports in the newspapers and magazines about increasing demand for entrepreneurship education; and the fact that a curriculum involving entrepreneurship even at the junior high school or high school level induces students to learn not only business-related topics but math and science and communication skills as well.

The game part of the product consists of a simulated environment for starting and running a company. There are separate sub-simulations of markets, competitors, regulators, macroeconomic factors and a random factor for “luck”. The game has a sophisticated multi-media interface - for example, a 3D office where phones ring with messages from the market, a TV that will provide macroeconomic information when switched on, and simulated managerial staff with whom the player (CEO) can consult in making decisions. At the beginning of the game, the player can choose from a variety of businesses the type of business he/she wants to start (For example: manufacturing, personal services, software etc.) and has to make decisions such as which market

segment to sell to, how many people to hire, what type of financing to go for, etc. During the game, the player has to make production decisions such as how much to produce, whether to build new warehouses or negotiate with trucking companies, etc.; marketing decisions such as which channels of distribution to use, which media to advertise in and so on; management decisions involving hiring, training, promoting and firing of employees, and so on. There is an accounting subroutine that tracks and computes the implications of the various decisions for the bottom line. The simulation's responses to the player's decisions permit a range of possible final outcomes - from bankruptcy to a "hockey stick".

You have taken all possible precautions regarding intellectual property. The name of your company is Entrepreneurship, Inc. The name of the product is Venturing.

*Problem 1: Identifying the market*

Before we look at some market research data, please answer the following questions - one at a time: (Remember to continue thinking aloud as you arrive at your decisions and take all the time you need.)

1. Who could be your potential customers for this product?
2. Who could be your potential competitors for this product?
3. What information would you seek about potential customers and competitors - list questions you would want answered.
4. How will you find out this information - what kind of market research would you do?
5. What do you think are the growth possibilities for this company?

*Problem 2: Defining the market.*

In this problem you have to make some marketing decisions. Based on secondary market research (published sources, etc.), you estimate that there are three major segments who are interested in the product:

Segment	Estimated total size
Young adults between 15-25 years old	20 million
Adults over 25 years old who are curious about entrepreneurship	30 million
Educators	200,000 institutions

- The estimated dollar value of the instructional technology market is \$1.7 billion.
- The estimated dollar value of the interactive simulation game market is \$800 million.
- Both are expected to grow at a minimum rate of 20% p.a. for the next 5 years.

*The following are the results of the primary (direct) market research that you have completed*

*Survey #1 — Internet users were allowed to download a scaled down version (game stops after 15 min of playing) of the prototype and were asked to fill out a questionnaire.*

You get 600 hits per day. 300 actually download the product. You have 500 filled out questionnaires.

Willing to pay (SEK)	Young adults (%)	Adults (%)	Educators (%)
350-700	45	26	52
700-1000	32	38	30
1000-1300	15	22	16
1300-1600	8	9	2
1600-2000	0	5	0
Total	100	100	100

*Survey #2: The prototype was demonstrated at 2 Akademibokhandeln and 3 Bokia stores in Sweden.*

Willing to pay (SEK)	Young adults (%)	Adults (%)	Educators (%)
350-700	51	21	65
700-1000	42	49	18
1000-1300	7	19	10
1300-1600	0	8	7
1600-2000	0	3	0
Total	100	100	100

*Survey #3: Focus Group of educators (high school & community college teachers and administrators).*

The educators who participated in the focus group found the product exciting and useful, but want several additions and modifications made before they would be willing to pay a price of over 1000 SEK for it. As it is, they would be willing to pay 350-700 SEK and would demand a discount on that for site licenses or bulk (big) orders. Both at the bookstore demo and the focus group, participants are very positive and enthusiastic about the product. They provide you good feedback on specific features and also extend suggestions for improvement. But the educators are particularly keen on going beyond the “game” aspect; they make it clear that much more development and support would be required in trying to market the product to them. They also indicate that there are non-profit foundations and other funding sources interested in entrepreneurship that might be willing to promote the product and fund its purchase by educational institutions.

*Based on your market research, you arrive at the following cost estimates for marketing your product.*

Internet	10.000 SEK upfront + 3000 SEK per month thereafter.
Retailers	3-5 million upfront and support services and follow-up thereafter.
Mail order catalogs	Relatively cheap, but ads and demos could cost 300.000 SEK upfront.
Direct selling to schools	Involves recruiting and training sales representatives except locally.

### *Competition*

None of the following four possible competitors combine a simulation game with substantial education materials — you are unique in this respect.

Company	Product	Description	Price per unit	Sales (SEK)
Maxis	Sim City	Urban Planning Simulator	200 SEK	200 M.
Microprose	Civilization	Civilization Building Simulation	350 SEK	130 M.
Sierra On-Line	Caesar	City Building Simulation	400 SEK	120 M.

Future Endeavors Scholastic TreetopCD-ROMs of Scholastic Books n/a 6,5 M.  
(New Co. <1 year old.)

---

The game companies are making a net return of 25% on sales.

At this point, please take your time and make the following decisions: (please continue to think-aloud as you arrive at your decisions)

1. Which market segment/segments will you sell your product to?
2. How will you price your product?
3. How will you sell to your selected market segment/segments?

-----

This signals the end of the study. Thank you for you participation.

Ingvi Hrannar Ómarsson & Stephen Batley

## Appendix B. Coding scheme

- University Educational background:
- When did you start your first official company:
- How many companies have you started:
- Years worked for your ventures:
- Have you sold a company:
- Year of Birth:

### 1. Overall

- 1a. Total number of WORDS of text for each subject: \_\_\_\_\_ words
- 1b. Did this person believe the numbers? Enter Yes or No
- 1c. Did this person mention any of the following? Enter yes or no and the count of their mentions:

Gut feeling	Intuition
My personal choice	In my opinion
Total "gut feeling" count:	

- 1d. Did this person worry about how much money he or she has and what the costs of executing his or her marketing decisions will be? Enter yes or no
- 1e. If yes, count how many times they mentioned their concern:
- 1f. Did this person go beyond making marketing decisions to talk about building the business as a whole? Enter yes or no
- 1g. If yes, count how many times they mentioned each of the following:

- What it would take to put a sales force together:
- Issues related to the long term:
- Theorizing about entrepreneurial decisions/actions:
- Insights from previous experience:
- Insights from case studies/classes:

### 2. Partnerships/affiliations/relationships

- 2a. Did this person visualize partnering or building a relationship with someone? Enter yes or no
- 2b. If yes, count number of partnerships they visualized:

### 3. Segment decision

- 3a. Did this person actually decide on one or more segments? Enter yes or no
- 3b. Did this person decide to sell to all three segments? Enter yes or no
- 3c. If this person chose more than one segment, was it simultaneous or prioritized? Enter S or P

### 4. Number of new markets

- 4a. Who could be your potential customers for this product?
- 4b. What do you think the growth opportunities are for this company?

4c. Did this person visualize new segments other than the ones suggested? Enter yes or no 4d. If yes, list the new segments:

5. Channel decision

5a. Check off channels they used:

Internet    Retail    Mail order catalog    Direct sales

5b. Direct sales:

I will personally contact:

I will recruit salespeople: