Discovering Entrepreneurs' Thinking Style – Do They Have Different Abilities Regarding Creativity, Rationality, and Intuition?

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Abstract

This research explored how entrepreneurs differ from non-entrepreneurs regarding creative, rational, and intuitive thinking. Individuals’ creativity was tested through the Kaufman Domain of Creativity Scale (K-DOCS). Individuals’ rationality and intuition was tested by the Revised Rational Experiential Inventory (REI). Analyzing from 68 entrepreneurs and 106 non-entrepreneurs from all over the world, the findings suggest that entrepreneurs have excelled ability regarding creative and rational thinking compared to non-entrepreneurs. However, there is no significant difference regarding intuitive thinking between entrepreneurs and non-entrepreneurs. Nevertheless, there is a tendency that female entrepreneurs score higher on intuitive thinking. Earlier research has shown contradictory results on rationality and intuition and these are discussed in relation to the present findings. Implications of the results include giving advices to organizations about how to train and integrate entrepreneurial employees and expanding the current entrepreneurship-related literature pool.

*Keywords*: entrepreneurship, gender, creativity, rationality, intuition
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People tend to process information in different ways and shift between different thinking styles in different situations. Previous research has revealed that different types of people have different preferences in thinking styles. For example, Gridley (2007) found that engineers preferred to make usable and executable plans and they tended to think in a hierarchical way. Research also found that artists preferred divergent thinking and took originality into account while making decisions (Chin, 2013). Moreover, Karakas (2010) stated in his research that artists and scientists used both creative and critical thinking when developing their works in the fields.

The aim for conducting this research is to investigate whether entrepreneurs, compared to non-entrepreneurs, differ in thinking styles in terms of creativity, rationality, and intuition. This is a fairly new topic because most of the research studying the relation between creativity and rationality is in the field of philosophy. The few psychology-related research attempts are in the subjects of education and the design industry. Besides, there is little research exploring entrepreneurs’ uses of creativity, rationality and intuition holistically. Therefore, the present thesis constitutes an effort to further the understanding of entrepreneurial thinking styles.

Why choose entrepreneurs as research subjects? Entrepreneurship has increasingly gained attention in the past years due to the significant contributions to the existing and emerging economy (OECD, 2015), along with employment rate, work equities, positive social changes and environmental awareness. Entrepreneurs are defined as “the developers of businesses from the ground up—coming up with an idea and turning it into a profitable business” (Brooks, 2015). It is not necessary that every entrepreneur owns a company, but they usually run a business that is based on their own ideas or products. It seems that a paradoxical mindset is required to manage entrepreneurship, because entrepreneurs need creativity and intuition to generate new ideas/products, and rationality to manage a business. The aim of this research is to see whether
entrepreneurs differ in their creativity, rationality, and intuition skills compared to people who are not entrepreneurial.

Researchers hold different views about how creativity and rationality interact with each other. Some support the idea that creativity and rationality are two opposite processes because rationality uses conscious and analytical cognitive processes which mostly handled by the left brain hemisphere while creativity requires holistic and unconscious cognitive processes that the right brain hemisphere is predominantly responsible for (Aubin & Haddad, 2012). In addition, it was claimed that, even when using right and left hemispheres at the same time, people had a habitual preference regarding whether to use creativity or rationality as their main thinking styles (Witteman, van den Bercken, Claes, & Godoy, 2009). Other researchers assert that creativity and rationality are actually complementary. Weisberg (1993) described creativity as an “intentional production of novelty” and emphasized that reasoning played a big role in creative behaviors. Reasoning, defined as an intentional and analytical process of figuring things out, has been used as an interchangeable term for rationality in multiple studies (Cian, Krishna, & Schwarz, 2015; Schmidt, 1992; von Kutschera, 1999). Paul (1993) stated that it was important to have logical and rational justifications to support creative ideas, and it was the rationalizing process that put an idea into “practical intelligence” (Sternberg, 1998). Hitt (1965) also supported that creativity itself was an activity that switched between “original thinking” and “logical reasoning”. This research is in line with the argument that creativity and rationality may interact with each other. We believe that both creativity and rationality are involved when entrepreneurs are processing their thoughts and behaviors. And as for intuitive thinking, it is common for researchers to study intuition with creativity or rationality. Researchers widely agree that intuition is an essential element for creativity (Hunter, 2002). However, intuition and rationality are two complementary aspects (Burke & Miller, 1999; Evans, 2010; Hogarth, 2001; Ringel, 2004).

The present paper will elaborate on the concepts of creativity and rationality, and also discuss intuition based on its connection to creativity and rationality. In the literature review
section of the paper, creativity and rationality will be discussed in terms of their components, respectively: 1) originality and utilization will be discussed in the creativity section; 2) objective rationality and subjective rationality will be discussed in the rationality section. Besides, intuition will also be reviewed through its connection to creativity and rationality. Hypotheses and research questions will be drawn on creativity, rationality, and intuition, respectively, at the end of each section.

**Literature Review**

**Creativity**

Researchers define creativity in multiple ways. Some argue that the ability to generate novel and original ideas is the main trait of creative people (Kaufman & Baer, 2006, p. 16). Others argue that it is equally important to own the ability to process ideas in an appropriate way or make something useful with the ideas (Sternberg & Lubart, 1991). There is support that both idea generation and idea utilization are critical for creativity and therefore, the creativity score was measured using the Kaufman Domain of Creativity Scale (K-DOCS), which contains questions that can detect both novelty, such as “Writing a poem”, and utility, such as “Helping to carry out or design a scientific experiment”. This section will discuss both idea generation and idea utilization, respectively; meanwhile, entrepreneurs’ capabilities to generate and utilize ideas will be predicted through their unique traits.

**Idea generation.** Idea generation is the stage of creativity that is most commonly identified when it comes to creativity topics. The concept of idea generation is to combine existing information and newly collected information in new ways to generate novel and original ideas (Amabile, 1983). The main technique for generating ideas is brainstorming (Osborn, 1953) and it aims to produce as many new ideas as possible, instead of worrying about the quality of the ideas. Research has found that two variables significantly predict individuals’ ability for producing novel ideas: Risk propensity and openness to experience.

The essence of risk propensity is that individuals think or behave in a novel way in order to
solve problems and manage risks (Rohrmann, 2002). This concept resonates with the definition of idea generation, which also largely adopts novel thinking and novel productions. It has been consistently verified that entrepreneurs have higher risk propensity than non-entrepreneurs (Caird, 1991; Knight, 2012; Rauch & Frese, 2007), which means entrepreneurs are more likely to perform or even seek risky behaviors (Stewart, Watson, Carland, & Carland, 1999). As risk propensity positively correlates with idea generation, it is predictable that entrepreneurs are better at producing novel ideas. Apart from risk propensity, individuals’ ability to generate novel ideas can also be predicted through a core personality trait: Openness to experience. Research shows that people who are open to experience are better at managing divergent thinking through internal and external resources and individuals’ openness is directly related to their ability to generate new ideas, especially at the early stage of creativity (Salter, Wal, Criscuolo, & Alexy, 2015). Cumulative research has found that openness to experience was a significant factor characterizing entrepreneurship (Antoncic, Bratkovic Kregar, Singh, & DeNoble, 2015; Howard & Howard, 1995) and the openness trait was associated with both entrepreneurial intentions and entrepreneurs’ performance (Barrick & Mount, 1991; Zhao, Seibert, & Lumpkin, 2010). Due to entrepreneurs’ high level of risk propensity and openness to experience, it can be predicted that entrepreneurs are better at idea generation compared to non-entrepreneurs.

**Idea utilization.** Many researchers argue that utilizing an idea in an appropriate and useful way is another important aspect of creativity. The goal in this stage of creativity is to pragmatize ideas into reality. Campbell’s creativity model (1960) defines idea utilization as a selective-retention process, where individuals develop the ideas from the generative stage, then choose, preserve and reproduce selected ideas. The controlled-attention theory (Beaty, Silvia, Nusbaum, Jauk, & Benedek, 2014) also provides a unique perspective on how people manage their creative ideas in a practical way. This theory claims that a great amount of cognitive control is needed to select potentially useful ideas and eventually turn novel ideas into a real product. As selecting, preserving and reproducing ideas are conscious behaviors, creative people, who
actually utilize their ideas, must conduct the selection-retention processes intentionally. It is predicted that entrepreneurs are more likely to pragmatize their novel ideas due to their prominent self-control ability, which is defined as the capability to apply willpower and exerting actions (Baumeister & Vohs, 2003). Entrepreneurs who were selected for this study are the ones who had turned their thoughts/intentions of being an entrepreneur into actions. Research revealed that entrepreneurs who had gone through the intention-action gap tended to show a strong volitional capability, including self-control (Van Gelderen, Kautonen, & Fink, 2015). In addition, the hot/cold self-control theory also illustrated that people with stronger self-control were more likely to think with their “cold” cognition, which regulated individuals’ attentions on specific and effortful tasks (Metcalfe & Mischel, 1999). In the present study, it is assumed that high self-control abilities lead entrepreneurs to be better at alternating between generating novel ideas and utilizing selected creative ideas with intentions. As this research agrees that both novelty and utility are equally important for defining creativity, we hypothesize:

_H1: Entrepreneurs are more creative compared to non-entrepreneurs_

**Rationality**

It is widely agreed that rationality is an “optimizing strategy” (Mosterín, 2008), which means to make the best choice out of existing options. Researchers used different categorical names to classify rationality types. This research divides rationality into two categories: One is objective rationality, which stands for the process during which people make decisions or select actions only based on objective evidences (Faro & Lefort, 2013). Another is subjective rationality, which refers to the process during which people make decisions or select actions based on available resources, such as their knowledge or reachable tools; and when there are no resources to refer to, one would use subjective logical assessments when processing the information (Ryall, 2003). For example, if entrepreneurs need to decide whether or not launch a new product, they can refer to previous market reports from other product to predict sales (aka. available resources); meanwhile, they must use subjective assessments when making the decision.
as no one has ever launched the same product before.

The Revised Rational-Experiential Inventory (REI) was used to measure rationality in this study. This scale measures both individuals’ ability and engagement in employing rationality when making decisions and conduct actions. This section will discuss both objective and subjective rationality, respectively. Besides, entrepreneurial traits will be used to reason why entrepreneurs may have a different level of rationality compared to non-entrepreneurs.

**Objective rationality.** Objective rationality, which can also be called algorithmic rationality or absolute rationality, is based on strict rules and formulas, and has no room for personal emotions and imaginations (Faro & Lefort, 2013). One example of utilizing objective rationality can be solving problems with mathematical algorithms. Researchers found that this kind of rationality excluded all the novelty and there was no creativity involved (Schipper, 2010). The measurement for this research does not include formula-based absolute answers and is more about self-believed rationality. Therefore, the rationality discussed in this study excludes objective rationality.

**Subjective rationality.** In order to discuss the concept of subjective rationality, it is important to point out that individuals’ opinions and beliefs are very important in subjective rationality. Therefore, right choices are “right” because people think they are right; choices are assessed as rational because people think they are rational. According to rationality theories, subjective decisions and actions can be considered as rational based on three normative notions: Intentionality, consistency, and choice of self-interest (Demeulenaere, 2014).

**Intentionality.** The first notion indicates that individuals are rational if they can support their decisions and actions with intentional reasons (Weber, 1961). Reisert and Conte (2004) found that the execution of intentional behaviors could be predicted by individuals’ needs for achievements. Goal theory clearly explains the reason why people who care about achievements are more likely to perform intentional behaviors: Achievement-oriented people tend to have planned (intention-oriented) behaviors (Ajzen, 1991) and are persistent on carrying out the plans
as an achievement or an idea of achieving is a strong intrinsic motivation for people to meet an end (Abd-El-Fattah & Patrick, 2011). The correlation between entrepreneurship and needs for achievement has been widely studied. McClelland (1962) found that entrepreneurs were predominantly motivated by achievement needs and it was an effective drive for entrepreneurs to be persistent on decisions. Other researchers also confirmed that entrepreneurs tended to have a higher need for gaining achievements, while achievement needs actually predicted entrepreneurial success (Davis & McClelland, 1962; Rauch & Frese, 2007; Schumpeter, Becker, & Knudsen, 2002). As the need for achievement is an effective predictor for intentional actions, it is assumed in the present study that entrepreneurs have a higher tendency to perform intentional behaviors, and it hence increases the chance for them to behave rationally.

**Consistency.** The second notion claims that individuals’ rationality can be predicted by their consistency about the subjective beliefs (Sen, 1977). It is worth pointing out that being consistent regarding one’s beliefs does not contradict being adaptive; instead, it is about being adaptive during the process but being persistent for reaching the conceptual ends. For example, if an entrepreneur plans to design an educational application but ends up producing an educational website, it is still considered consistent since the result meets the conceptual goal, which is to build something educational. The assumption that entrepreneurs may be better at being consistent regarding their beliefs can be drawn from the finding that entrepreneurs tend to have higher internal locus of control (Bonnett & Furnham, 1991; Mueller & Thomas, 2001). People with high internal locus of control believe in their own abilities to control their own destiny and future, instead of counting on external reasons, such as fate and luck (Lefcourt, 1991). High internal locus of control provides entrepreneurs with strong willpower to have faith in their own visions and work consistently toward a certain vision. As consistency is a recognizable predictor for rationality and entrepreneurs are more likely to be consistent regarding certain goals, it is predictable that entrepreneurs are more inclined to behave rationally.

**Choice of self-interest.** The third notion indicates that rationality can be predicted by
whether individuals can chase their own interests effectively (James, 1990). This is a controversial dimension for predicting rationality, as this concept does not emphasize the traits of actions, such as intentionality and consistency, but focus on the purpose of an action, which is to meet self-interest. The core argument of this concept is that when individuals are making decisions or selecting behaviors based on their own interest, they tend to select the most appropriate ways that may lead to a desired outcome (Weber, 1961). Therefore, when people reason with their own interests in mind, they tend to intentionally and consistently choose something that matches their own value systems, which may or may not be in line with the social norms. Boudon’s rationality theory provides supports for keeping “choice of self-interest” as one aspect for rationality. The theory states that when people have “good reasons” to explain their decisions and behaviors, the “good reasons” can be the ones that are good from an individual’s point of view, namely meet self-interest, and the “good reasons” are not necessarily the ideal reasons (Boudon, 1989).

Research showed that entrepreneurs were driven to pursue personal interests, such as being their own bosses and seeking profits, and meet collective interests, such as designing products based on customers’ preferences (Van de Ven, Sapienza, & Villanueva, 2007). Despite of some differences, personal and collective interests are not exclusive; instead, both personal and collective interests aim at meeting a fundamental self-interest, which is to run the entrepreneurial business successfully. This corresponds with the theory that, in business industry, fulfilling others’ interests ultimately serves one’s own interest (Heffner & de Tocqueville, 1956). Therefore, it can be predicted that entrepreneurial drives for meeting self-interest positively guide entrepreneurs to behave in a rational manner.

This present research uses Revised REI to measure rationality. In the Revised REI, rational ability and rational engagement are used as two aspects that determine individuals’ overall rationality. Rationality is based on three normative notions: Intentionality, consistency, and choice of self-interest and there are reasons to believe that entrepreneurs perform better on all
these three notions, therefore it is hypothesized that:

\[ H2: \text{Compared to non-entrepreneurs, entrepreneurs have higher level of rationality in terms of rational ability and rational engagement} \]

**Intuition and Its Connection to Creativity and Rationality**

The scale that is used for measuring rationality (Revised REI) also includes intuition measures, as intuition and rationality are considered to be two complementary aspects. The definition for intuition varies in different literature, but it is commonly agreed by researchers that intuition shares four characteristics: 1) intuitive processes are fast, unconscious and seemingly effortless (Hogarth, 2001, p. 14); 2) intuitive processes are heuristic as experience plays a vital role on intuitive actions (Epstein, 2010; Riquelme & Watson, 2002); 3) intuitive processes are holistic and associative: the holistic and associative perception enables pattern/meaning/structure recognition and leads to novelty generations (Bowers, Regehr, Balthazard, & Parker, 1990); 4) emotions and feelings are greatly involved in intuitive processes (Burke & Miller, 1999).

The effects of using intuition in entrepreneurship is significant: it is found that the use of intuitive thinking can lead to creativity (Hunter, 2002), opportunity identification (Baldacchino, 2013), decision management and goal achievement (Allinson, Chell, & Hayes, 2000). This section will analyze intuition through its four characteristics and connect it with creativity and rationality, respectively. Besides, predictions about entrepreneurs’ intuitive skills will be drawn based on their characteristics that are related with handling intuitive tasks.

**Intuition and creativity.** As mentioned in the creativity section, generating novel and original ideas is a fundamental aspect of creativity. The ideation process contains a great amount of intuition, which is a rapid and unconscious cognitive process (Shah, Smith, & Vargas-Hernandez, 2003). The intuitive process enables people to get rid of logical and analytical thinking and have a completely open mind for divergent thoughts and new possibilities (Ringel, 2004). Holistic association plays an essential role in intuitive processes and individuals’ intuitive capabilities can be displayed through making associations with existing information and
formulating new combinations (Mednick, 1962). Some of the techniques that are used for holistic association include mind mapping, which is to create a central idea and build upon it; randomness, which is to find connections among random objects for building new ideas; and provocative actions, which is to perceive things differently by changing physical surroundings (Daniel, 2013). Research has found that people differed in their abilities of using intuitive thinking to make associations. Creative people are better at producing new ideas through associative processes compared to uncreative people (Benedek & Neubauer, 2013); entrepreneurs are better at using intuition to make sense of and associations to knowledge and surrounding information (Busenitz & Barney, 1997). The productions extracted from the intuitive and associative processes may become a business idea that entrepreneurs can develop for profit. Therefore, it seems necessary for entrepreneurs to embrace superior intuitive capability as entrepreneurs may rely on their intuition to generate new business ideas at the first place.

**Intuition and rationality.** The concepts of intuition and rationality have been widely studied from a cognitive perspective and it is a shared view that dual systems are involved when processing information: One system is quick, unconscious and automatic and is referred to as an intuitive process, while the other system is slow, conscious, and intentional and it is referred to as a rational and analytical process (Evans, 2010). The measurement used in this research is based on the cognitive-experiential self theory, which supports the view that individuals process information through dual systems and believes that individuals’ behaviors are regulated by the interaction of the two thinking styles (Epstein, 1994).

Both intuitive (heuristic, unconscious) thinking and rational (analytic, algorithmic) thinking are required in order to conduct entrepreneurial actions (Dutta & Crossan, 2005; Mitchell, Friga, & Mitchell, 2005). More specifically, intuition is an imperative reason for entrepreneurial achievements (Mitchell et al., 2002) and the entrepreneurial intuition influences entrepreneurs’ thinking processes and consequently impacts entrepreneurs’ actions (Fox, 1981; Lewis & Leyser,
Both novice and expert entrepreneurs are inclined to use intuition when solving problems and making decisions (Dew, Read, Sarasvathy, & Wiltbank, 2009). The difference is that novice entrepreneurs tend to attribute an intuitive decision to gut feelings, while expert (or habitual) entrepreneurs are more likely to refer to their experience when processing intuitive thinking. Despite of the recognizable use of intuition, entrepreneurs greatly use their rationality as well. However, it is worth pointing out that the capability to switch between intuitive and rational thinking does vary among entrepreneurs. Besides, expert entrepreneurs usually perform better during the process of switching between intuitive and rational thinking (Baldacchino, 2013).

This present research uses REI to measure entrepreneurs and non-entrepreneurs’ intuition scores. In REI, both intuitive ability and intuitive engagement are measured and the sum total of these two aspects is used to determine individuals’ overall intuition. As there is clear evidence that reveals the importance of intuition on entrepreneurship, it is hypothesized that:

**H3 (a): Compared to non-entrepreneurs, entrepreneurs have higher level of intuition in terms of intuitive ability and intuitive engagement**

**Gender and Rationality/Intuition**

The relationship between gender and rationality/intuition is also interesting to discover, as existing research finds conflicting results. On the one hand, studies have reported that there are significant gender differences regarding rationality and intuition. For example, Epstein (2003) mentioned that there are small yet significant gender differences on thinking styles when measuring participants with the Revised REI test (the same test that is used in this study); women are more likely to reason with intuitive feelings while men prefer to use rational analyses. In addition, a study from Sladek, Bond and Phillips (2010), also conducted with the Revised REI test, confirmed that men process information with more rationality and women use more intuitive thinking. Moreover, there is strong evidence supporting the idea that females do not just prefer accessing intuition; they are actually good at using intuition. For example, Lieberman (2000) found that women are better at detecting signals when communicating non-verbally.
Signal-detecting skills may explain why women have better access to intuitive feelings. Besides, Myers (2004) described in his study that women were more intuitive due to the fact that they were better at sensing emotional cues, partly due to genetic reasons behind. In addition, Graham and Ickes (1997) demonstrated that women’s empathic ability accounted for their superior performance on utilizing intuitive thinking. The existing findings that support women’s superior intuitive ability and men’s superior rational ability have covered different populations, such as business people (Dolan & Stevens, 2013), healthcare workers (Sladek et al., 2010), and athletes (Raab & Laborde, 2011).

On the other hand, there are studies showing that no significant gender differences are found when examining rational thinking and intuitive thinking. Hayes and his colleagues found that female and male managers were equally intuitive and rational when solving problems and making decisions. Besides, female employees were less intuitive than male employees when handling business (Hayes, Allinson, & Armstrong, 2004). Hodgkinson and Sadler-Smith’s (2003) research also confirmed the finding that there was no gender difference in intuition. Moreover, some of the studies stated that the majority of research found gender differences in rationality and intuition was due to a stereotyped definition for rationality and intuition, and claimed that these definitions were socially biased.

The present research selected entrepreneurs as the study subjects and it was wondered whether female entrepreneurs and male entrepreneurs score differently regarding rationality and intuition. Similar amounts of females and males were recruited to participate in the present study to account for potential gender differences in rationality and intuition, which may bias results. However, it was hard to predict whether gender differences would actually be detected, as the existing literature does not give a clear image. Therefore, the following questions were kept in mind when running statistical analysis:

*Question 1: Do female entrepreneurs have higher scores on intuition compared to male entrepreneurs and males in general?*
Question 2: Do male entrepreneurs have higher scores on rationality compared to female entrepreneurs and females in general?

To sum up, entrepreneurship is important for sustaining a high societal and economical development. There is, therefore, a need to understand entrepreneurial thinking and its premises, in order to better foster entrepreneurs in society. Unfortunately, there is a lack of studies on entrepreneurial thinking. This present study chooses to study entrepreneurs’ thinking styles through an analysis of creative, rational, and intuitive thinking. These three thinking styles are selected due to their significant correlation with each other and their great impact on managing entrepreneurship. The current literature has two main deficiencies: First, creativity, rationality or intuition have only been separately studied with regarding to entrepreneurship, however, there is little research exploring entrepreneurs’ uses of creativity, rationality and intuition in a holistic way. Second, existing research that studied entrepreneurs’ thinking styles does not take gender differences into consideration (e.g. Groves, Vance, Choi, & Mendez, 2008; Karabey, 2012). This could produce misleading findings as gender differences are detected in rational and intuitive thinking: Women tend to use more intuitive thinking while men prefer to engage in more rational thinking (Hayes et al., 2004; Hodgkinson & Sadler-Smith, 2003).

Aim and Hypotheses

The aim of this research is to investigate whether entrepreneurs differ in their creativity, rationality, and intuition skills compared to people who do not describe themselves as entrepreneurs. After discussing and analyzing previous research findings, three hypotheses are tested in the present study. First (H1), entrepreneurs have higher creativity ability than non-entrepreneurs. Second (H2), compared to non-entrepreneurs, entrepreneurs have higher level of rationality in terms of rational ability and rational engagement. Third (H3), compared to non-entrepreneurs, entrepreneurs have higher level of intuition in terms of intuitive ability and intuitive engagement. Next to the three hypotheses, two gender-related questions are formulated for discovering: 1) Do female entrepreneurs score higher on intuition than male entrepreneurs
and males in general? 2) Do male entrepreneurs score higher on rationality than female entrepreneurs and females in general?

**Methods**

**Participants**

In this study, 174 participants (68 entrepreneurs and 106 non-entrepreneurs; 101 female and 73 male) were recruited to answer the questionnaires. Participants who are age from 18 to 55 years old were recruited for this study. Worldwide population participated in the present study, but the majority of the participants are Caucasians (68%) and Asians (18%). Besides, 74% of the participants have bachelor or above degrees. Entrepreneurs from all kinds of fields participated in this study and most of them have never received any training that is related to entrepreneurship. Due to the potential gender bias that may be caused by the Revised REI measurement, similar numbers of males and females were recruited in both the entrepreneur group and the non-entrepreneur group.

**Measurements**

**Revised rational experiential inventory (REI).** A five-point likert-type scale Revised Rational Experiential Inventory (REI) (Pacini & Epstein, 1999) was used to test the rationality and intuition level of entrepreneurs and non-entrepreneurs. REI includes four dimensions 1) rational ability (RA), which stands for the innate ability to have logical and analytical thinking styles; 2) rational engagement (RE), which refers to individuals’ intentional reliance on thinking logically and analytically; 3) intuitive/experiential ability (EA), which stands for the innate ability to have intuitive impressions and feelings; and 4) intuitive/experiential engagement (EE), which is individuals’ intentional reliance on making decisions based on feelings and intuitions (Pacini & Epstein, 1999). There are 10 items included in each dimension, including questions such as “Using logics usually works well for me in figuring out problems in my life” and “I enjoy intellectual challenges” for testing RA and RE, respectively; and questions such as “I trust my initial feelings about people” and “I often go by my instinct when deciding on a course of
action” for testing EA and EE, respectively. Participants score each question on a five-point scale, ranking from $1 = \text{totally disagree}$ to $5 = \text{totally agree}$. Both the rationality scale (rational ability and rational engagement) and the intuition scale (intuitive ability and intuitive engagement) have high reliability. Three studies were conducted for checking the reliability of the Revised REI test. The reliability coefficient scores for rationality were Cronbach’s $\alpha = .86, .88, .90$ and the reliability coefficient scores for intuition were Cronbach’s $\alpha = .91, .86, .87$ in the three studies (Witteman et al., 2009). Besides, half of the items are reversed coded in order to make sure that participants actually answer all the questions carefully.

**Kaufman domain of creativity scale (K-DOCS).** As for measuring creativity, Kaufman Domain of Creativity Scale (K-DOCS) (Kaufman, 2012) was applied and it was also a widely used five-point likert-type scale test that has confirmed reliability and validity. The measurement contains five different domains in creativity and correspondent questions were asked in each domain: 1) Everyday domain, such as “Finding something fun to do when I have no money”; 2) Scholarly domain, such as “Writing a letter to the editor”; 3) Performance domain, such as “Composing an original song”; 4) Mechanical domain, such as “Taking apart machines and figuring out how they work”; and 5) Artistic domain, such as “Making a sculpture or piece of pottery” (Kaufman, 2012). There are 10 items for each domain, except that there are 11 items for Everyday domain and 9 items for Artistic domain. Participants received a written instruction before starting the test and the instruction stated, “Compared to people of approximately your age and life experience, how creative would you rate yourself for each of the following acts? For acts that you have not specifically done, estimate your creative potential based on your performance on similar tasks”. After reading the instruction, participants score each question on a five-point scale, ranking from $1 = \text{much less creative}$ to $5 = \text{much more creative}$. Coefficient alpha reliabilities were tested in Kaufman’s (2012) study and there appeared to be sufficient internal consistency reliability, as $\alpha = .86, .86, .87, .86, .83$ for each of the domains, respectively. Besides, test-retest reliability was also confirmed, as the correlation coefficients.
were .80, .76, .86, .78, .81 for each of the domains, respectively (Kaufman, 2012).

**Procedures**

Recruitment was conducted through online platforms, such as Facebook, and local incubators for startups, which are organizations that provide resources for startups in order to speed up startups’ growth and increase the success rate for startups. Participants were tested individually through an online questionnaire that is administrated through Google Form and the surveys were completed at the participants’ choices of time and location. The stated aim for the participants was to “discover individuals’ thinking styles in every day life”. The survey started with asking demographic information such as gender and age; then followed with the rationality/intuition measurements (Revised REI) and the creativity measurements (K-DOCS). It takes averagely 15 to 20 minutes to finish the online survey. All the data collecting processes were confidential and anonymous. Besides, all the participation was voluntary and participants were permitted to withdraw at any time.

**Statistical Procedure**

In this study, data was analyzed through SPSS and independent variables (whether one is entrepreneur or not and gender) were coded (0 = Non-entrepreneur, 1 = Entrepreneur; and 0 = Female, 1 = Male) before running any analysis. Preliminary analyses, including descriptive and correlation statistics, were conducted at the very beginning in order to get an overall view of the data and to confirm that there was no violation of the assumptions of normality, linearity, and homoscedasticity. Besides, the correlation statistics revealed the strength and the direction of the relationship among the dependent variables, which are creativity, rationality and intuition. After the preliminary analyses, independent-sample t-test was used to explore how entrepreneurs and non-entrepreneurs and how females and males score on creativity, rationality, and intuition. Due to the fact that a significant gender difference was detected on intuition scores through the t-test, a two-way ANOVA was utilized after the t-test in order to get a deeper understanding on female and male’s difference on intuitive thinking.
Results

Descriptive and Correlation Statistics (Preliminary Analysis)

Descriptive statistical analysis was conducted at first in order to get an overall view of the collected data; and data screening was done before and after the descriptive analysis. Table 1(a) and table 1(b) report the means and the standard deviations for all the related variables, along with the numbers of the items in each scale. The independent variables for the present study are whether one is entrepreneur or not and gender, while the dependent variables contain creativity, rationality, and intuition. A t-test was conducted based on whether one is entrepreneur or not and gender. The t-test for gender differences only revealed that there is a significant difference existed in intuition scores for women (M = 69.34, SD = 12.36) and men (M = 64.99, SD = 11.82; t(172) = 2.33, p = .01, one-tailed).

Correlation statistics was used to indicate the direction of the relationship between the dependent variables (creativity, rationality and intuition) and how strongly the dependent variables are related to each other. After running a correlation analysis with all the data included, the relationship between creativity (as measured by K-DOCS) and rationality (as measured by REI) was explored through Pearson correlation coefficient. There was a small, positive and significant relationship between creativity and rationality, r = 0.23, n = 174, p < .01, with high creativity associated with high rationality. A correlation analysis was also run based on whether one is entrepreneur or not, the results showed that the correlation between total creativity and total rationality for non-entrepreneurs was r = .22, while for entrepreneurs, there was no significant correlation (r = .16). Besides, a correlation analysis was conducted based on gender differences and the results showed that the correlation between total creativity and total rationality for males was r = .30, which is significant, while for females, there was no significant correlation (r = .16).

Table 1(a)

Mean (M) and Standard Deviation (SD) for Entrepreneurs and Non-entrepreneurs of Different
**Genders**

<table>
<thead>
<tr>
<th>Items</th>
<th>M</th>
<th>SD</th>
<th>M</th>
<th>SD</th>
<th>M</th>
<th>SD</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creativity</td>
<td>160.97</td>
<td>24.02</td>
<td>176.08</td>
<td>27.77</td>
<td>156.83</td>
<td>24.56</td>
<td>146.83</td>
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</tr>
<tr>
<td>Rationality</td>
<td>79.53</td>
<td>10.52</td>
<td>80.79</td>
<td>9.94</td>
<td>77.25</td>
<td>10.69</td>
<td>76.94</td>
<td>10.85</td>
</tr>
<tr>
<td>Intuition</td>
<td>73.47*</td>
<td>13.45</td>
<td>64.61</td>
<td>12.33</td>
<td>67.59</td>
<td>11.53</td>
<td>65.40</td>
<td>11.40</td>
</tr>
</tbody>
</table>

Note. *p < .05

Table 1(b)

**Mean (M) and Standard Deviation (SD) for All Participants in Different Groups**

<table>
<thead>
<tr>
<th>Items</th>
<th>M</th>
<th>SD</th>
<th>M</th>
<th>SD</th>
<th>M</th>
<th>SD</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creativity</td>
<td>158.06</td>
<td>24.37</td>
<td>162.05</td>
<td>29.38</td>
<td>169.41*</td>
<td>27.07</td>
<td>153.53</td>
<td>24.44</td>
</tr>
<tr>
<td>Rationality</td>
<td>77.93</td>
<td>10.64</td>
<td>78.95</td>
<td>10.50</td>
<td>80.24*</td>
<td>10.14</td>
<td>77.15</td>
<td>10.70</td>
</tr>
<tr>
<td>Intuition</td>
<td>69.34*</td>
<td>12.36</td>
<td>64.99</td>
<td>11.82</td>
<td>68.51</td>
<td>13.49</td>
<td>66.87</td>
<td>11.48</td>
</tr>
</tbody>
</table>

Note. *p < .05

**Hypotheses Testing**

As there were one categorical independent variable (entrepreneur or non-entrepreneurs) and three continuous dependent variables (creativity, rationality, and intuition) in the present study, an independent-sample t-test was used to explore whether entrepreneurs and non-entrepreneurs differ significantly in terms of creativity, rationality, and intuition scores. Eta squared was used to calculate the effect size. According to the guideline that was proposed by Cohen (1988, pp. 284–287), the eta squared value could be interpreted as: .01=small effect, .06=moderate effect, and .14=large effect.
There were significant differences between entrepreneurs ($M = 169.41$, $SD = 27.07$) and non-entrepreneurs ($M = 153.53$, $SD = 24.44$; $t(172) = -4.01$, $p = .00$, one-tailed) in creativity scores. And the magnitude of the differences in the means (mean difference = -15.89, 95% CI: -23.70 to -8.07) was large (Eta squared = .09). Therefore, hypothesis 1, entrepreneurs have higher creativity ability compared to non-entrepreneurs, was supported.

