To what extent does the cognitive style of novice entrepreneurs lead to effectual and causal decision making?

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ABSTRACT

Starting an own business is a dream held by increasingly more individuals around the world. In recent years, the academic field of entrepreneurship gained a boost in interest and one can find more and more universities that offer entrepreneurship courses. Conducting research in that domain promises to be a valuable undertaking with many unknown variables yet to explore. A key aspect concerns the decision making process of entrepreneurs, as entrepreneurs constantly face difficult decisions to make. A shift in understanding entrepreneurial decision making represents the concept of effectuation that opposes the concept of causation that was long held to be the norm of how entrepreneurs think. Causation describes the decision making process were one sets long term goals based on logical predictions. Effectuation describes the idea of one individual choosing short term means and not defining precise long term goals. There is another concept relatable to entrepreneurial decision making, namely the cognitive style. The cognitive style is to be described as two major different types of processing information. The first one being intuitive processing of information, the other one being analytical processing of information. The aim of this research is to find if the is a relationship between the effectual/causal decision making and the cognitive style. Conducting the research in Mexico, with the help of the The Instituto Tecnológico y de Estudios Superiores de Monterrey (ITESM) campus Querétaro, it is targeted to add to existing literature in related knowledge domains. Although there has not been found a significant relationship between these two concepts, some inferences could be gained about the sampling population of novice entrepreneurs in Mexico. The overall population tends to prefer causal decision making and process information intuitively.

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Keywords

Cognitive style, Effectuation, Causation, Entrepreneurial Decision-Making, Entrepreneurship, Novice Entrepreneurs, Business Administration.

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1. INTRODUCTION

Starting an own business is a dream held by increasingly more individuals around the world (Bosma, & Levie, 2010). In recent years, the academic field of entrepreneurship also gained a boost in interest among various institutions, such as for example universities that more and more offer entrepreneurship courses or governments that further aim to support the flourishment of innovative companies with new visions and ideas to better our environment and society (Busenitz, et al., 2003). Conducting research in that domain promises to be a valuable undertaking with many unknown variables yet to explore (Kuratko, 2005). However, already providing a fitting definition of this knowledge domain has proven to be a difficult task. Some scholars question the necessity of this field of study, as they argue that it does not explain or predict empirical phenomena beyond what is known from research in other fields (Shane & Venkataraman, 2000; Moroz & Hindle 2011). They explain, that the study of entrepreneurship in general combines several aspects from other knowledge domains, especially concerning other social sciences and applied business theories (Venkataraman, 1997). Already in the early 1930´s nonetheless, Joseph Schumpeter began to explain the importance of the entrepreneurial behavior, describing it as the source of innovative products and processes that drive the change processes in the business landscape (Hagedoorn, 1996).Entrepreneurship can be described as the *"process by which individuals – either on their own or inside organizations – pursue opportunities without regard to the resources they currently control."* (Stevenson & Jarillo, 1990). On an individual level, an entrepreneur is described as *"one who manages a business for the principal purpose of profit and growth"* (Carland et al. 1984).Regardless of the detailed content of these explanations, these definitions, among other similar ones (Brazeal & Herbert, 1999; Hofer & Bygrave, 1992.; Bae, Qian, Miao, & Fiet, 2014) stress common aspects to define the entrepreneurial process and the entrepreneur himself.

Moroz & Hindle 2011 compare several models and theories in that context to find common denominators that can be used as a foundation to understand the entrepreneurial process in a systematic and comprehensive manner. A key aspect concerns the decision making process of entrepreneurs, as entrepreneurs constantly face difficult decisions to make (Busenitz & Barney, 1997). A shift in understanding entrepreneurial decision making was presented by Sarasvathy 2001; namely the concept of effectuation. Moroz & Hindle 2011 rated the concept of effectuation as the only concept that presented a direct practical focus. The concept of effectuation is an alternative to the principal of planned decision making, which was firstly regarded as the dominant way entrepreneurs make their decisions (Ansoff, 1988; Brews and Hunt, 1999; Mintzberg, 1978). Causal decision making, or causation, is described as making decisions based on logical predictions, so a long term focus is chosen with pre-determined goals. The concept of effectuation concerns the decision making approach were short term means are chosen and no precise long term goals are defined (Sarasvathy 2001). Both concepts are not to be regarded as opposite ends of a theoretical framework, but rather as complimenting two distinctive concepts (Reymen et al., 2015). As the concept of effectuation represents a paradigm shift in entrepreneurial studies (Perry, Chandler, & Markova, 2012), there is yet to conduct more research on that topic (Edmondson and McManus, 2007).Some examples of recent literature in that field that aim to validate and extend the concept include: The role of trust in effectual decision making (Goel & Karri, 2006), The level of entrepreneurial experience and effectuation (Read & Sarasvathy, 2005), The role of effectuation in high technology firms (Mthanti & Urban 2014), Antecedents and consequences of effectuation and causation in the international new venture creation process (Harms & Schiele 2012), Effectuation and Networking of Internationalizing SMEs (Galkina & Chetty 2015) and Effectuation, Exploratory Learning and New Venture Performance: Evidence from China (Cai, Guo, Fei, & Liu, 2016).

Emphasizing the need for further research concerning the topic of effectuation, it is noteworthy that significant work to explore entrepreneurial decision making is conducted from another perspective; the perspective of cognition (Krueger & Kickul, 2006). Mitchell et al. (2002) stresses that *"entrepreneurial cognitions are the knowledge structures that people use to make assessments, judgments, or decisions involving opportunity evaluation, venture creation, and growth*". In the field of psychological research, scholars generally distinguish between two major different types of processing information, which they define as the so called cognitive style (Riding & Cheema, 1991). The first one is referred to as intuitive (Jung, 1964/1968), natural (Tversky & Kahneman, 1983) or heuristic (Chaiken, 1980; Fiske & Taylor, 1991; Tversky & Kahneman, 1983). The other type of processing information is described as thinking-conceptual-logical (Buck, 1985; Leventhal, 1984; Jung, 1964/1968), analytical-rational (Epstein, 1983) or deliberative-effortful-intentional-systematic (Bargh, 1989; Chaiken, 1980; Higgins, 1989). Allinson & Hayes (1996) generally define the cognitive style as the preferred approach to information processing. They distinguish two different thinking styles, the intuitive and analytical thinking style which they measure with their established Cognitive Style Index (CSI). Epstein, Pacini, Denes-Raj & Heier (1996) developed a similar measurement of the cognitive style.

Sarasvathy (2001) explains that there are behavioral patterns that are typical of effectuation and causation, however Perry, Chandler and Markova (2012) argue that effectuation and causation refer to cognitive processes. This is due to the fact that Sarasvathy (2001) used think-aloud protocols to explain her concepts in her works, which represents some cognitive processes. The establishment of a theoretical link between effectuation and causation, and the cognitive style represents a research gap that would be of interest to explore.

A research topic in that context crystalizes. Current research on the theory of effectuation is based on studies conducted with expert entrepreneurs and does not concern novice-entrepreneurs (Arend, Sarooghi & Burkemper, 2015). It would be of value to further test the concept of effectuation by conducting research on novice entrepreneurs. The aim of this research is to contribute to existing theory and to gain new inferences in those knowledge domains. Previous research in that field has shown a theoretical link between those concepts (Krueger and Kickul, 2006), and empirical

evidence is yet to be provided. Summarizing these thoughts and idea, following research question is formulated:

To what extent does the cognitive style of novice entrepreneurs lead to effectual and causal decision making?

