Entrepreneurs’ Cognition and Entrepreneurial Opportunity:

Does Affect Matter?

Thesis

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Abstract

This study examined that the role of entrepreneurs’ different cognitive styles in pursuing entrepreneurial opportunities. In addition, the present study investigated the impact of affect as a potential moderator of the relationships between cognitive styles and opportunities. Based on data from undergraduate students, this study found that entrepreneurs’ cognitive preference for intuitive and analytic styles has positive influences on two types of opportunities, creation and discovery, respectively. Furthermore, this study found that affect moderated the relationship between entrepreneurs’ cognitive styles and opportunities. When entrepreneurs with intuitive cognitive style pursue opportunities, positive affect at the moment strengthened this relationship. When entrepreneurs with analytic cognitive style pursue opportunities, negative affect at the moment moderated this relationship. Implications are discussed and directions for future research are provided.
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Fields of Study

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Entrepreneurs’ Cognition and Entrepreneurial Opportunity: Does Affect Matter?

Many entrepreneurial researchers have examined the origin and process of entrepreneurial opportunities (Alvarez & Barney, 2007; Casson, 1982; Shane, 2000). They have emphasized the role of individuals’ characteristics in the entrepreneurial process. For example, entrepreneurs are distinguished from non-entrepreneurs (e.g. managers) with respect to cognition such as the use of biases and heuristics (Busenitz & Barney, 1997) and different cognitive styles (e.g., Allinson, Chell, Hayes, 2000; Baron, 1998; Allinson & Hayes, 1996). However, a question which has not been examined is whether all entrepreneurs share the same characteristics. Do entrepreneurs differ from each other?

Since entrepreneurial opportunities are pursued by specific entrepreneurs, the characteristics of entrepreneurs could determine these opportunities (Shane & Venkataraman, 2000). Individual differences of entrepreneurs could explain the reason why they differently pursue and behave towards entrepreneurial opportunities (Zahra, Korri, & Yu, 2004). In particular, entrepreneurs can be different from each other in terms of cognitive factors such as their approach to information processing in the pursuit of opportunities. Recently, Alvarez and Barney (2007) suggested two perspectives of an
entrepreneurial opportunity, discovery and creation. The discovery view assumes that opportunities are already pre-existing, and those opportunities are discovered by “alert” entrepreneurs (Shane, 2003). On the other hand, the creation view assumes that opportunities do not exist until they are enacted by entrepreneurs, and any differences that are seen are as a result of the enactment pieces (Aldrich & Kenworthy, 1999). However, these differentiations between discovery and creation might also lead researchers to wonder if there are different cognitive processes between entrepreneurs. In other words, different cognitive styles of an entrepreneur might explain why some entrepreneurs tend to discover opportunities whereas others are likely to create opportunities.

However, what makes entrepreneurs use a certain cognitive approach in forming opportunities? Studies on the relationship between cognition and affect (e.g., Bower, 1991; Erez & Isen, 2002; Mackie & Worth, 1989) provide a useful ground for understanding the effect of cognitive style on the choice of opportunities. The neurobiological perspective argues that cognition could interact with affect within the brain of an individual (Cohen, 2005). When people make decisions or solve problems, they could be influenced by the interaction between cognition and affect in complex ways. Specifically, Bower (1991) found that affect influences the perception of an individual, so that people experiencing positive affect (PA) are more likely to perceive aspects around themselves more favorably than people experiencing negative affect (NA). Thus, the PA or NA of an entrepreneur may influence the relationship between cognition and the pursuit of opportunities. However, only Baron (2008) has suggested, in a theoretical paper, that a study on the interaction between the cognition and the affect of
entrepreneurs on opportunities should be pursued. It is, therefore, necessary to examine how affect may either strengthen or weaken the relationship between cognitive styles of entrepreneurs and entrepreneurial opportunities.

The purpose of this study is to examine the role of these different cognition styles, intuitive and analytic, of entrepreneurs and moderating impact of affect, PA and NA, in the entrepreneurial process. First, this study investigates the entrepreneurs’ cognitive styles as a factor which leads entrepreneurs to pursue different opportunities. Second, this study examines whether the affect of entrepreneurs will moderate the relationship between cognitive styles and opportunities pursued by entrepreneurs. By examining these purposes, this study can contribute to the entrepreneurship literature. Theoretically, this study can contribute to entrepreneur research by distinguishing different cognitive styles determined a certain type of opportunity and by suggesting affect as a new condition in the entrepreneurial process. From a practical perspective, this study would enable managers to know how entrepreneurial opportunities can be formed, so that the managers can improve their understanding of entrepreneurs’ characteristics.

This study is organized as follows: the next section discusses two cognitive styles of entrepreneurs, intuitive and analytic cognitive styles, and two perspectives of an entrepreneurial opportunity, discovery and creation. This study then argues the characteristics of affect, and the relationship between two dimensions of affect, PA and NA as moderators of who might pursue two different opportunities. Next, this study describes and provides the results of an empirical test of these hypotheses. The last section contains conclusions and implications for research and practice.
THEORIES AND HYPOTHESES

The cognitive style of entrepreneurs

Entrepreneurial cognition refers to “the knowledge structures that people use to make assessments, judgments, or decisions involving opportunity evaluation, venture creation, and growth” (Mitchell, Busenitz, Lant, McDougall, Morse, & Smith, 2002, p.97). There have been many studies on the importance of entrepreneurs’ cognition in the entrepreneurial process (e.g., Hayes & Allinson, 1998; Allinson, Chell, & Hayes, 2000; Baron, 1998, 2002; Baron & Ward, 2004; Kickul, Gundry, Barbosa, & Whitcanack, 2009). For example, Baron and Ward (2004) argued that cognitive mechanisms can have a critical role in all aspects by which people think, say, and act. In particular, entrepreneurs’ knowledge, susceptibility to cognitive bias, and the use of cognitive strategies have a significant influence on pursued opportunities (Baron, 2002). Since the cognitive mechanism includes the ways that people collect, organize, scrutinize, interpret, and integrate information (Allinson & Hayes, 1996), cognitive styles of an entrepreneur are a critical determinant in understanding entrepreneurs’ decision-making and behaviors.

According to Allinson, Chell, and Hayes (2000), cognitive style is defined as “preferred approach to information processing” (p.31) or “the way of thinking about and processing vital information upon which decisions are made” (p.32). Allinson and Hayes (1996) suggested two types of cognitive styles, intuition and analysis. Intuitive cognitive style is the approach of processing information quickly and effortlessly based on the global perspective of an individual. Thus, people who prefer intuitive cognitive style are more likely to be nonconformist, use open-ended ways of problem-solving, and depend
on holistic, synthetic, lateral, and relational manners of thinking. On the contrary, analytic cognitive style is the approach to information processing in a systematic and sequential manner. People who prefer analytic cognitive style tend to be conformist, use a structured approach to problem-solving, and employ careful, deductive, rigorous, convergent, and critical reasoning.