As for rationality, there was also significant difference detected between entrepreneurs ($M = 80.24$, $SD = 10.14$) and non-entrepreneurs ($M = 77.15$, $SD = 10.69$; $t(172) = -1.89$, $p = .03$, one-tailed). This means that entrepreneurs are more rational than non-entrepreneurs. Besides, it was found that the magnitude of the differences in the means (mean difference = -3.08, 95% CI: -6.30 to 0.13) was small (Eta squared = .02). As for intuition, the result showed that there was no significant difference in intuition scores for entrepreneurs ($M = 68.51$, $SD = 13.49$) and non-entrepreneurs ($M = 66.87$, $SD = 11.48$; $t(172) = -0.86$, $p = .20$, one-tailed). The magnitude of the intuition differences in the means (mean difference = -1.65, 95% CI: -5.42 to 2.13) was very small (Eta squared = .004).

Therefore, the results from the entrepreneurship-based $t$-test supported hypothesis 2, indicating that entrepreneurs had higher level of rationality compared to non-entrepreneurs. Besides, the results rejected hypothesis 3, suggesting that entrepreneurs did not have higher intuition compared to non-entrepreneurs.

**Gender Analysis On Intuition**

Other than running a $t$-test based on whether one is an entrepreneur or not, an independent-sample $t$-test was also conducted based on gender differences, with the same dependent variables, which were creativity, rationality, and intuition. Due to the significant gender difference that was detected on the intuition scores (details showed in the preliminary analysis section), we wondered whether there would be an “interaction effect” (gender $\times$ entrepreneurship) on the intuition scores. Therefore, a two-way between-groups analysis of variance (two-way ANOVA) was used to further explore the impact of gender $\times$
entrepreneurship on intuitive thinking. The interaction effect between gender and entrepreneurship was not statistically significant, $F(1, 170) = 3.01, p = .09$. However, there was a weak interaction tendency, which meant that females who were entrepreneurial tended to use more intuitive thinking compared to males who were entrepreneurial.

Other than the weak interaction effect, it was found that there was a statistically significant main effect for gender when considering intuition, $F(1, 170) = 8.25, p = .005$, though the effect size was small (partial eta squared = .046). However, the main effect on intuition scores for entrepreneurs and non-entrepreneurs, $F(1, 170) = 1.74, p = .19$, did not reach statistical significance. This finding is correspondent with the $t$-test above.

**Discussion**

The aim of the present study was to explore whether entrepreneurs differed from non-entrepreneurs on creative, rational and intuitive thinking. Regarding creativity, it was hypothesized that entrepreneurs had higher creative ability compared to non-entrepreneurs (H1) and the findings support this hypothesis. The result was expected as creativity has always been considered as the “lifeblood” of successful entrepreneurship (Ward, 2004). Besides, multiple studies have been conducted on entrepreneurial populations with various measurements and there have been similar findings. For example, Mark and Todd’s (2015) study on student entrepreneurs used the Creative Achievement Quotient (CAQ) and found that students who had entrepreneurial experience had significantly higher CAQs. In addition, a comparative study at the University of Brasov studied entrepreneurial students at two different time points (2009 and 2013) and confirmed that entrepreneurs tended to continuously excel in creative ability (Lupsa-Tataru, 2014). The relationship between entrepreneurship and creativity has also been studied in general populations. For example, a country-level study conducted on European citizens indicated that being creative is a source of recognizing entrepreneurial opportunities (Audretsch & Belitski, 2013). The findings indirectly explained why entrepreneurs tended to be more creative than non-entrepreneurs. Besides, a gender-based study by Ronda, Shruti and
Gwendolyn (2016) stated that the direct and positive relationship between creativity and entrepreneurship existed in both female and male populations. It is difficult to evaluate whether being entrepreneurial makes people creative or creative people are more likely to become entrepreneurs; however, the present study, along with other existing studies, confirms that creativity plays an important role in entrepreneurship and entrepreneurs have more outstanding creative abilities compared to non-entrepreneurs.

Regarding rationality, it was hypothesized that entrepreneurs would have higher rational ability compared to non-entrepreneurs (H2). The finding from our study supported this hypothesis. Previous studies on rationality and entrepreneurship have come to controversial results. On the one hand, there is evidence showing that entrepreneurs are supposed to be more rational than non-entrepreneurs. For example, Arend (2016) found in his experimental research that entrepreneurs were better at breaking rules in a rational way compared to non-entrepreneurs. Moreover, Joef and Jean’s (2010) study elaborated the fact that entrepreneurs largely used analogical reasoning when creating and running novel ventures in order to receive support from stakeholders. On the other hand, some researchers state that the relationship between rationality and entrepreneurship is unclear. For example, YunXia Zhu (2015) conducted a study on Chinese entrepreneurs and found that emotions, which are a main component of intuition, play a fundamental role in making entrepreneurial decisions. Entrepreneurs have to balance their emotions and rationality holistically in their everyday business practices. However, there is no evidence showing that entrepreneurs are good at either managing emotional/intuitive or rational thinking in that study. We predict that the reasons why some researchers found significant associations between rationality and entrepreneurship while some did not is due to the selection of participants. It is possible that outstanding rational ability can only be attributed to certain types of entrepreneurs, such as experienced and long-term entrepreneurs as experienced entrepreneurs have learned from past experience in order to increase the chances of making rational decisions (Bingham & Eisenhardt, 2011; DeCanio, 1979).
Regarding intuition, it was hypothesized that entrepreneurs would have higher intuition scores compared to non-entrepreneurs (H3). Besides, a question was raised to examine whether female entrepreneurs were better at intuitive thinking compared to male entrepreneurs. The finding from the present study did not support H3, but a tendency was found that (entrepreneurial) women are more likely to be intuitive compared to (entrepreneurial) men.