The structure of this article begins with a literature review concerning the theories related to cognitive style and the concepts of effectuation and causation. This is followed by the formulation of several hypotheses to answer the given research question. The Methodology part will outline the characteristics of the sample from which data is derived from. The collection method will be explained, and it will be outlined how the data has been analyzed. Later, in the analysis part, first inferences can be gained, while clearly outlining and evaluating the gathered data. Finally, in the conclusion, these findings will be presented in more detail, which will allow room for further discussions. This includes the description of why this research is of relevance and it presents future possibilities for further research on that topic.

2. LITERATURE REVIEW

To begin with the answering of the research question, the first step is to choose a definition of entrepreneurship to set the intended use of theories in context. Shane and Venkataraman (2000) define the field of entrepreneurship as "the scholarly examination of how, by whom, and with what effects opportunities to create future goods and services are discovered, evaluated and exploited." The theories of effectuation and causation, as well as the concept of the cognitive style give an insight on how individuals think and make their decisions to discover, evaluate and exploit business opportunities. The distinctive feature of both effectuation and causation will be outlined and will be directly compared to emphasize the differences. Furthermore, the concept of the cognitive style will be outlined, which describes the person's preferred way of gathering, processing and evaluating information (Allinson & Hayes 1994). Intuitive and analytical thinking styles will be set in the context of entrepreneurial behavior. A link between the preferred decision making processes and the cognitive style will be established that leads to the formulation of four research hypotheses to explore in the analysis part of this research.

2.1 Causation and Effectuation

2.1.1 Causation

Much of existing entrepreneurship literature is based on the principal of causation and it has long been subject to philosophical discussions. This begins from Aristotle and includes more recent theoretical concepts like John Mackie's INUS condition (Mackie, 1998). Causation can be described as a process where a particular effect is taken as given and a focus on selecting between means to create that effect is maintained (Sarasvathy, 2001). So, an entrepreneur who has a preferred causal decision making process makes rational choices that are based on all possible information relevant to his decision (Chandler, DeTienne, McKelvie & Mumford, 2011). Causation models consist of many-to-one mappings, meaning that many approaches are used to reach one goal. Furthermore, causation processes are effect dependent and seen as excellent to exploit knowledge, since all information is used to attain a certain goal. In causation models the decision makers are assumed to be independent, while the model itself is static. In an entrepreneurial context causation has four dimensions that can be summarized in the following: (1) Causal decision making aims to maximize the potential returns for a decision by selecting the optimal strategies. (2) Detailed competitive analyses are established, such as for example Porters models in strategy (Porter, 1980). (3) Causal decision making is preferred when already existing knowledge, such as the expertise in a certain field, is the source of a competitive advantage. (4) Causal decision making emphasize the predictable variables of the uncertain future, meaning that it is thought out to control the future by being able to correctly predict it (Sarasvathy, 2001). An uncertain future occurrence, where current information is not sufficient to predict it, can therefore not be approached by a causal decision making process to achieve aimed goals. At this point, the concept of effectuation represents an alternative to the causal decision making process (Sarasvathy, 2001).

2.1.2 Effectuation

In recent entrepreneurship literature the concept of effectuation gains an increase amount of importance, since it describes the aspect of uncertainty when entrepreneurs discover, evaluate and exploit a business opportunity (Chandler et al. 2011). According to Sarasvathy (2001) *"Effectuation processes take a set of means as given and focus on selecting between possible effects that can be created with that set of means."* Effectual decision making processes consist of one-to-many mappings, meaning that one given resource or opportunity can be used to reach many outcomes. In an entrepreneurial context, this means that is feasible to reach several possible effects, no matter what generalized end goal was defined at the initial formulation of an end goal. It allows the entrepreneurs to be flexible in their decision making process and to change initial goals so that arising opportunities can be pursed and exploited to attain a successfully operating business option (Sarasvathy, 2001). The dimensions that distinguish effectual decision making is the allowance to select alternatives based on loss affordability, flexibility, and experimentation (chandler et al., 2011). The four dimensions that oppose the effectual decision making process to the causal decision making process are: (1) Affordable loss rather than expected returns, (2) Strategic alliances rather than competitive analyses, (3) Exploitation of contingencies rather than exploitation of preexisting knowledge (4) Controlling an unpredictable future rather than predicting an uncertain one.

Some researchers find that the theory has yet to be tested in a more extensive manner (Perry et al. 2012). Arend, Sarooghi & Burkemper (2015) argue that effectuation only partly describes entrepreneurial activity, mainly due to the fact that the domain of entrepreneurship itself is too broadly defined and spans multiple disciplines and scales and level of analysis. Arend et al. (2015) propose five directions on how to improve the theory of effectuation. They argue that there is a need to a better understanding of what already exists in the problem space, so a significant differentiation can be made to other business theories that address similar

approaches, like the blue ocean strategies (Kim & Mauborgne, 2004) and disruptive innovation (Christensen & Bower, 1996). It is argued that the theory should lead to a performance improvement and that it should entail predictions. Further research on effectuation is advised to reach this addressed issues.

Current research to validate the concept of effectuation is conducted by Sarasvathy herself, including the works: An effectual approach to international entrepreneurship: Overlaps, challenges, and provocative possibilities (Sarsvathy, Kumar, York & Bhagavatula 2014), and Effectuation and Over-Trust: Debating Goel and Karri (Sarasvathy & Dew 2008).

2.1.3 Direct comparison between Causation and Effectuation

As Sarasvathy (2001) explains: *"Both causation and effectuation are integral parts of human reasoning that can occur simultaneously, overlapping and intertwining over different contexts of decisions and actions."* So, both effectuation and causation are not to be seen as opposite measurements. They are not mutually exclusive, but measure two different concepts (Kraaijenbrink, Ratinho & Groen, 2012).

To fully grasp the differences between the two concepts, Sarasvathy (2001) established seven categories of differentiation:

Category of differentiation	Causation	Effectuation
Givens	-Effect is given	-Only some means or tools are given
Decision making selection criteria	-Help choose between means to achieve given effect -Selection criteria based on expected return -Effect dependent	-Help choose between possible effects that can be created with given means -Selection criteria based on affordable loss or acceptable risk -Actor dependent
Competencies employed	Excellent at exploiting knowledge	Excellent at exploiting contingencies
Context of Relevance	-More ubiquitous in nature -More useful in static, linear, and independent environments	-More ubiquitous in human action -Explicit assumption of dynamic, nonlinear, and ecological environments
Nature of Unknowns	Focus on the predictable aspects of an uncertain future	Focus on the controllable aspects of an unpredictable future
Underlying logic	To the extent we can predict future, we can control it	To the extent we can control future, we do not need to predict it
Outcomes	Market share in existent markets through competitive strategies	New markets created through alliances and other cooperative strategies

Table 1. Contrasting Causation and effectuation (Sarasvathy, 2001)

While conducting her studies, Sarasvathy (2001) found five behavioral principles that can be linked to the concepts of effectuation and causation. She established the five dimensions based on the relationships found between the participants thinking aloud and the behavior they displayed when facing a given problem. The principles found can be defined as sub-constructs of the concepts and can be observed and therefore tested to distinguish between causal and effectual decision making behavior (Perry et al., 2012). The five sub-contracts are displayed in following Table 2, according to Perry et al. (2012):

Sub-Constructs	Causation	Effectuation
1.Givens	Beginning with a given goal	Beginning with a set of given means
2.Decision making selection criteria	Focusing on expected returns	Focusing on affordable loss
3.Strategies pursed to reach outcomes	Emphasizing competitive analysis	Emphasizing strategic alliances and pre-commitments
4.Competencies	Exploiting preexisting knowledge	Leveraging environmental contingencies
5.Control of future events	Trying to predict a risky future	Seeking to control an unpredictable future

Table 2. The five sub-contracts of Effectuation and Causation.