Although a great deal of attention has been devoted to entrepreneurs’ cognition, the empirical results are mixed. One research stream on the role of entrepreneurs’ cognition shows that entrepreneurs who prefer an intuitive style are more successful in pursuing opportunities than those who prefer an analytic style. Allinson, Chell, and Hayes (2000) found that entrepreneurs who prefer the intuitive cognitive style have greater success in pursuing opportunities because they face uncertain environments where there is little direct information, a high level of ambiguity, complexity, and time pressure. When entrepreneurs have information which is unfamiliar, incomplete, indirect, and unorganized, they might not thoroughly analyze the information, and thus might pursue opportunities using verbal and nonverbal cues or signals from information which is integrated in synthetic and lateral thinking (Olson, 1985). Thus, these studies argued that intuitive cognitive style could be more useful in forming opportunities. These opportunities resulting from an intuitive cognitive style could often be new and seemingly unrelated to other opportunities.

On the other hand, other studies have reported that entrepreneurs tend to process information in an analytic manner. Baron (2002) argued that both of cognitive styles are important for entrepreneurs, and thus successful entrepreneurs are more adept at changing
their cognitive styles depending on the situation. He pointed out the role of cognitive styles in the two different stages of new venture creation, the formation and the exploitation of opportunities. While an intuitive cognitive style may be more helpful for exploitation of opportunities, an analytic cognitive style may be more useful for formation of opportunities. Specifically, when entrepreneurs form new opportunities with respect to products or services, the analytic cognitive style is more helpful because they have to carefully search situations or markets and analyze information and data. Furthermore, Olson (1985) also contended that both cognitive styles are critical, and emphasized the role of an analytic cognitive style in the assessment and evaluation of the information and potential demand of opportunities and existing markets.

The existence of these mixed results of opportunities pursued suggests that there is a need for better theory to explicate the conditions under which particular cognitive styles have more or less positive effects on opportunities. This study proposes that these mixed results might result from different characteristics of opportunities. Studies on entrepreneurial opportunities do not distinguish between two types of opportunities, and they assumed opportunities as one which are not distinct. However, Alvarez and Barney (2007) classified opportunities into two types, discovery and creation. Discovery opportunities are already in existing markets, and thus the information about opportunity would be accessible to all potential entrepreneurs. On the other hand, creation opportunities do not exist in existing markets, so entrepreneurs enact them. Using the classification of Alvarez and Barney (2007), this study could discuss that while studies emphasized the role of intuitive cognitive style of entrepreneurs have focused on creation opportunity, studies suggested the importance of analytic cognitive style have focused on
discovery opportunity. Since two types of opportunities could require different abilities and skills of entrepreneurs, it is necessary to investigate the relationship between cognition and opportunities with respect to both discovery and creation perspectives.

*The effect of cognitive style on opportunities pursued*

As discussed, certain cognitive styles of an entrepreneur can play a critical role in the two different views of entrepreneurship (Allinson, Chell, & Hayes, 2000; Baron, 1998; Busenitz & Barney, 1997; Shane, 2000; Shane & Venkataraman, 2000). Alvarez and Barney (2007) argued that entrepreneurial opportunities are formed and exploited in terms of creation and discovery perspectives. When entrepreneurs form opportunities which do not have clear outcomes, the intuitive cognitive style of an entrepreneur can be critical because creation opportunities begin as perceptions by cognition of entrepreneurs rather than specific information (Aldrich & Kenworthy, 1999). The creation perspective assumes that entrepreneurial opportunities are not typically in pre-existing markets, instead these opportunities are enacted by the entrepreneurs (Aldrich & Kenworthy, 1999; Alvarez & Barney, 2007; Santos & Eisenhardt, 2009). In contrast to discovery opportunities, direct and relevant information for opportunities does not exist in the creation process (Alvarez & Barney, 2007). Thus, in the creation process where there is a high-level of uncertainty, incomplete data, and indirect information, entrepreneurs potentially rely on their intuition and curiosity rather than the analysis of information (Allinson, Chell, & Hayes, 2000).

Bird (1988) pointed out the importance of the intuition approach to information processing in entrepreneurial actions. She found that the intuition approach to
information processing encourages entrepreneurs to synthesize indirect information and gain broad perspectives to untapped resources. Even in the contexts of incomplete data and indirect information there may be cues which trigger new paths that might lead to new opportunities. In doing so, possible paths are provided by entrepreneurs’ perceptions, and then entrepreneurs enact, observe, adjust, and react as they socially construct realities until they form opportunities (Alvarez & Barney, 2010; Baker & Nelson, 2005). Therefore, the pursuit of creation opportunities would be more influenced by the intuitive cognitive style of entrepreneurs than by the analytic cognitive style of them.

Hypothesis 1A. Entrepreneurs who tend towards intuitive cognitive style will be more likely to pursue opportunities that do not have clear outcomes than those who tend towards analytic cognitive style.

On the other hand, studies on discovery opportunities have argued that a market already exists and is not perfect, so that exogenous factors such as environment changes can influence the formation of entrepreneurial opportunities (Shane, 2000). From this perspective, opportunities tend to be objective phenomena in well-structured markets, so that entrepreneurs can access knowledge and information of structure, products, and outcomes about opportunities.

Shane (2000) emphasized the role of search and recognition for entrepreneurs in discovering opportunities. Several studies have suggested that certain cognitive styles of an individual can make some individuals more ‘alert’ to the existence of opportunities (Carolis & Saparito, 2006; Shane, 2003) because cognitive styles have an impact on entrepreneurs’ interpretation and actions such as searching behaviors towards information and data. Specifically, individuals who prefer analytic cognitive style are more likely to
focus on detail, favor a structured way to problem-solving (Allinson & Hayes, 1996), and thus may tend to find gaps between pieces of information. Similarly, in order to discover opportunities in existing markets, it is more important for entrepreneurs to have careful, rigorous, and critical thinking abilities to process information which they already have and they obtain than to have a strong propensity for exploring, impulsive synthesis, and lateral reasoning. In addition, when entrepreneurs process information to discover opportunities, analytic thinking abilities and skills are helpful because search and recognition of opportunities are developed by the evaluation and assessment of opportunities in existing markets such as potential demand of opportunities. Therefore, entrepreneurs with an analytic cognitive style tend to find information related to entrepreneurial opportunities by searching or trying to find the benefit of new information by recognition. Given that entrepreneurs may consider their own information and information obtained into new ways in the process of discovery opportunities, those with analytic cognitive style can be more influential than those with intuitive cognitive style.

Hypothesis 1B. Entrepreneurs who tend towards analytic cognitive style will more likely to pursue opportunities that have anticipated outcomes than those who tend towards intuitive cognitive style.