Studies on intuition and entrepreneurship are relatively new and only few researchers have studied how intuition impacts entrepreneurship (mainly published after 2008). The lack of academic production may be due to the fact that intuition is a vague concept that is hard to measure and because intuition works in unconscious ways that have no precise way to describe or to measure. Despite of the vagueness of the concept, some of the previous studies did provide support to help predict the relationship between intuition and entrepreneurship. For example, Dutta and Crossan (2005) stated in their study that intuition plays an essential role in entrepreneurial practices. More specifically, intuition is an imperative reason for entrepreneurial achievements (Mitchell et al., 2002) and the entrepreneurial intuition influences entrepreneurs’ thinking processes and consequently impacts entrepreneurs’ actions (Fox, 1981; Lewis & Leyser, 2002). In addition, Dew and his colleagues (2009) found that both novice and expert entrepreneurs were inclined to use intuition when making decisions. These studies all stated the important role of intuition in entrepreneurship, however, there were no clear finding stating that entrepreneurs were better than non-entrepreneurs at intuitive thinking. Besides, it was noticed that, unlike this present study, most of the existing literature did not take gender differences into consideration. This could cause misleading findings as individuals’ levels of intuitive thinking were significantly related to gender difference and it was widely agreed upon that women tended to use more intuitive thinking while men preferred to engage in more rational thinking (Hayes et al., 2004; Hodgkinson & Sadler-Smith, 2003).

Implication

The results suggest that, compared to non-entrepreneurs, entrepreneurs do not excel in their
intuitive thinking, though entrepreneurs do perform better in rational and creative thinking. Nowadays, organizations are putting great emphasis on gaining entrepreneurial talents. These talents can also be called intrapreneurs, which are the entrepreneurial employees who work in established organizations (Antoncic & Hisrich, 2003). The present study provides a new understanding of entrepreneurs’ thinking styles, which may help organizations to better predict entrepreneurs or intrapreneurs’ performance and locate appropriate talents for the right position. For example, organizations could predict that entrepreneurial employees might have more novel ideas. This would enable them to build teams including entrepreneurs so that creative thinking is a part of all teams.

Besides, the findings in the present research could also provide practical suggestions for organizations when designing training programs for potential and existing entrepreneurs or intrapreneurs, because research showed that entrepreneurship, or intrapreneurship can be taught and trained (Katz, 2007). For example, organizations could pay more attention to training their entrepreneurial employees to be more rational as rationality plays a significant role on turning a creative idea into a profitable business; and have a better control on their intuition abilities as intuition contributes greatly on generating creative ideas.

Furthermore, the present research contributes to the current entrepreneurship-related literature pool. There has not been any research that has cumulatively studied entrepreneurs’ creativity, rationality and intuition. Despite its shortcomings, our study opened a new door for the entrepreneurship-related research field.

Limitations and Further Research Suggestions

The present study has three main limitations. First, the research was conducted on a general population instead of separately studying entrepreneurs from different stages of the entrepreneurship process, such as early/novice, middle/developing, and late/expert stages of entrepreneurship. This choice of study population may have biased the results as entrepreneurs in different stages might think and behave differently (Klonek, Isidor, & Kauffeld, 2015); also,
more creative thinking is needed at the early stage of entrepreneurship and more rational and stable thinking is required for the later business part, such as handling sales and supply chain (Johnson, Danis, & Dollinger, 2008). Second, the control group could have been more specific. Non-entrepreneurs from the general population were chosen as the control group. Although we tried to generalize the participating population for the control group as much as possible, the numbers of participants still leaned to be mainly people aged 18 to 35 years old and with high educational background. This may have biased the results for the intuition and rationality tests as age matters in developing rational and intuitive thinking (Sladek et al., 2010); and education helps the development of reasoning (Phillips, Dearden, Hirst, & Peters, 1976, p. 64). Third, we did not categorize entrepreneurs according to their performances in the field, which may have influenced the results as entrepreneurs’ thinking styles were related to their performances and achievements. For example, research found that rationality played a moderating effect between entrepreneurship and improved performance (Deligianni, Dimitratos, Petrou, & Aharoni, 2015). Therefore, the results might be different if we had only recruited high performers or successful entrepreneurs. Other than the three main limitations, it should also be noted that recruitment and measurement could be improved. Recruitment was conducted through an online survey, which did not allow to control the participants’ environments. Besides, experimental measurements could have lead to more ideal findings than self-report questionnaires for measuring thinking styles, especially for testing the creativity level. Also, forced-choices self-report questionnaires have been criticized by researchers (Cornwell & Dunlap, 1994) for their impact on leading to false disparities among scales.

Future research should choose to study entrepreneurs in a specific stage and compare their thinking styles regarding creativity, rationality, and intuition to entrepreneurs in different stages or to another specific population. Some suggested populations for control group includes artists, as they regularly access their creative and intuitive thinking when producing art works (Chin, 2013), writers, as they seem to greatly utilize logical thinking in their original works (Kellogg,
1999), or marketers, as they should be able to switch among intuitive, creative and rational thinking in order to meet the needs of dynamic markets (Dickson, 1992). It is also recommended to take culture into consideration as cultural environment could largely influence individuals’ thinking styles. For example, Germans have been found to avoid uncertainty and think in a linear way whereas Asians tend to think in a more holistic way (Lonner, Berry, & Hofstede, 1980) and may tend to put harmony in front of rationality.

**Conclusion**

In this research, entrepreneurs were compared to non-entrepreneurs on their thinking styles regarding creativity, rationality, and intuition. The findings revealed that entrepreneurs had significantly higher creative and rational abilities than non-entrepreneurs. Besides, female (entrepreneurs) tended to use more intuitive thinking than male (entrepreneurs) though the difference was not significant. As the present findings do not completely correspondent with previous findings, future studies are needed to confirm the patterns of entrepreneurs’ thinking styles. Besides, as this is a relatively new topic for entrepreneurship, it is hoped that this research provides a fundamental insight for further exploring how entrepreneurs rank on creativity, rationality, and intuition, and furthermore, on how entrepreneurs balance creative, rational, and intuitive thinking.
References


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