To note is that both processes, effectuation and causation, depend on individual traits and on external factors that trigger the given differences. For instance, one individual can assess external risk in a different manner than other individuals (Sarasvarthy, 2009).

2.2 Cognitive Style

When it comes to the cognitive style, it is first to set the concept into the entrepreneurial context. Here, Allinson, Chell & Hayes, 2000 argue that entrepreneurs can be distinguished from non-entrepreneurs based on pursued intentions. These intentions however do not always refer to the intentions that lead to entrepreneurial outcomes. For

instance, personal goals are also pursed and refer to income, lifestyle, autonomy, and intention to growth and capital accumulation Allinson et al. (2000). Allinson et al. (2000) argue that the cognitive style of successful entrepreneurs will be an intuitive one, due to the fact that the environment of entrepreneurs is in essence uncertain. The characteristics are mainly incomplete information, time pressure, ambiguity, and uncertainty (Allinson et al. 2000). However, an analytical thinking process is a necessity for the establishment of formal business plans, opportunity analysis, resource acquisition, and goal setting (Bird, 1988). Bird (1988) further mentions that intuitive thinking inspires vision, hunch, an expanded view of untapped resources, and a feeling of the potential of the enterprise. Furthermore, it is interesting to note that Kickul et al. (2009) argue that Individuals with an intuitive thinking style are more confident but less comfortable in recognizing opportunities, while analytical individuals are less confident but more capable of recognizing opportunities.

When it comes to the measurement of the cognitive style, Epstein et al. (1996) contributed significant research in that field. They conducted two studies that proof the reliability and validity of a new self-report measure of individual differences in intuitive-experiential and analytical-rational thinking based on cognitive-experiential self-theory (CEST) (Epstein et al., 1996). The CEST is regarded to be a theory of personality that explains how individuals process information by either a rational system or an experiential system. Both systems are interactive and can be described as parallel in nature. The rational system works mainly at the conscious level, being described as intentional, analytic, primarily verbal, and relatively affect free. The experiential system on the other side is described as automatic, preconscious, holistic, associationistic, primarily nonverbal, and closely associated with affect. Further to note is that behavior and conscious thought both engage jointly in the two systems and are often perceived as conflict between emotions and thoughts (Epstein et al., 1996; Denes-Raj & Epstein, 1994) The preference for one system is determined by several factors: (1) The preference of an individual for relying on one system (2) The degree to which an individual is familiar with responding to a issue in a certain manner (3) The mount of emotional involvement (4) Relevant previous experience (Anderson, 1982).

Epstein et al (1996) further constructed the Rational-Experiential Inventory (REI) scales to measure the two independent modes of cognition, one being a modified version of the Need for Cognition Scale (NFC) (Cacioppo & Petty, 1982) and the other new scale being Faith in Intuition (FI). Epstein et al. (1996) provide 10 items that are meant to measure the cognitive style of individuals according to those approaches. The selection for the two modes is due to the fact that the authors researched whether the items should bimodal (as in "I am more of a 'thinking-type' person than a 'feeling-type' person") or unimodal (as in "I believe in trusting my hunches" and "I enjoy intellectually challenging problems") (Epstein et al. 1996). So in other words, it was to find out whether the two systems of cognition have a reciprocal or orthogonal relation to each other.

After conducting an extensive literature review, were related measurements concerning Intuitive and analytical thinking have been rated as not feasible for this case (Briggs & Myers, 1976), the authors selected two unipolar dimensions that rely on the rational and experiential information processing explained by the CEST. As mentioned earlier, this resulted in a modified version of the Need for Cognition Scale (NFC) (Cacioppo & Petty, 1982) and the new scale being Faith in Intuition (FI). The NFC measures the analytic-rational processing of individuals, while the FI measures the intuitive-experiential processing of individuals.

2.3 Decision Making Process and Cognitive Style in Perspective

Referring back to the concepts explained earlier in the literature review, it is now to outline resemblances between the concepts of effectuation and causation and the concept of cognitive style in an entrepreneurial context to stress the significance of the initially posed research question. Here, for the cognitive style mainly the work of Allinson et al. (2000) will be compared to the work of Sarasvathy (2001) on effectuation and causation, since both articles have been discussed earlier and are set in an entrepreneurial context. Allinson & Hayes (2011) stress that knowing one´s own cognitive style can enhance the one´s job performance. This is due to the line of argumentation that a fit between the cognitive style of an individual with the cognitive demands of a task lead to better overall performance. In that context, Sarasvathy (2001) finds that expert entrepreneurs usually prefer effectual decision making to causal decision making. Allison & Hayes (2011) argue that the better performing entrepreneurs prefer using intuitive thinking to analytical thinking.

As stated earlier, individual traits and external factors may influence an individual's preferred decision making process Sarasvathy (2009). According to Messick (1984) individuals can change their cognitive style in order to adapt to a certain undertaking. So both concepts can influenced by internal and external factors.

When it comes to the possibility to use both concepts for entrepreneurship educational purposes, Rush and More (1991) argue that the measurement of the cognitive style through the Cognitive Style Index (CSI) can be used to change one´s own cognitive style through distinctive training methods. As mentioned before, Sarasvathy (2009) states that, according to her experiment with successful experts and MBA students, experts tend to use effectual decision making and that this inference can change current entrepreneurship education.

2.4 Research Hypotheses

To answer the initially posed research question, the next step is to formulate a set of hypotheses. As mentioned in the previous sections, the preferred decision making style of individuals is based on choosing means to achieve a certain effect (causation) and on choosing possible effects that can be pursued with given means (effectuation) (Sarasvathy, 2001). In section 2.3 of this article Allison & Hayes (2011) state that intuitive individuals are better entrepreneurs, while Sarasvathy (2001) argue that individuals who prefer effectual decision making have more expertise. It would be interesting to see if there is a link between these two statements. In general, the pursuit of arising opportunities is a trait of an individual who uses an effectual decision making

processes. Linking this to the finding of Kickul et al (2009), this would mean that this individual with an intuitive thinking style is more confident to purse this arising opportunity and therefore is making his or her decisions based on the concept of effectuation. On the other hand, an individual with an analytical thinking style is less confident to purse an arising opportunity and therefore is making his or her decisions based on the concept of causation.

Finding these theoretical links, it promises to be an interesting undertaking to explore and empirically test the correlation between cognitive style and proffered decision making processes. There seems to be a theoretical link between intuitive thinking and effectual decision making. So, the first hypothesis to test can be formulated as the null hypothesis: (**$H1_0$**) Intuitive thinking in novice entrepreneurs does not lead to effectual decision making. The corresponding alternative hypothesis, that is expected to be true, is: (**$H1_A$**) Intuitive thinking in novice entrepreneurs leads to effectual decision making.

Interesting to see in that context is also to explore the correlation between analytical thinking and causal decision making. The third hypothesis therefore is the null hypothesis: (**$H2_0$**) Analytical thinking in novice entrepreneurs does not lead to causal decision making. The corresponding alternative hypothesis is: (**$H2_A$**) Analytical thinking in novice entrepreneurs leads to causal decision making. Summarizing, these are the four hypotheses that aim to answer the initially formulated research question:

1. (**$H1_0$**) Intuitive thinking in novice entrepreneurs does not lead to effectual decision making.
2. (**$H1_A$**) Intuitive thinking in novice entrepreneurs leads to effectual decision.
3. (**$H2_0$**) Analytical thinking in novice entrepreneurs does not lead to causal decision making.
4. (**$H2_A$**) Analytical thinking in novice entrepreneurs leads to causal decision making.