The moderating impact of affect in the relationship between cognitive style and opportunities

Although many studies have examined the role of entrepreneurs’ cognition in entrepreneurial process such as the pursuit and exploitation of opportunities, the impact of entrepreneurs’ affect has not been studied as much. Previous studies have found a close
relationship between cognition and affect (Fiedler, 1991; Fogas, 1995; Oaksford et al, 1996). Affect interacts with thought when making a decision (Oaksford et al, 1996). When people interpret data and information and make a decision, they use two mechanisms in the brain: cognition (i.e., reason) and affect (Cohen, 2005). The more intense affect people experience, the more their cognition can be distorted (Oaksford et al, 1996). Furthermore, the affect infusion model asserted that affective cues and information have an impact on the cognitive and behavioral process of an individual (Forgas & George, 2001). The impacts of affect infusion can be different depending on the contents and characteristics of tasks. When people perform tasks which need open and constructive thinking (Forgas, 1995; Forgas et al, 1984) and form new pattern or response (Read, Vanman, & Miller, 1997), affect can readily influence cognition. Thus, people could tend to engage in a particular perception or decision making behavior associated with affect they feel (Fiedler, 1991; Fogas, 1995).

Considering the consistency of these findings in the prior studies, it seems likely that opportunities pursued by entrepreneurs may be influenced by the interaction between cognition and affect they experience. Baron (2008) pointed out the importance of entrepreneurs’ affect in the entrepreneurial process. One of the reasons for this is that entrepreneurial processes include cognitive events of entrepreneurs such as recognition, perception, and social construction of opportunities. When entrepreneurs discover opportunities, they may not only interpret their information and knowledge about opportunities, but also try to obtain new information and data through search and recognition. When entrepreneurs create entrepreneurial opportunities, they may use their intuition based on disparate and broad information and knowledge which they already
have. That is, in order to form opportunities, entrepreneurs tend to use their information and knowledge which they have acquired. Thus, when entrepreneurs process the information and knowledge, particular affect can have a critical role in facilitating and triggering to use particular information and knowledge consistent with current affect (Forgas & George, 2001). Furthermore, when environments are rapidly changeable and unpredictable, affect can be regarded as proximal causes of affective reactions (Forgas, 1995, 2000; Forgas & George, 2001). In entrepreneurial settings, opportunities are formed in situations with a high-level of uncertainty, complexity, and unpredictability because these entrepreneurs discover or create new and marketable opportunities (e.g., Alvarez & Barney, 2007; Shane, 2003). In particular, when entrepreneurs create opportunities, they have indirect, ambiguous, and indeterminate information. Therefore, affect can strongly exert an influence in the entrepreneurial process. Given these characteristics of entrepreneurship, affect can strengthen or weaken the relationship between entrepreneurs’ cognitive style and the opportunities pursued.

**Affect**

An individual’s state affect is defined as shifts in current moods produced by external events (Watson, et al., 1988). State affect is provoked in a specific context, and is a shorter-term reaction which is subject to a greater extent of fluctuation than affect as trait (Tellegen, 1985). This study focuses on affect as state because state affect is likely to be more associated with entrepreneurs’ cognitive process than trait affect. Affective events under a high-level of uncertainty can be regarded as proximal causes of affective reactions (Baron, 2008; Weiss & Cropanzano, 1996). Weiss and Cropanzano (1996)
suggested that “Things happen to people in work settings and people often react emotionally to these events. These affective experiences have direct influences on behaviors and attitudes. (p.11)” In entrepreneurial contexts, when entrepreneurs pursue opportunities, they experience new events and face highly uncertain and unpredictable environments (Santos & Eisenhardt, 2009). Different kinds of events which entrepreneurs experience can make them happy or nervous at that moment, and thus this affect can directly impact on the pursuing behaviors of opportunities of entrepreneurs. In addition, prior research reported that the effects of personality and trait such as Big Five personality and affectivity are relatively weak or these traits have indirect effects (e.g., Barrick & Mount, 1991; Baum & Locke, 2004). Therefore, affect at the moment could be more influential in pursuing opportunities than trait affect.

Previous research has shown that there are two dimensions of affective state: PA and NA. PA is the degree to which a person experiences high in enthusiasm, energy, mental alertness, and determination (Watson & Tellegen, 1985; Watson et al., 1988), while NA is the extent to which one feels subjective distress, such as irritability, anxiety, or nervousness (Watson & Clark, 1984). Specifically, whereas high PA is characterized by enthusiasm, energy, mental alertness, and determination, low PA is characterized by drowsy and sluggish. Thus, individuals experiencing high PA are self-confident and energetic and perceive the world positively. On the other hand, high NA is a general dimension of subjective distress and unpleasurable engagement that subsumes a variety of aversive mood states, including anger, contempt, disgust, guilt, fear, and nervousness, with low NA being a state of calmness and serenity (George & Brief, 1996; Watson & Tellegen, 1985; Watson, et al., 1988). PA and NA have been shown to be largely
independent dimensions which operate according to different cognitive processes and associate with different types of determinants and consequences (Diener & Emmons, 1985; Fredrickson, 1998; Watson & Clark, 1984; Watson et al., 1988). In particular, psychology scholars found the different effects of PA and NA on cognitive styles when individuals process information. Whereas PA might be related to heuristic information processing and encourage creativity and flexibility, NA might be associated with systematic information processing, and prompt accuracy in cognitive processes (Clore, Schwarz, & Conway, 1994; Staw & Barsade, 1993). Consistent with this reasoning, these different characteristics of PA and NA can play different roles in the relationship between entrepreneurs’ cognitive style and opportunities that entrepreneurs may pursue.

Positive affect and opportunities

Since individuals experiencing PA try to maintain their positive state, they tend to evaluate their job or the world positively (Isen & Simmonds, 1978; Isen & Levin, 1972). Individuals experiencing PA perceive that everything or their environment is not problematic, so they do not need to other specific information about their environments. They are likely to feel confident about general knowledge structures which they already have, and when they process information, they tend to use general knowledge structures which might be applied to their situations. In addition, Fredrickson (1998, 2001) suggested a broaden-and-build theory of PA. From this perspective, PA broadens thought-action repertories of people and builds their enduring social resources (Rhee, 2007). PA at the moment extends the self in the process, creates the desire to appreciate current life environments, and integrates these environments into new perspectives of self
and of the world. Whereas PA can encourage a wider range of cognition and attention resources (Isen, 1990; Aspinwall, 1998, 2001; Fredrickson & Joiner, 2002), PA is not motivated for individuals to use analytic reasoning (Isen, Daubman, & Nowicki, 1987; Wegener, Petty, & Smith, 1995). Thus, individuals experiencing PA tend to exceed the given information or data, and sometimes generate new idea, information, and inferences (Fiedler, 1990).

Consistent with this reasoning, when entrepreneurs process information and knowledge related to opportunities they are pursuing, those experiencing PA tend to use their general knowledge structures than specific and given data. As discussed, when entrepreneurs create new opportunities, their intuitive cognitive style could be more useful to process information for creation opportunities. They do not have all relevant data, information, and knowledge, so that they depend more on their intuition (Alvarez & Barney, 2007). Entrepreneurs who prefer an intuitive cognitive style tend to integrate and synthesize incomplete, unorganized, and unrelated information. They could obtain cues or signals from this process, and thus these cues and signals might lead to the formation of new ideas or opportunities (Olson, 1985). In this process, when entrepreneurs form opportunities, PA can motivate those with intuitive cognitive style to rely more on their general knowledge and internally generated information which they possess at the moment rather than more careful information processing such as gathering other information. Or PA can motivate entrepreneurs with intuitive cognitive style to broaden their scope, to diffuse their attention, and to integrate their environments. Therefore, when entrepreneurs pursue opportunities that do not have clear outcomes, PA could
intensify the relationship between intuitive cognitive style and creation opportunities that entrepreneurs may pursue.

Conversely, when entrepreneurs discover new opportunities, those with analytic cognitive style could be more successful than those with intuitive cognitive style. In the discovery view, entrepreneurs use information and knowledge which they already have and actively try to obtain from other sources (Alvarez & Barney, 2007; Shane, 2000). Therefore, in order to pursue opportunities, the searching behaviors and careful reasoning are important. Entrepreneurs who prefer analytic cognitive style are encouraged to process information and knowledge in logical and critical manner. However, since individuals experiencing PA perceive the world favorably, it is not necessary to gather other information and specific data (Bohner et al, 1992; Makie & Worth, 1989; Schwarz, 1990). They are less likely to put their effort in search other information, and tend to use their general knowledge structures. As a result, PA might interrupt the analytic reasoning which needs an activation and use of previous knowledge structures (Isen, Daubman, & Nowicki, 1987; Wegener, Petty, & Smith, 1995). Thus, when entrepreneurs pursue opportunities that have anticipated outcomes, PA could negatively influence the positive relationship between analytic cognitive style and discovery opportunities that entrepreneurs may pursue.

Hypothesis 2A. Positive affect moderates the relationship between entrepreneurs’ intuitive cognitive style and opportunities, such that the positive effects of intuitive cognitive style on the pursuit of opportunities that do not have clear outcomes will be stronger for entrepreneurs experiencing high positive affect than for those experiencing low positive affect.

Hypothesis 2B. Positive affect moderates the relationship between entrepreneurs’ analytic cognitive style and opportunities, such that the positive effects of analytic
cognitive style on the pursuit of opportunities that have anticipated outcomes will be weaker for entrepreneurs experiencing high positive affect than for those experiencing low positive affect.

*Negative affect and opportunities*

NA describes the extent to which an individual experiences high levels of anxiety, fear, hostility, and anger (Waston & Clark, 1984). Individuals experiencing high NA have been found to focus on their negative aspects and those of the world around them (Watson & Pennebaker, 1989). They are more likely to regard their situations as potentially problematic situations, and to perceive ambiguous or threatening social information negatively. They may feel less confident about their general knowledge structures, and they are motivated to be opened to using any other information which is applicable to current situations over preexisting knowledge (Bies, Tripp, & Kramer, 1997). Thus, individuals experiencing NA often use more careful and extensive information processing. Specifically, they may scrutinize every social interaction for hidden meaning or sinister purpose, and have a heightened sensitivity to other information and knowledge, making them more likely to perceive information accurately compared with neutral moods (Bless & Schwarz, 1999; Clore et al, 1994; Forgas, 1995).

Similarly, when entrepreneurs interpret information and knowledge for formation of opportunities, those experiencing NA are more likely to use accurate and careful information processing than general knowledge structures they have. In a creation setting, entrepreneurs who prefer intuitive cognitive style are more likely pursue opportunities that do not have clear outcomes. That is, there are not relevant and direct information about creation opportunities in a current situation, so that they tend to depend on their
intuition or pieces of information. They try to synthesize and integrate the pieces of information and knowledge that is internally provided. However, individuals experiencing NA perceive their environments to be problematic, so they tend to be hypervigilant to information and collect specific and detail-oriented data from external sources (Bies, Tripp, & Kramer, 1997). Therefore, it could be not useful to rigorously search for other information and accurately process information in order to form opportunities that do not have clear consequences. When entrepreneurs try to process their general knowledge structures, NA which they are experiencing could decrease the use of general knowledge structures. Therefore, when entrepreneurs pursue opportunities with unknowable outcomes, NA could weaken the relationship between intuitive cognitive style and creation opportunities that entrepreneurs may pursue.

Conversely, when entrepreneurs form existing entrepreneurial opportunities, those with analytic cognitive style could be better equipped to pursue opportunities than those with intuitive cognitive style because analytic cognitive style could facilitate to process information in logical manner. Moreover, since entrepreneurs discover new opportunities in existing markets, they tend to use the data and information that they already have as well as them that are gathered from other sources, and are able to obtain sufficient data and information depending on their effort (e.g., Alvarez & Barney, 2007). Therefore, the search for new information could play an important role in discovering opportunities. Given the importance of search behaviors, entrepreneurs experiencing NA are more likely to pursue opportunities because they tend to find new information to solve problems in current unfavorable situations, and focus on the specific information at hand and externally provided information (Fiedler, 1990). In addition, individuals experiencing
NA might be less biased and avoid overestimating the possibility of problems (Bohner et al, 1992; Mackie & Worth, 1989; Sweeney, Anderson, & Bailey, 1986). Therefore, when entrepreneurs with analytic cognitive style discover existing entrepreneurial opportunities, those experiencing NA may be more likely to carefully interpret and analyze the data, information, and knowledge which are collected externally. Based on this reasoning, this study expects that when entrepreneurs with analytic cognitive style pursue opportunities that have clear outcomes, NA could positively influence the positive relationship between analytic cognitive style and discovery opportunities that entrepreneurs may pursue.

Hypothesis 3A. Negative affect moderates the relationship between entrepreneurs’ intuitive cognitive style and creation opportunities, such that the positive effects of intuitive cognitive style on the formation of opportunities that do not have clear outcomes will be weaker for entrepreneurs experiencing high negative affect than for those experiencing low negative affect.

Hypothesis 3B. Negative affect moderates the relationship between entrepreneurs’ analytic cognitive style and discovery opportunities, such that the positive effects of analytic cognitive style on the formation of opportunities that have clear outcomes will be stronger for entrepreneurs experiencing high negative affect than for those experiencing low negative affect.

The model of this study is shown in Figure 1. The present study uses this model to test the effect of entrepreneurs’ cognitive style on the pursuit of opportunities, and the moderating role of PA and NA in the relationship between entrepreneurs’ cognition and opportunities.

METHOD

Sample
Participants were students who were enrolled in entrepreneurship classes at a large university in Ohio, USA. Although some researchers have criticized the students sample in behavioral studies (Robinson, Huefner, & Hunt, 1991), many other researchers have used the sample of students in the studies on decision-making in business contexts (Khera & Benson, 1970; Remus, 1986). Galio and Katz (2001) argued that the sample using entrepreneurship students can be appropriate for opportunity studies because they can offer “reliable results about the cognitive processes of this theoretically narrow topic.” In particular, entrepreneurship classes (Entrepreneurship class and new venture creation class) where this study collected data focus on the creation of businesses, market opportunities, and entrepreneurial strategies, so this study could assume that students taking these classes have desires to pursue new opportunities and start new business. In addition, some empirical studies found reliable results from the sample of students in entrepreneurship research (e.g., Kickul et al., 2009; Shepderd & DeTienne, 2005). Therefore, this study argues that the sample of entrepreneurship students is appropriate for our research. Respondents consisted of 32 men (72.7%) and 12 women (27.3%), and the average age were 20.93 years (SD=2.06). In terms of grade at college, 2.3% of respondents were freshmen, 31.8% were sophomores, 22.7% were juniors, and 43.2% were seniors.