3. METHODOLOGY

To answer the given research question, novice entrepreneurs have been reached out to during a period of time of roughly 3 weeks. It is aimed to collect data by presenting a survey to entrepreneurs who have started their own business no longer than five years ago and who have only founded one company so far. The entrepreneurs should be the founders of their own company to assure that the ideas of an actual founder does not distort the idea of the research participant. Furthermore, the participant should be the found of his or her first company, to make sure the experience level is that of a truly novice entrepreneur. Besides, the participant should have an academic background, meaning that they have a degree from a higher education institute. The survey itself consist of several questions to determine the preferred decision making process and was established by Alsos (2014). The survey measures further the cognitive style according to Epstein et al. (1996). Other questions concerned cultural tightness and looseness by (Gelfand et al. 2011), which are not directly part of this study but are used for other studies that are simultaneously conducted on the concept of effectuation. In total the survey contained 51 questions. The first 26 questions had to be answered on a scale from 1 to 5, ranging from strongly disagree to strongly agree. The scale has the attributes proposed by likert (1932) and will result in a set quantitative data that will be analyzed in the analysis part of this study.

To gain a different perspective than similar studies conducted on effectuation, for instance on MBA students in the U.S. (Sarasvathy, Dew, Read, & Wiltbank, 2007), this study is conducted in Mexico. At the University of Twente there has been several bachelor and master theses conducted on the topic of effectuation and causation. No work however approached the topic in an environmental context outside of Europe. In Mexico, Here one may expect different environmental settings that may allow for different inferences on proposed research question. The participants mainly operate in the region of Querétaro, in the center of Mexico. Querétaro is considered one of most economically vibrant regions in Mexico and hosts a large number newly founded start-ups and entrepreneurs (Treviño 2001).

3.1 Sample

To reach out the targeted set of novice entrepreneurs in Mexico, a number of institutions were contacted to aim for sufficient data gathering. The Instituto Tecnológico y de Estudios Superiores de Monterrey (ITESM) campus Querétaro offered several platforms to approach novice entrepreneurs. The attached business incubator of the university was contacted, which hosts several entrepreneurs of different experience levels. The survey was presented to the entrepreneurs face to face to assure for reliable and valid data gathering. Two events of the University were attended, that represented a platform for novice entrepreneurs to present their business ventures and to establish new business contacts. Also here, the survey was presented face to face. Additionally, the survey was send to entrepreneurs via social networks (Mainly Facebook) and via e-mail to roughly 800 former students of the ITESM. These students have attended courses that concerned business and entrepreneurship related topics. Additionally some entrepreneurs were contacted through personal contacts. All data was collected through Google forms and the participants voluntarily agreed to participate. In order to prevent biased or invalid results, the participants were briefed about the study. They were told to have the chance to receive the results of the study, which was highly appreciated by most participants. The original survey was translated into Spanish, although most participants spoke English, to avoid misunderstandings and assure for reliable and valid data collection. The survey was translated by a Spanish native speaker and employee of the ITESM. Further, it was controlled by more students currently studying at the University. Most of the questions are derived from earlier introduced Literature

In total 106 entrepreneurs have answered the survey, of which 66 responses can be used for the study. All respondents are Mexican nationals, who operate in Mexico. A total number of 30 (45.45%) survey participants were female and a larger amount of 36 (54.55%) participants were male. Most of the respondents hold a bachelor's degree (96.97%), only one participant holds a master's degree and one has a diploma. The educational background of the participants is mostly not business related (63.64%), meaning that there degree of a higher education is not business related. In Total 84.85 % however have had entrepreneurship related courses. 10.61% of the respondents

have heard of the term effectuation before, 12.12% know the term effectuation, but the great majority does not know the term effectuation. The main motivation to start a business for the most was to follow a dream (22.73%) or to better the world (19.70%). Most of the participants had no parents who were an entrepreneur (36.36%), 34.85% of the participants had one parent that was an entrepreneur and 21.21% of the participants had parents that were both entrepreneurs. The average age of the respondents is 24.41 years, ranging from 21 to 39. The market sectors the entrepreneurs are operating in is very divers and includes education, health, marketing, IT, textile, foods and various technology related sectors. The average time the companies founded by the entrepreneurs have been existing is 1.40 years.

3.2 Variables and Measures

3.2.1 Independent variables: NFC and FI (Cognitive Style)

First, it is noteworthy that in this study, the cognitive style of the participants is the independent variable of the study. The first 10 by Epstein et al. (1996, p.399) measure two independent processing modes for cognition. The first 5 questions measure the Need for Cognition (NFC) and the remaining 5 measure the Faith in Intuition (FI). The article by Epstein et al. (1996) mentions 2 reversed items (questions 1 and 2, indicated by R) in the NFC items, while actually there are 3 reversed items. Questions 1, 2 and 5 are reversed items, which has been approved by Epstein. In this case the reversed scores will be used when computing the means and Cronbach Alpha's, so the original scores will be modified.

3.2.2 Dependent variables: Effectuation and Causation

In this research, effectuation and causation are the dependent variables of the study. The measurement of effectuation and causation (questions 11-20) embodies the fact that both concepts are not opposite measurements, but rather measure two different concepts that are not mutually exclusive (Kraaijenbrink et al., 2012).. However, several problems in the measurement of this concepts existed previously to the establishment of the survey by Alsos (2014). They concerned issues such as the lack of discriminant validity documented by high positive correlation between causation and effectuation measures (Alsos, Clausen & Solvoll, 2014; Chandler et al., 2011; DeTienne & Chandler, 2010); the lack of internal consistency indicated by low correlations between effectuation principles (Brettel et al., 2012; Chandler et al., 2011), and inconsistency in predictive validity as effectuation principles correlate differently to suggested related measures (Brettel et al., 2012; DeTienne & Chandler, 2010; Johansson & McKelvie, 2012). The scale developed by Alsos (2014) considers the identified weaknesses and presents a new measurement of the two concepts.

The first five questions measure the concept of causation, while the remaining 5 measure the concept of effectuation. Each of the set of 5 questions has one question that is related to the five sub-constructs of the concepts, described earlier in the literature review part 2.1.3. So all five sub-dimensions of the concepts are covered in the survey. The measurement is taken on Likert scale, ranging from 1 "totally disagree" to 5 "totally agree". This indicates, that the lower the score, the higher the tendency of the participant towards one decision making process and corresponding sub-dimension. The mean of each item is calculated to describe the general tendency of favoring one decision making process over the other (If statistically significant).

3.2.3 Control Variables

To assure that the information provided by the participants is reliable, the survey contains several questions that can be taken as control variables. First, questions referring to reveal details concerning the founding of the company aim to proof that asked entrepreneurs can be classified as novice entrepreneurs and that they belong to the target group of this study. This questions concern education of the participants, country of origin, country operating in, being the owner of the company, being the founder of the company, time of being an entrepreneur and time of existing of the founded company. Furthermore, some detailed questions regarding the revenue of the founded company were optional to answer to.

The control variables for the dependent variables effectuation and causation are chosen to be: gender, age, previous business education, parents being entrepreneurs or not. To determine if there is a relationship between the control variables and the dependent variables, a regression analysis is performed (See appendix 11.6 & 11.7). The conducted correlation matrix does not show any significant correlations between the control variables and the concepts to measure (see Appendix 11.5). Also, including the control variables does not better the model explanation (Beta values when control variables included do not significantly differ in model 1 or model 2, see appendix 11.6 & 11.7).