Measures

Cognitive style. Cognitive styles were measured with Cognitive Style Index (CSI) by Allinson and Hayes (1996). This scale includes two types of cognitive styles, intuition and analysis. This scale consists of 38 items, and participants were asked to indicate a
true, uncertain, and false response mode, (true coded as ‘2’, uncertain coded as ‘1’ and false coded as ‘0’). The score range is from 0 to 76. A score of zero reflects a very strong intuitive cognitive style and the score of 76 indicates a very strong analytic way of thinking. In order to clear comparison between two cognitive styles, this variable was coded as dummy (intuition coded as ‘0’ and analysis coded as ‘1’) based on a guideline of Allinson and Hayes (1996). The Cronbach’s alpha for cognitive style is .804.

Affect. Affect was measured with the highly reliable and valid Positive and Negative Affectivity Schedule (PANAS; Watson, Clark, & Tellegen, 1988). The PANAS contains twenty items of PA and NA (e.g., “excited” and “anxious”). Because this study focused on affect as a state (that is, relatively short-term fluctuations in mood) rather than trait affect (that is, long-term individual differences in affectivity), participants were asked to indicate to the extent to which they had felt this way right now, that is at the present moment on a scale ranging from 1, “very slightly or not at all,” to 5, “extremely.” When used with instructions for respondents to report how they feel over relatively short time periods such as right now or at the present moment, the PANAS assesses affect as a state rather than a trait (Watson, 2000; Watson et al., 1988). Responses to these items were averaged into the overall PA and NA score. The Cronbach’s alpha for PA is .895, and .858 is for NA.

Entrepreneurial opportunity. This study measured the preference of opportunities as discovery and creation opportunities. This study used two different types of scenarios to effectively manipulate the entrepreneurial opportunities, discovery and creation. For creation opportunities, this study developed the new scenario which includes general and
broad information in poultry industry. For discovery opportunities, this study used the scenario adopted from Shepderd & De'Tienne (2005), and it contains various specific comments from focus groups in footwear industry. Participants were asked to read those scenarios, and then to indicate the degree of attractiveness to invest on a scale ranging from 1, “very slightly or not at all,” to 10, “extremely attractive”, and reasons of their choice for each opportunity.

Controls. Respondents’ age, gender, and class were controlled in order to preclude the potential confound resulting from individual differences.

Analyses

To test the discriminant validity of measures which this study used in this study, this study conducted a CFA using AMOS. This study compared fit indexes of the five-factor model (cognitive style, PA, NA, discovery opportunity, and creation opportunity) and the three-factor model (cognitive style, affect, and pursuit of opportunity). The chi-square ($\chi^2$) test of the three models showed that the five-factor model ($\chi^2=55.60$, df=46, CFI=.94, TLI=.91, RMSEA=.07) yielded a better factor structure than did the three-factor model ($\chi^2=112.58$, df=51, CFI=.64, TLI=.45, RMSEA=.168; $\triangle \chi^2=56.98$, $\triangle$ df=5). This evidence indicated that the variables were distinct and should be examined separately (Browne & Cudeck, 1993; Hu & Bentler, 1999).

To test hypotheses, therefore, this study used a hierarchical regression. In a hierarchical regression, the control variables (age, gender, and class) were entered in step1, the independent variables (intuitive and analytic cognitive styles) were entered in
step 2, and then the interaction variables (PA and NA) were entered in step 3. In addition, prior to conducting interaction analyses, this study centered the variables at their grand means in order to reduce nonessential multicollinearity and facilitate the interpretation of results (Dawson & Richter, 2006).

RESULTS

Table 1 provides descriptive statistics and correlations among study variables. Table 2, 3, 4, and 5 show the results of hierarchical regression models for opportunities pursued. The interaction graphs are presented in Figure 2 and 3.

Hypothesis 1 proposed that entrepreneurs’ different cognitive style can influence different opportunities. Specifically, Hypothesis 1a suggested that entrepreneurs who prefer intuitive cognitive style are more associated with opportunities that have uncertain outcomes. Hypothesis 1b stated that entrepreneurs who prefer analytic cognitive style are more associated with opportunities that have anticipated outcomes. As shown in model 2, the relationships between entrepreneurs’ intuitive cognitive style and creation opportunities (β = -0.319, p < .05; β = -0.295, p < .10), and entrepreneurs’ analytic cognitive style and discovery opportunities (β = 0.430, p < .05; β = 0.415, p < .05) are both positively significant. Thus, the findings provide support for Hypothesis 1.

Hypothesis 2 stated that PA moderates the relationship between entrepreneurs’ cognitive style and entrepreneurial opportunities. First, Hypothesis 2a suggested that the positive effects of intuitive cognitive style on the formation of creation opportunities will be stronger for entrepreneurs experiencing high PA than for entrepreneurs experiencing
low PA. As shown in model 3 of Table 2, the interaction of PA with intuitive cognitive style had a significant effect on creation opportunities (β=-.750, p < .05). Figure 2 shows the relationship between entrepreneurs’ intuitive cognitive style and creation opportunities is more positive for those with high, as opposed to low, PA. Therefore, these results support Hypothesis 2a. Next, Hypothesis 2b proposed that the positive effects of analytic cognitive style on the formation of discovery opportunities will be weaker for entrepreneurs experiencing high PA than for entrepreneurs experiencing low PA. Table 3 shows that the moderating effect of PA in the relationship between analytic cognitive style and discovery opportunities is not significant (β=.272, p > .05). Thus, Hypothesis 2b is not supported.

Hypothesis 3 suggested that NA moderates the relationship between entrepreneurs’ cognitive style and opportunities pursued. First, Hypothesis 3a proposed that the positive effects of intuitive cognitive style on creation opportunities will be weaker for entrepreneurs experiencing high NA than for those experiencing low NA. As shown in model 3 of Table 4, the interaction of NA with intuitive cognitive style do not have a significant effect on creation opportunities (β=.146, p > .05). Thus, this finding does not provide support for Hypothesis 3a. Next, Hypothesis 3b noted that the positive effects of analytic cognitive style on the discovery opportunities will be stronger for entrepreneurs experiencing high NA than for those experiencing low NA. Table 5 shows the moderating effect of NA in the relationship between analytic cognitive style and discovery opportunities is significant (β=-.454, p < .05). In addition, the graph of the interaction (Figure 3) shows that the relationship between analytic cognitive style and
discovery opportunities is more positive for entrepreneurs experiencing high, as opposed to low, NA. Therefore, Hypothesis 3b is supported.

DISCUSSION

The results of the current study provide some insight into entrepreneurship research. The positive link between cognitive characteristics of individuals and opportunities has been well established in entrepreneurship literature. Our findings more specifically reveal that a certain cognitive style of entrepreneurs could lead to pursue a certain type of opportunity. Whereas entrepreneurs who prefer intuition more pursue creation opportunities, those who are more likely to use analysis tend to be more effective in pursuing discovery opportunities. Thus, this research presents how entrepreneurs differ in pursuing opportunities from other entrepreneurs with respect to cognitive style.

This study suggests that affect of entrepreneurs experiencing at the moment is a significant moderator of the relationship between cognition and opportunities. It is the first attempt to examine the models of cognition, affect, and opportunity in the entrepreneurial process. Our findings demonstrate that the strength of intuitive cognitive style on creation opportunities is more pronounced when entrepreneurs experience high PA than when they feel low PA. The effect of analytic cognitive style on discovery opportunities is more intensified when entrepreneur experience high NA than when they feel low NA. These results may be attributable to the fit effect between entrepreneurs’ cognition and affect. Fit is defined as the compatibility between characteristics of two entities (Kristof, 1996). A high-level of supplementary fit could be reflecting congruence between two specific features. Traditional fit research found that similarity between two
characteristics would enhance perceptions or attitudes of an individual (e.g., Cable & Judge, 1996). Consistent to this reasoning, the relationship between intuitive cognitive style (or analytic) and PA (or NA) of entrepreneurs can be regarded as supplementary fit with respect to information processing. When entrepreneurs who prefer intuition process information, PA can encourage them to think in a broad and holistic manner and integrate themselves into their environment. NA also prompts to focus on details of information and to think in a careful and rigorous manner. Therefore, PA and NA could moderate the relationship between cognitive style and opportunities.

In addition, our results show that PA is not significantly associated with the relationship between analytic cognitive style and discovery opportunities. One possible explanation for this finding is the role of search behaviors in order to pursue opportunities. As discussed, entrepreneurs may discover opportunities that have clear outcomes through search and recognition (Shane, 2000). They use their knowledge as well as try to obtain other relevant data and information. In this process, PA may provide cues or ideas of other sources for search because PA prompts to diffuse attention to various resources (Fredrickson, 2001). Thus, it is possible for PA to help the positive relationship between an analytic cognitive style and discovery opportunities. Furthermore, the results of this study report that when entrepreneurs feel NA, intuitive cognitive style is not related to creation opportunities. This can be attributed to the characteristics of contexts where creation opportunities are pursued. From a creation perspective, a market does not exist, and entrepreneurs are under highly uncertain situations (Alvarez & Barney, 2007). Thus, they are likely to reply on their intuition rather than specific given data and information.
They may not have direct and relevant information, so that it might be impossible for them to analyze the information.

These results have several theoretical and practical implications. As a contribution to theory, this study extends entrepreneurship research by investigating the different impacts of entrepreneurs’ cognitive styles on certain types of opportunities in the entrepreneurial process, and by examining the role of affect as a moderator of the relationship between cognition and opportunity. First, the results that different types of cognition are associated with different types of opportunities imply that the benefits of cognitive styles are not completely general. While the entrepreneurs with intuition could receive greater opportunity creation, entrepreneurs with analysis could more discover opportunity through careful search and decision-making. In addition, this study demonstrates that the effect of cognitive style on opportunities differ by individual differences such as affect. It is because individuals’ cognitive process could interact with their affective state. This study applied this relationship to the entrepreneurial contexts. Therefore, our study not only demonstrates the interaction of affect on the relationship between cognition and opportunity but also suggests which affect such a moderating effect is applied to. Our study contributes to the body of literature on cognition and affect, which have been developed in separate and independent research streams. On the practical level, this study can contribute to the practitioner aspect of entrepreneurship as a field of study. Entrepreneurs should play an important role in starting and running new ventures. Our findings indicate that entrepreneurs could improve their understandings of the cognitive and affective characteristics before simply pursuing opportunities. Therefore, it might be also possible to develop techniques for assisting entrepreneurs.
understand different characteristics of information process, and they could learn to make decisions in a more effective manner.

This study also has several limitations. First, this study collected the data from the respondents’ self-report and obtained the measures of all variables from the same respondents. These might cause the problems associated with subjectivity and the common method bias. Thus, it is necessary to use more objective measures in future research. Second, this study was tested using the sample of undergraduate students. Students who are taking entrepreneurship classes could be more appropriate because their cognitive processes can be focused on the entrepreneurship topics. However, the tests in different social contexts are needed because the manipulation of entrepreneurial conditions using scenarios might not reflect real business situations (Kerlinger & Lee, 2000). In particular, most researchers have assumed that entrepreneurship context is highly uncertain, ambiguous, and complex. Therefore, this study might not consider various types of environments. It is necessary to apply this study to real situations in the future, and the real study will increase the external validity. Third, this study measured state affect of entrepreneurs by asking participants their feeling right now or at the present moment. However, Barsade (2002) suggested that the experiment would be ideal because state affect is fleeting and transitory. Although PANAS is a highly reliable and valid measure of affect, it is possible to compound of the effects of other factors such as trait affect. Therefore, this study encourages a more rigorous design which could control other factors in the future. Last, this study concentrated on entrepreneurs’ characteristics in the entrepreneurial process. Given that entrepreneurial opportunities are pursued by specific individuals (i.e., entrepreneurs), it is critical to examine the role of entrepreneurs’
differences (Baron, 2002; Shane & Venkataraman, 2000). However, it is also necessary to simultaneously investigate the effects of internal and external features of a firm. The model can extend to the contextual factors such as diversity of a firm or preference of customers. Since internal and external contextual factors of a firm could be independent and operate in accordance with different processes, future research may yield different results when the interaction effects of external contextual factors in the relationship between internal characteristics of a firm and the pursuit of opportunities are tested.
References


Appendix: Tables, Figures, and Scenarios
### Table 1

Descriptive Statistics and Correlations among Study Variables\(^a\)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>S.D.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Age</td>
<td>20.93</td>
<td>2.06</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Gender (^b)</td>
<td>.27</td>
<td>.45</td>
<td>-.16</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Class (^c)</td>
<td>.95</td>
<td>.21</td>
<td>-.11</td>
<td>-.11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Cognitive style (^d)</td>
<td>.48</td>
<td>.51</td>
<td>-.01</td>
<td>.13</td>
<td>-.01</td>
<td>(.80)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Positive affect</td>
<td>3.17</td>
<td>.62</td>
<td>.04</td>
<td>-.30*</td>
<td>.04</td>
<td>-.17</td>
<td>(.90)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Negative affect</td>
<td>2.06</td>
<td>.78</td>
<td>-.29</td>
<td>.31*</td>
<td>.16</td>
<td>.32*</td>
<td>-.29</td>
<td>(.86)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Discovery opportunity</td>
<td>6.34</td>
<td>1.96</td>
<td>-.21</td>
<td>-.34*</td>
<td>.10</td>
<td>.49*</td>
<td>-.31*</td>
<td>.63*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Creation opportunity</td>
<td>4.86</td>
<td>1.94</td>
<td>.11</td>
<td>-.06</td>
<td>.21</td>
<td>-.31*</td>
<td>-.00</td>
<td>-.17</td>
<td>-.23</td>
<td></td>
</tr>
</tbody>
</table>

\(^a\) N=44.