3.4 Data Analysis

The analysis of the data is conducted via Excel and SPSS, version 22. First, the Cronbach's alpha for both concepts are measured to check for internal consistency (reliability) of the items. Both concepts are found to be not entirely internal consistent. With a Cronbach's alpha value of >0.7 (Alsos, 2014) both measurements score slightly or significantly below. The score for the NFC items is 0.313 and for the FI items the score is 0.686. The causation items score 0.471 and the effectuation items 0.596.

The original survey from which the data is obtained from was translated into Spanish and therefore one has to make sure that the Spanish version of the survey still measures the same concepts. This can be assured by conducting an exploratory factor analysis (EFA) to test the validity of the survey. A Kaiser-Meyer-Olkin (KMO) measurement and a Bartlett's test are conducted in this context.

In the Analysis section of this thesis, the concepts of effectuation and causation are then analyzed to determine which decision making process is preferred among the participants. After that, the concept of cognitive style is analyzed to determine the dominant thinking style among the entrepreneurs. Following these analyses, the hypotheses testing is conducted. The general aim of the study is to establish a correlation/regression analysis between the two concepts to answer the given research question.

4. ANALYSIS

4.1 A-Priori Analyses

Before revealing the statistical analysis of the hypotheses, some general remarks about the sampling population of the novice entrepreneurs in Mexico are given. Concerning the constructs to measure in this research, one can find some inferences about the cognitive style and preferred decision making process of the population. Novice Mexican entrepreneurs show a slightly higher tendency for the Need for Cognition score. The mean score is 2.91 (SD = 0.47), which means that the population can be described as slightly preferring analytical thinking. With a mean score of 3.4 (SD = 0.75) the population has a relatively high Faith in Intuition score, meaning that the population is to be described as generally more intuitive. When it comes to the preferred decision making process, the population prefers causal decision making over effectual decision making. The mean score for Causation is 3.75 (SD = 0.66), so the population prefers making decisions based on logical predictions. For Effectuation, the mean is 2.73 (SD = 0.83), so the population has a slight tendency to select short term means without defining precise long term goals, generally however sticks to causal decision making. When examining the statistical output for the test of normality, one can rate the distribution of concepts measured as approximately normally distributed according to the boxplots given (see Appendix 11.4). The Shapiro-Wilk test however only shows that one concept is normally distributed. Given the results of the boxplots, normal distribution of the concepts is assumed for the further research.

4.2 Factor Analysis

To test for the validity of the cognitive style measurements (NFC and FI) as well as the validity of the effectuation and causation measurements, an exploratory factor analysis was conducted. A Principal axis factor analysis (PAF) was conducted with the Promax-Rotation method. The Promax-Rotation method allows for a correlation of the factors to rotate, so it does not have to be assumed that the scales have to be independent from each other. The number of factors to extract in each analysis was fixed to 2, once for the cognitive style measurements (NFC and FI) and once for the preferred decision making processes (effectuation and causation). The threshold for the KMO measurement is a value >0.5 and for the Bartlett's test it is p>0.000 (Morrison, 1990; Cronk, 2012). The KMO reveals a value of 0.678 for the survey items measuring the cognitive style. The value comes close above 0.5 and can therefore be argued to be adequate. For the items measuring effectuation and causation, a value of 0.644 is measured and can be rated as adequate as well. Since the scales are established scales, it is not feasible to delete items to better the scores. The correlation structure in general is adequate for the factor analysis. The Bartlett's test in both cases indicates a significant deviation between the correlation matrix and the unit matrix. This means that there is sufficient correlation between the items that significantly deviate from the vale 0 and therefore can be used for the factor analysis. With the extracted factors, 38.44% of the total variance in items can be explained in the cognitive style measurement. In the effectuation and causation measurement, 31.77% of the total variance in items can be explained. The Scree-Plot in both cases does not reveal the optimal number of factors, since there are no sharp bends in the trend displayed. The Pattern matrix in both cases show that some items have suppression loadings of >0.30 or are not loading as expected. This in essence means again, that the two factors to measure in each analysis are not clearly revealed through the factor analysis.

4.3 Regression and Correlation Analysis

4.3.1 Hypothesis $H1_0$ and Hypothesis $H1_A$

$H1_0$: Intuitive thinking in novice entrepreneurs does not lead to effectual decision making.

$H1_A$: Intuitive thinking in novice entrepreneurs leads to effectual decision.

First, the $H1_0$ hypothesis is tested, which is arguably thought to be rejected according to the literature review conducted earlier. A correlation matrix with a two-tailed test significance between the means of the concepts measured was conducted. Since the concepts measured are normally distributed, the Pearson correlation coefficient is checked to evaluate the correlation between the concepts. The coefficients reveal, that there is a very low positive correlation between NFC and effectuation (0.047). Further, there is very low negative correlation between FI and effectuation (-0.047). At this point, the $H1_0$ hypothesis is to argue to be true. When examining the OLS regression matrix, it is also to argue that there is no statistical significance between NFC and effectuation and between FI and effectuation. A regression equation was found ($F_{(7; 55)}$ = 0.401, P<0.898), with an R^2 of 0.049. The individuals predicted effectuation score equals to 3.7 + 0.162 (NFC) points and 3.7 + 0.077 (FI) points. This indicates a low prediction power and one can rate $H1_0$ as true. Also, the control variables do not increase this prediction power.

4.3.2 Hypothesis $H2_0$ and Hypothesis $H2_A$

$H2_0$: Analytical thinking in novice entrepreneurs does not lead to causal decision making.

$H2_A$: Analytical thinking in novice entrepreneurs leads to causal decision making.

The $H2_0$ hypothesis is expected to be rejected according to the literature review conducted earlier. A correlation matrix with a two-tailed test significance between the means of the concepts measured was conducted. Since the concepts measured are normally distributed, the Pearson correlation coefficient is checked to evaluate the correlation between the concepts. The coefficients reveal, that there is a very low positive correlation between NFC and causation (0.242). Further, there is a very low positive correlation between FI and causation (0.099). At this point, the $H2_0$ hypothesis is to argue to be true. When examining the OLS regression matrix, it is also to argue that there is no statistical significance between NFC and causation and between FI and causation. A regression equation was found ($F_{(7; 55)}$ = 1.851, P<0.096), with an R2 of 0.088. The individuals predicted effectuation score equals to 2.289 + 0.353 (NFC) points and 2.289 + 0.056 (FI) points. This indicates a low prediction

power and one can rate $H2_0$ as true. Also, the control variables do not increase this prediction power.

5. DISCUSSION

In the previously conducted literature review it has been revealed, that according to Sarasvathy (2001), entrepreneurs with less experience (MBA students) have a higher tendency for causal decision making. In conducted research, this has been indicated as well, showing that novice entrepreneurs in Mexico also showed a tendency to causal decision making. However, at the same time there has been some indication for a tendency for effectuation as well. This at first sight contradicting result can be explained by the fact that both concepts are not to be seen as opposite ends but two different concepts. Another possibility of that result might be due to the possibility that there has been a social bias among the Mexican novice entrepreneurs. As the sample was drawn from entrepreneurs close to the Instituto Tecnológico y de Estudios Superiores de Monterrey (ITESM) campus Querétaro, the internal organizational culture of the University or general cultural aspects of the region may have influenced the responses of the participants. Many former students were asked to fill out the survey on campus, with former teachers and colleagues in their direct environment. For instance, one item of the survey was to rate the statement "I do not like to think too much". It is intended to measure the Need for Cognition with this item, but it might not be culturally accepted to respond to that question with "totally agree", even if it is the case. Few other items had similar potential issues.