\(^b\) Gender (male=0, female=1).

\(^c\) Class (class A=0, class B=1).

\(^d\) Cognitive style (Intuitive=0, Analytic=1).

\(^*\) p<.05 \(^**\) p<.01.
Table 2

Results of Hierarchical Regression Analysis: Moderating Effect of Positive Affect in the Relationship between Intuitive Cognitive Style and Creation Opportunities

<table>
<thead>
<tr>
<th>Variables</th>
<th>Creation Opportunity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Model 1</td>
</tr>
<tr>
<td>Age</td>
<td>.137</td>
</tr>
<tr>
<td>Gender</td>
<td>-.016</td>
</tr>
<tr>
<td>Class</td>
<td>.225</td>
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<tr>
<td>Intuitive Cognitive style</td>
<td></td>
</tr>
<tr>
<td>Positive affect</td>
<td></td>
</tr>
<tr>
<td>Cognitive style × Positive affect</td>
<td></td>
</tr>
</tbody>
</table>

F: .912                      1.477   4.583**

R²: .064                      .163   .426

Adjusted R²: -.006            .053   .333

* Standardized coefficients are shown. N=44.

* p<.05   ** p<.01.
Table 3
Results of Hierarchical Regression Analysis: Moderating Effect of Positive Affect in the Relationship between Analytic Cognitive Style and Discovery Opportunities

<table>
<thead>
<tr>
<th>Variables</th>
<th>Discovery Opportunity</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
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<tbody>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
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<td>-.148</td>
<td>-.136</td>
<td></td>
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<tr>
<td>Gender</td>
<td>.330*</td>
<td>.221</td>
<td>.197</td>
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<tr>
<td>Class</td>
<td>.115</td>
<td>.114</td>
<td>.130</td>
<td></td>
</tr>
<tr>
<td>Analytic Cognitive style</td>
<td>.430*</td>
<td>.433*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive affect</td>
<td>-.172</td>
<td>-.375*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cognitive style × Positive affect</td>
<td></td>
<td></td>
<td></td>
<td>.272</td>
</tr>
<tr>
<td>F</td>
<td>2.395*</td>
<td>4.655**</td>
<td>4.365**</td>
<td></td>
</tr>
<tr>
<td>R²</td>
<td>.152</td>
<td>.380</td>
<td>.414</td>
<td></td>
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<tr>
<td>Adjusted R²</td>
<td>.089</td>
<td>.298</td>
<td>.320</td>
<td></td>
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</tbody>
</table>

* Standardized coefficients are shown. N=44.

* *p < .05  ** *p < .01.
Table 4
Results of Hierarchical Regression Analysis: Moderating Effect of Negative Affect in the Relationship between Intuitive Cognitive Style and Creation Opportunities

<table>
<thead>
<tr>
<th>Variables</th>
<th>Creation Opportunity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Model 1</td>
</tr>
<tr>
<td>Age</td>
<td>.137</td>
</tr>
<tr>
<td>Gender</td>
<td>-.016</td>
</tr>
<tr>
<td>Class</td>
<td>.225</td>
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<tr>
<td>Intuitive Cognitive style</td>
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<tr>
<td>Negative affect</td>
<td>-.042</td>
</tr>
<tr>
<td>Cognitive style × Negative affect</td>
<td></td>
</tr>
</tbody>
</table>

| F                          | .912    | 1.442   | 1.230   |
| R²                         | .064    | .160    | .166    |
| Adjusted R²                | -.006   | .049    | .031    |

*Standardized coefficients are shown. N=44.

* p<.05  ** p<.01.
Table 5
Results of Hierarchical Regression Analysis: Moderating Effect of Negative Affect in the Relationship between Analytic Cognitive Style and Discovery Opportunities

<table>
<thead>
<tr>
<th>Variables</th>
<th>Discovery Opportunity</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Model 1</td>
<td>Model 2</td>
<td>Model 3</td>
</tr>
<tr>
<td>Age</td>
<td>-.142</td>
<td>-.179</td>
<td>-.112</td>
</tr>
<tr>
<td>Gender</td>
<td>.330*</td>
<td>.252+</td>
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</tr>
<tr>
<td>Class</td>
<td>.115</td>
<td>.122</td>
<td>.108</td>
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<tr>
<td>Analytic Cognitive style</td>
<td>.415*</td>
<td>.397*</td>
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<tr>
<td>Negative affect</td>
<td>.110</td>
<td>.463*</td>
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<tr>
<td>Cognitive style × Negative affect</td>
<td></td>
<td>-.454*</td>
<td></td>
</tr>
</tbody>
</table>

F          2.395*   4.322**   4.607**
R²         .152      .362     .428
Adjusted R² .089     .279     .335

*Standardized coefficients are shown. N=44.

* p<.05  ** p<.01.
Figure 1
Model

Entrepreneurs
Affect

Entrepreneurs
Cognitive
Style

Pursuit of
Opportunity
Figure 2
Interaction Effect of Positive Affect in the Relationship between Intuitive Cognitive Style and Creation Opportunity
Figure 3

Interaction Effect of Negative Affect in the Relationship between Analytic Cognitive Style and Discovery Opportunity
Scenario1

Creation Opportunity

A chicken farmer in Arizona had a flock of chickens that developed a severe cataract problem. When he became aware of the problem, he separated the afflicted birds from the rest of the flock and subsequently observed that the afflicted birds seemed to calmer and were much easier to handle and also had less pecking behaviors. So dramatic was the difference that a poultry medical veterinarian visiting the farm, rather than being asked for a cure, was asked if there was any way to similarly afflict the rest of the flock. It has not proved possible chemically or genetically to duplicate the reduced vision of the chickens, resulting from the cataracts, but a chicken wearing special contact lenses could have its vision reduced enough to obtain the good behavior the Arizona farmer observed. This behavior has important economic implications for the chicken farmer.

The Poultry Industry

Poultry and egg production had its beginnings in the family barnyard. As late as 1900, it was not unusual for a family to have its own chickens even in urban areas, or to buy eggs fresh from a small local farmer. In 1921 the largest commercial egg farm in the United States was in Petaluma, California, and boasted a flock of about 2,000 hens. The hens were not housed nearby; rather, the eggs were picked up twice daily and loaded into a horse-drawn wagon.

In an effort to increase the efficiency of egg production, some California farmers began confining the birds to large henhouses during the 1930s and 1940s. In other parts of the United States, eggs were still being collected from haystacks until the 1940s when henhouses became common throughout the country. Continuing their innovation, California poultrymen began to increase the utilization of henhouse space by further confining the birds in groups of three or four within multitiered wire cages, 18” x 12” in size. By the 1950s, these innovations had spread widely throughout the United States and had led to considerable concentration in the poultry industry.

In 1974 the largest commercial flock of laying hens in the United States was 2.5 million birds, and 80% of the 440,000,000 laying hens in the United States were housed on 3% of the known chicken farms. California, North Carolina, and Georgia accounted for 25% of the nation’s chickens, while nine additional states (mostly in the South and Northeast) accounted for an additional 36% of the chicken population. Two counties in southern California contained 20 farms that housed 21 million chickens. By 2008 the commercial flock of laying hens in the United States was 470.8 million birds.

Cannibalism among Chickens
Like many other fowl, chickens were social birds and chicken societies had a definite social structure. A self-selected ranking of chickens began when chickens were about 8 to 10 weeks of age and resulted in a complete peck order by the time the birds reached sexual maturity. According to Mark O. North, a poultry consultant, “This order is the result of the birds being able to identify other birds in the group, and through fighting and pecking, establish a hierarchical type of social organization.”

North believed that the recognition of the comb on the head of the chicken was a means of preserving the peck order, as was the position of the head. Dominant chickens carried their heads high, while submissive birds maintained a low head level. If a submissive bird raised its head too high, it was immediately pecked by one or more of its superiors until the head was lowered. Pecking could increase until the birds became cannibalistic. Submissive birds were also pecked if they entered the territory of a cage claimed by a more dominant bird. Thus cannibalism was a greater problem when more birds were confined in cages. Cannibalism also varied with the breed of the chicken, and, unfortunately, the more productive strains tended to be more cannibalistic. According to Daniel Garrison, a major U.S. breeder had developed an extremely productive chicken, but “you had to put a sack over her head to keep her from killing her pen mates.”

Besides the obvious loss to the farmer when a bird was killed by its pen mates, submissive birds got less time at the feeding trough and thus produced fewer eggs than the more dominant birds. Also, once the peck order was established, replacing a dead bird seriously disturbed the peck order.

2 Poultry Digest, December 2006.

Debeaking had been the major means of combating cannibalism for nearly 70 years. The debeaking process did not interfere with the formation of the peck order, but reduced the efficiency of the beak as a weapon. The debeaking operation was simple in concept: Using a hot knife and an anvil, the upper and lower mandibles of the chicken’s beak were cut off at different lengths. The beak was then pressed against the hot knife to cauterize the wound and prevent excess bleeding. In the debeaking operation, the chickens were subjected to considerable trauma resulting in a temporary weight loss and the retardation of egg production for at least a week; but at five months the loss was only one egg. If the beak was cut too short, the chicken would often enter a permanent regression; if left too long, the beak would grow back and become a deadly weapon again. The establishment of the peck order among debeaked chickens took a longer time and involved greater social stress than it did among chickens with their full beaks since clear victories were rare. Experience had shown that debeaking reduced mortality due to cannibalism from as high as 25% for flocks of birds with full beaks to about 9% for debeaked flocks.

Debeaking was usually done during the first few weeks after the five-month-old hens were purchased. The farmer’s own employees or a service company could be hired to provide the debeaking crews, depending on the size of the farm. The cost of the
debeaking operation was almost entirely labor. An experienced crew of three, each earning about $8.50/hour, could debeak approximately 220 birds per hour.

Bird Contact Lenses

Your friends think that the three of you could potentially form an opportunity based on contact lenses for chickens. However, several technical difficulties had been identified with the product. In particular, the early prototypes did not always remain in the chicken’s eyes after insertion, and they frequently caused severe irritation in the last months of the chicken’s 12-month laying life. Both problems had been quite serious because, as Daniel Garrison explained, “No farmer is going to spend time looking into the eyes of his chickens to make sure the lenses are still there and the eyes are not bloodshot.”
Scenario 2

Discovery Opportunity

There are a series of comments from focus groups in the footwear industry. The focus group was asked to discuss the “negatives” involved in purchasing and/or using a particular product.

Comments from focus group 1:

Person #1: I know it sounds shallow but I don’t like the colors that are offered today. I just can’t find a suitable match to the clothes that I wear.

Person #3: I don’t think that is shallow #1. In fact the main reason that I buy Nike running shoes is because of the brand name. People are impressed if you wear Nike, or really, it is that they look at you strangely if you are wearing another brand.

Person #5: The shape is too bulky. They’re huge. They make my feet look too big. I look like Krusty the clown.

Person #2: I know what I can’t stand? The runners get dirty so easily. They look good while you are wearing them inside the house but as soon as you go outside once or twice they look old.

Person #7: I agree with the comments made so far, most running, athletic, and outdoor activity shoes just don’t look good. They are unattractive. They’re ugly.

Comments from focus group 2:

Person #2: Despite the fact that the runners only seem to last six months, the price is so high. I can’t believe how high the price is. It costs me a fortune to keep my family in running shoes.

Person #6: I am not sure why we have to pay so much. It can’t be that expensive to make a pair of shoes. Maybe it is all the money that they spend on marketing.

Person #1: I would update my basketball shoes more often if the price was a lower.

Person #4: I agree that our current shoes are too expensive but I would pay more if they were better. If they did all the things that I wanted them to do.

Comments from focus group 3:

Person #7: Doesn’t matter how old I was, every pair of runners I have had have squashed my feet. It is like a wrench that gets turned tighter and tighter the further I run.

Person #6: Mine seem to fit OK, but they are still uncomfortable because they do not offer enough cushioning. I like to feel as if I am running on a cloud or marshmallows.

Person #7: I know what you mean. The current pair that I have I can feel the impact of each step move up my whole body.

Person #4: My feet get hot. When I am running on the track around the park in summer my feet get so hot they feel like they will explode. It is like I am running on hot coals.

Person #3: My feet get hot but the discomfort comes from the sweat. My feet sweat so much that when I take my shoes off my socks are dripping wet. This gives me blisters.

Person #2: I get blisters and blood blisters. The only good think is that it is fun to pop the blisters after a long run.
Person #4: I am a bit embarrassed to say it but because my feet sweat I get fungal infections. Tinea. Then my feet itch like crazy. And my shoes and feet smell. I mean stink.
All Participants: So do mine.

Comments from focus group4:
Person #2: My shoes are only six months old and the stitching around the front panel is already broken and unraveling.
Person #6: You know the Reebok pump? You pump it and the shoe fits snuggly around your foot. As the leather stretches it becomes loose in about a week. You pump it again and once again it is snug. BUT once you have used the pump about ten times then it doesn’t seem to work again. That is really annoying.
Person #1: I would like a running shoe, and for that matter a hiking shoe that is waterproof. Specifically, my hiking shoes are leather and even if I keep them polished the water still gets in if I am walking on a muddy and puddle filled track.
Person #4: My running shoes have air holes that try to cool my feet but the support around the air holes always seems to crack.
Person #7: I thought that leather was a strong material but I am surprised how often my kids running shoes get ripped and fall apart.
Person #3: They just don’t seem to be very durable. I have to replace my children’s runners every six months – before they have grown out of them.