When it comes to translating the survey from the original English version, special care had to be taken to not change the meaning of some items. One may discuss if that has been the case and how to cope with some items that might have a different connotation in Spanish in this case and how it was interpreted by the participants. The factor analysis conducted is not totally sufficient in this case. A professional translation with care about cultural details and another form of non-quantitative analysis would have been a safer approach to validate the survey. Noteworthy however is that the participants were offered to leave a comment when filling out the survey an there have been no comments that showed that the participants did not clearly understand the survey.

Concerning the hypotheses outcomes, one may argue about the sample size of the population. With a sample size of 66, the sample is considered big enough (n >50) (Field, 2013), a higher number of respondents would increase the validity and reliability of the study however. The control variables that were used to check for possible other independent variables that influence effectual or causal decision making needed a larger more diverse sample size to gain stronger inferences. The explaining power of the control variable age is relatively poor, since the large majority of the respondents were in their 20´s. A more diverse population would allow for more accurate results. Similar issues arise when checking educational degree's obtained, since almost every respondent had only a bachelor's degree.

Some issues may arise when it comes to the Cronbach's alpha measured. To note is that every measurement of cronbach´s alpha values were below a threshold of 0.7 (Tavakol & Dennick, 2011) and therefore had to be rated as not reliable. According to Lozano, Garcia-Cueto, & Muniz (2008), an increase in items asked concerning one concept, the value of the Cronbach´s alpha improves, which indicates a higher reliability of the results.

6. CONCLUSIONS

6.1 Hypotheses Testing

When conducting the literature review about the concepts of cognitive style and preferred decision making process, there seemed to be a theoretical link that was to be tested in the analysis part of this article. Testing both set of hypotheses showed however no statistical inferences that there is a link between NFC/FI and effectuation or NFC/FI and causation. In both cases the H_0 hypotheses were rate as true and the H_A hypotheses were rejected. As the main objective of this research was to answer the initially posed research question: **To what extent does the cognitive style of novice entrepreneurs lead to effectual and causal decision making?** It is now safe to state that, according to this research, the cognitive style of novice entrepreneurs do not predict an effectual of causal decision making process. However, general remarks can be made about the population of novice entrepreneurs in Mexico can be made. The population shows a higher tendency for causal decision making than effectual decision making, although there can be seen a slight tendency for overall effectual decision making. The population displays a higher faith in intuition than is displays a need for cognition. So, overall there is a preference for intuitive thinking compared to analytical thinking. The variables gender, age, previous business education, parents being entrepreneurs or not do not change the relationship between any of the measured concepts.

6.2 Societal Relevance

As stated in the introduction of this article, the societal relevance of this research lies in the fact that various institutions can implement gained inferences for different reasons. Although this study has its limitations, universities and governmental institutions may discover new ideas to conduct research in the field of entrepreneurial decision making. Practically this means supporting more successful entrepreneurs through better education. This would possibly lead to more innovations and a stronger economic growth. For Mexico, so far and as seen when conducting the literature review, it is the first empirical study on effectuation. The local universities and government may profit in this case, especially due to the fact that Querétaro is seen as the regional startup center (Treviño, 2001).

6.3 Scientific Relevance

An interesting aspect concerning the scientific relevance of this study is the data gathered during the study. It can be used for future research. The data collected contains more measurements concerning cultural dimensions and some information about the economic performance of some startup companies. Edmonson and McManus (2007) described that the research on effectuation in its beginning and the link to the cognitive style of individuals is a new approach in this conducted study. There is a need for more

quantitative research also in the field of entrepreneurial cognition field, especially when it comes to regional differences in entrepreneurial decisions (Liñán, Urbano & Guerrero 2011).

7. LIMITATIONS

Due to the fact that research concerning effectuation is still in its beginnings, the majority of theoretical concepts were derived from the work of Sarasvathy (2001) and there has yet to be a stronger understanding of the concepts (Chandler et al. 2011). The survey that was used to measure this concept contained the five sub-constructs defined by Sarasvathy (2001), while there still might be other sub-constructs to measure effectuation (Perry et al. 2012). Also concerning the theory behind the cognitive style needs to be explored in more detail (Sternberg & Grigorenko, 1997).

The survey was conducted during a limited time frame and was distributed with the help of the ITESM. An early closing of the institute for the summer did not allow for arguably needed more responses. In general, it can be seen as a limitation that mainly participants close to that institute where part of this study. The findings of the research cannot be stated valid for the whole population of Mexico, the sample is not representative in that aspect. Also, the sample population can be seen as widely homogenous, mainly young individuals within the same age range and similar educational background are part of the study. The average time being an entrepreneur is under 2 years in this study, which is wide before the threshold of 5 years defined earlier. It might be that there are significant differences in entrepreneurial decision making within this time range, since learning might be happening faster in that short time period (Minniti & Bygrave 2001).

8. FURTHER RESEARCH

More research has to be conducted to stronger test the relationship between cognitive style and preferred decision making process. It would be interesting to see the potential changes of the relationship in different environmental settings and with different types of the sampling population. As mentioned in the discussion part, cultural differences may influence the results of the study. As described by Harms & Schiele (2012) and Sarasvathy (2001), individuals may react to their environment by changing a different type of preferred decision making process.

It might be promising to further explore the level of expertise in the context of entrepreneurial decision making. This study focuses on novice entrepreneurs in Mexico. Interesting in that context is that entrepreneurship in Mexican culture is seen significantly different than for instance in the U.S. (Fairlie & Woodruff 2007). Family businesses seem to play a major role and may be the source of inspiration for some to become an entrepreneur. A study in Mexico concerning the influence of the family in given theoretical context may lead to new inferences, also growing up in an entrepreneurial family environment may affect the expertise of young individuals starting their own business.

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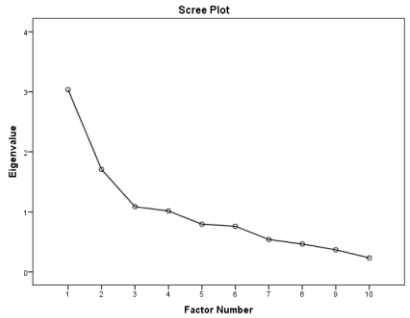
11. APPENDIX

11.1 Explanatory Factor Analysis Cognition

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,678
Bartlett's Test of Sphericity	Approx. Chi-Square	158,558
	df	45
	Sig.	,000



Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings [a]
Factor	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	3,036	30,356	30,356	2,518	25,177	25,177	2,350
2	1,707	17,065	47,422	1,327	13,267	38,444	1,743
3	1,085	10,855	58,277				
4	1,015	10,151	68,427				
5	,794	7,937	76,364				
6	,759	7,595	83,959				
7	,539	5,392	89,351				
8	,464	4,640	93,991				
9	,368	3,678	97,669				
10	,233	2,331	100,000				

Extraction Method: Principal Axis Factoring.

a. When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.

Pattern Matrix[a]

	Factor	
	1	2
Cog Epstein 1 REV		,954
Cog Epstein 2 REV		,677
Cog Epstein3 I prefer to do something that challenges my thinking abilities rather than something that requires little thought.	,533	
Cog Epstein4 I prefer complex to simple problems.	,352	
Cog Epstein 5 REV		,403
Int Epstein6 I trust my initial feelings about people.		
Int Epstein7 I believe in trusting my hunches.	,431	
Int Epstein8 My initial impressions of people are almost always right.	,499	
Int Epstein9 When it comes to trusting people, I can usually rely on my "gut feelings."	,795	
Int Epstein10 I can usually feel when a person is right or wrong even if I can't explain how I know.	,822	

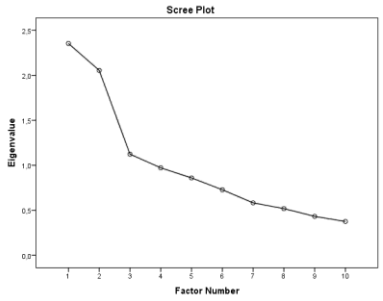
Extraction Method: Principal Axis Factoring.
Rotation Method: Promax with Kaiser Normalization.

a. Rotation converged in 3 iterations.

11.2 Explanatory Factor Analysis Effectuation and Causation

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,644
Bartlett's Test of Sphericity	Approx. Chi-Square	110,824
	df	45
	Sig.	,000



Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
Factor	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	2,354	23,542	23,542	1,715	17,151	17,151	1,686
2	2,055	20,550	44,092	1,462	14,615	31,766	1,500
3	1,124	11,235	55,327				
4	,972	9,719	65,046				
5	,859	8,595	73,641				
6	,728	7,281	80,921				
7	,582	5,822	86,744				
8	,518	5,183	91,927				
9	,432	4,320	96,247				
10	,375	3,753	100,000				

Extraction Method: Principal Axis Factoring.

a. When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.

Pattern Matrix[a]

	Factor	
	1	2
Caus_1 We use the long-term goal that we have set as the starting point and strive to acquire the resources that we need in order to achieve this goal		,551
Caus_2 An evaluation of the business' profit potential is decisive when we decide how much to invest		,668
Caus_3 We work systematically in order to achieve long-term goals and do not consider short-term opportunities	,319	
Caus_4 We analyze the competitive market offerings and position our products and prices accordingly	,349	
Caus_5 We base our strategic decisions on rigorous analysis of how the market and competitive situations will evolve over time		,749
Eff_1 We develop the business based on the resources that we have available, without any clear vision of what the business will become in the end	,497	
Eff_2 Instead of calculating how much profit we will gain if we invest, we invest based on the resources that we have at our disposal	,547	
Eff_3 We constantly change how we envision the business; "we make the path as we go"	,710	
Eff_4 We base our cooperation with others on informal agreements, which are changed depending on what they can offer	,608	
Eff_5 We let the business develop step-by-step and have no clear idea of what it will look like in the end		-,341

Extraction Method: Principal Axis Factoring.
Rotation Method: Promax with Kaiser Normalization.

a. Rotation converged in 3 iterations.

11.3 Cronbach´s Alphas

11.3.1 Cronbach´s Alpha NFC

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,313	,351	5

11.3.2 Cronbach´s Alpha FI

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,686	,685	5

11.3.3 Cronbach´s Alpha Causation

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,471	,503	5

11.3.4 Cronbach´s Alpha Effectuation

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,596	,597	5

11.4 Test of Normality

Descriptives

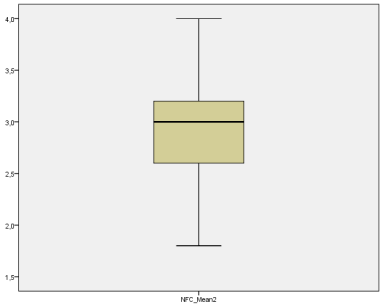
			Statistic	Std. Error
NFC_Mean2	Mean		2,9061	,05765
	95% Confidence Interval for Mean	Lower Bound	2,7909	
		Upper Bound	3,0212	
	5% Trimmed Mean		2,9111	
	Median		3,0000	
	Variance		,219	
	Std. Deviation		,46835	
	Minimum		1,80	
	Maximum		4,00	
	Range		2,20	
	Interquartile Range		,60	
	Skewness		-,232	,295
	Kurtosis		,135	,582
Mean_FI_Epstein	Mean		3,4030	,09237
	95% Confidence Interval for Mean	Lower Bound	3,2186	
		Upper Bound	3,5875	
	5% Trimmed Mean		3,4424	
	Median		3,4000	
	Variance		,563	
	Std. Deviation		,75038	
	Minimum		1,40	
	Maximum		4,60	
	Range		3,20	
	Interquartile Range		1,00	
	Skewness		-,602	,295
	Kurtosis		-,034	,582
Mean_Causation	Mean		3,7545	,08100
	95% Confidence Interval for Mean	Lower Bound	3,5928	
		Upper Bound	3,9163	
	5% Trimmed Mean		3,7785	
	Median		3,8000	
	Variance		,433	
	Std. Deviation		,65801	
	Minimum		1,80	
	Maximum		5,00	
	Range		3,20	
	Interquartile Range		,80	
	Skewness		-,458	,295
	Kurtosis		,990	,582
Mean_Effectuation	Mean		2,7333	,10249
	95% Confidence Interval for Mean	Lower Bound	2,5286	
		Upper Bound	2,9380	
	5% Trimmed Mean		2,7448	
	Median		2,7000	
	Variance		,693	
	Std. Deviation		,83267	
	Minimum		1,00	
	Maximum		4,20	
	Range		3,20	
	Interquartile Range		1,20	
	Skewness		-,152	,295
	Kurtosis		-,958	,582

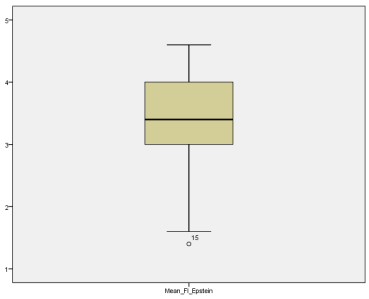
Tests of Normality

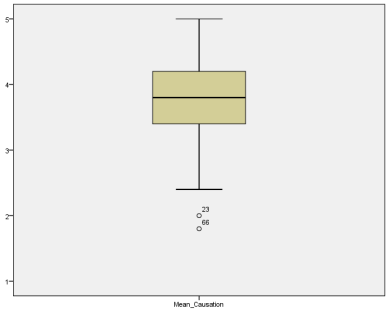
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
NFC_Mean2	,110	66	,047	,973	66	,158
Mean_FI_Epstein	,089	66	,200*	,954	66	,016
Mean_Causation	,128	66	,009	,956	66	,021
Mean_Effectuation	,107	66	,061	,963	66	,045

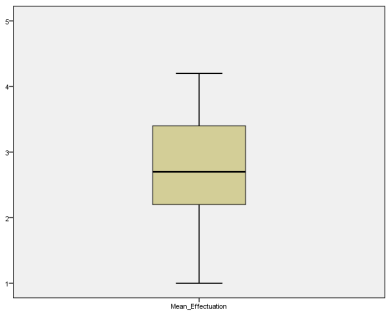
*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction









11.5 Correlation Matrix

Correlations

		NFC_Mean2	Mean_FI_Epstein	Mean_Causation	Mean_Effectuation	Age	Gender	Did you follow entrepreneurship courses?	Is one or are both of your parents entrepreneur?
NFC_Mean2	Pearson Correlation	1	,228	,242	,047	,011	,014	-,169	-,035
	Sig. (2-tailed)		,065	,051	,709	,930	,909	,175	,782
	N	66	66	66	66	66	66	66	63
Mean_FI_Epstein	Pearson Correlation	,228	1	,099	-,047	-,073	-,077	-,127	,186
	Sig. (2-tailed)	,065		,430	,708	,562	,537	,311	,144
	N	66	66	66	66	66	66	66	63
Mean_Causation	Pearson Correlation	,242	,099	1	,069	-,012	,241	-,113	-,110
	Sig. (2-tailed)	,051	,430		,585	,927	,052	,367	,393
	N	66	66	66	66	66	66	66	63
Mean_Effectuation	Pearson Correlation	,047	-,047	,069	1	-,117	-,118	,003	-,021
	Sig. (2-tailed)	,709	,708	,585		,350	,346	,978	,871
	N	66	66	66	66	66	66	66	63
Age	Pearson Correlation	,011	-,073	-,012	-,117	1	-,113	,044	-,141
	Sig. (2-tailed)	,930	,562	,927	,350		,366	,723	,270
	N	66	66	66	66	66	66	66	63
Gender	Pearson Correlation	,014	-,077	,241	-,118	-,113	1	-,131	-,130
	Sig. (2-tailed)	,909	,537	,052	,346	,366		,294	,312
	N	66	66	66	66	66	66	66	63
Did you follow entrepreneurship courses?	Pearson Correlation	-,169	-,127	-,113	,003	,044	-,131	1	-,071
	Sig. (2-tailed)	,175	,311	,367	,978	,723	,294		,580
	N	66	66	66	66	66	66	66	63
Is one or are both of your parents entrepreneur?	Pearson Correlation	-,035	,186	-,110	-,021	-,141	-,130	-,071	1
	Sig. (2-tailed)	,782	,144	,393	,871	,270	,312	,580	
	N	63	63	63	63	63	63	63	63

11. 6 Hypothesis 1 OLS regression analysis, including control variables

Model Summary[c]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	,347[a]	,120	,043	,65446	,120	1,557	5	57	,187	
2	,437[b]	,191	,088	,63900	,070	2,395	2	55	,101	2,100

a. Predictors: (Constant), Parents_entrepreneur=One of them, Age, Did_you_take_entrepreneurial_courses=Yes, DUMMY_gender, Parents_entrepreneur=Both

b. Predictors: (Constant), Parents_entrepreneur=One of them, Age, Did_you_take_entrepreneurial_courses=Yes, DUMMY_gender, Parents_entrepreneur=Both, Mean_FI_Epstein, NFC_Mean2

c. Dependent Variable: Mean_Causation

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3,335	5	,667	1,557	,187[b]
	Residual	24,414	57	,428		
	Total	27,749	62			
2	Regression	5,291	7	,756	1,851	,096[c]
	Residual	22,458	55	,408		
	Total	27,749	62			

a. Dependent Variable: Mean_Causation

b. Predictors: (Constant), Parents_entrepreneur=One of them, Age, Did_you_take_entrepreneurial_courses=Yes, DUMMY_gender, Parents_entrepreneur=Both

c. Predictors: (Constant), Parents_entrepreneur=One of them, Age, Did_you_take_entrepreneurial_courses=Yes, DUMMY_gender, Parents_entrepreneur=Both, Mean_FI_Epstein, NFC_Mean2

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95,0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	3,452	,788		4,379	,000	1,873	5,030		
	DUMMY_gender	,347	,172	,260	2,023	,048	,003	,691	,935	1,070
	Age	,005	,030	,023	,180	,858	-,054	,065	,953	1,049
	Did_you_take_entrepreneurial_courses=Yes	,201	,229	,111	,881	,382	-,256	,659	,974	1,027
	Parents_entrepreneur=Both	-,078	,225	-,049	-,349	,728	-,529	,372	,777	1,286
	Parents_entrepreneur=One of them	-,309	,188	-,226	-1,643	,106	-,685	,068	,817	1,224
2	(Constant)	2,289	,948		2,415	,019	,389	4,189		
	DUMMY_gender	,361	,168	,270	2,150	,036	,024	,698	,930	1,075
	Age	,007	,029	,028	,225	,823	-,052	,065	,950	1,052
	Did_you_take_entrepreneurial_courses=Yes	,110	,227	,061	,484	,630	-,346	,566	,939	1,065
	Parents_entrepreneur=Both	-,060	,224	-,038	-,268	,790	-,509	,389	,746	1,340
	Parents_entrepreneur=One of them	-,361	,185	-,264	-1,952	,056	-,732	,010	,803	1,245
	NFC_Mean2	,353	,180	,252	1,959	,055	-,008	,715	,887	1,128
	Mean_FI_Epstein	,056	,112	,065	,504	,616	-,168	,281	,896	1,116

a. Dependent Variable: Mean_Causation

11.7 Hypothesis 2 OLS regression analysis, including control variables

Model Summary[c]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	,196[a]	,039	-,046	,85475	,039	,457	5	57	,806	
2	,220[b]	,049	-,073	,86564	,010	,288	2	55	,751	1,673

a. Predictors: (Constant), Parents_entrepreneur=One of them, Age, Did_you_take_entrepreneurial_courses=Yes, DUMMY_gender, Parents_entrepreneur=Both

b. Predictors: (Constant), Parents_entrepreneur=One of them, Age, Did_you_take_entrepreneurial_courses=Yes, DUMMY_gender, Parents_entrepreneur=Both, Mean_FI_Epstein, NFC_Mean2

c. Dependent Variable: Mean_Effectuation

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1,670	5	,334	,457	,806[b]
	Residual	41,644	57	,731		
	Total	43,314	62			
2	Regression	2,101	7	,300	,401	,898[c]
	Residual	41,213	55	,749		
	Total	43,314	62			

a. Dependent Variable: Mean_Effectuation

b. Predictors: (Constant), Parents_entrepreneur=One of them, Age, Did_you_take_entrepreneurial_courses=Yes, DUMMY_gender, Parents_entrepreneur=Both

c. Predictors: (Constant), Parents_entrepreneur=One of them, Age, Did_you_take_entrepreneurial_courses=Yes, DUMMY_gender, Parents_entrepreneur=Both, Mean_FI_Epstein, NFC_Mean2

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95,0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	3,879	1,030		3,768	,000	1,818	5,941		
	DUMMY_gender	-,244	,224	-,146	-1,088	,281	-,693	,205	,935	1,070
	Age	-,041	,039	-,139	-1,043	,301	-,119	,037	,953	1,049
	Did_you_take_entrepreneurial_courses=Yes	,025	,299	,011	,083	,934	-,573	,623	,974	1,027
	Parents_entrepreneur=Both	-,114	,294	-,057	-,389	,698	-,703	,474	,777	1,286
	Parents_entrepreneur=One of them	-,127	,245	-,074	-,517	,607	-,618	,364	,817	1,224
2	(Constant)	3,700	1,284		2,881	,006	1,126	6,273		
	DUMMY_gender	-,248	,228	-,149	-1,092	,280	-,704	,208	,930	1,075
	Age	-,042	,040	-,142	-1,050	,298	-,121	,038	,950	1,052
	Did_you_take_entrepreneurial_courses=Yes	,009	,308	,004	,030	,976	-,608	,627	,939	1,065
	Parents_entrepreneur=Both	-,072	,304	-,036	-,238	,813	-,681	,536	,746	1,340
	Parents_entrepreneur=One of them	-,138	,251	-,081	-,551	,584	-,640	,364	,803	1,245
	NFC_Mean2	,162	,244	,093	,664	,509	-,327	,652	,887	1,128
	Mean_FI_Epstein	-,077	,152	-,071	-,507	,614	-,381	,227	,896	1,116

a. Dependent Variable: Mean_Effectuation