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DOES PERCEPTUAL ACUITY MATTER? — AN INVESTIGATION OF ENTREPRENEURIAL ORIENTATION, PERCEPTUAL ACUITY, AND FIRM PERFORMANCE

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One critical proposition in normative strategic management research is that an accurate perception of the environment by top managers is a prerequisite to attaining better organizational performance. However, recent entrepreneurship studies suggest that entrepreneurs are often leading or even causing environmental changes, and thus they may perceive greater industrial instability than there actually is. In this project, we examine if an over-perception of industrial instability exists among entrepreneurs. If it does, which perceptual mode (accurate perception versus over-perception) will benefit firm performance? We conducted the study in a highly volatile environment — China — and found that entrepreneurial orientation (EO) had an inverse U-shape relationship with perceptual acuity of industrial instability, indicating that a greater level of EO indeed led to an over-perception of industrial instability. However, we found that although perceptual acuity of industrial instability improved firm sales, it was negatively associated with organizational effectiveness evaluated by top managers. Additional analyses were conducted and implications were provided in the end.

Keywords: Perpetual acuity; entrepreneurship orientation; industry instability; performance.

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INTRODUCTION

The relationship between the objective environment, the descriptors of the cues surrounding a choice, and perceptions of the environment, the characteristics of the decision maker, has been at the forefront of management research for decades (Bourgeois, 1985; Downey, Hellriegel and Slocum, 1977; Downey and Slocum, 1975; Gifford, Robbitt and Slocum, 1979; Miller, 1993; Sutcliffe, 1999; Thompson, 1967). This is, in part, because an essential proposition in normative strategic management literature is that only accurate perceptions of the environment will direct managers to establish a strategic and structural fit between organizations and the environment, a fit will produce better performance (Bourgeois, 1985; Lawrence and Lorsch, 1967; Miles and Snow, 1978; Hambrick and D'Aevni, 1992). However, as top managers' perceptions are filtered by many organizational or individual factors (Sutcliffe, 1999; Tosi, Aldag and Storey, 1973; Pennings, 1975), perceptions of objective attributes are seldom accurately achieved in the decision-making process (Bourgeois, 1985; Sutcliffe, 1999).

The issues surrounding perceptual acuity are further complicated by recent contradictory findings. Researchers believe that some overly-perceived uncertainty can be beneficial: they may help firms to overcome inertial tendencies within the organization and motivate them to pursue goals that might look unattainable if the environment were assessed in utter objectivity (Sutcliffe, 1994). Moreover, recent entrepreneurship studies imply that entrepreneurs tend to perceive more industrial instability than there actually is because of their propensity to create changes and to lead market trends, a propensity that is necessary to bring about entrepreneurial success (Dickson and Weaver, 1997; Zahra and Neubaum, 1998). However, to date, no studies have attempted to reconcile these two apparently opposing propositions.

We thus design this study to examine the validity of these two propositions by investigating the effect of perceptual acuity of industry instability on firm performance. *Industrial instability* is the unpredictable change or variability in an organization's main operating environment (Dess and Beard, 1984; Keats and Hitt, 1988; Sutcliffe, 1994). How to treat industrial instability is a significant distinction between entrepreneurial firms and others — entrepreneurial firms are generally more welcoming and embracing of external changes than other firms. Moreover, the degree of industrial change (i.e., instability) is consistently found to explain more variance of managers' perceptions of uncertainty in the strategy-making process than other environmental attributes (Bourgeois, 1980, 1985; Duncan, 1972). Therefore, although other environmental dimensions (e.g., munificence and

complexity) are also worth studying, perceptual acuity of industrial instability is more critical with regard to our research purposes.

Our first purpose is to verify if the over-perception mode exists in entrepreneurial firms. In other words, we investigate the relationship between top managers' entrepreneurial orientation and the acuity of their perceptions of industrial instability. Managers with entrepreneurial orientation (EO) are often found to prefer environmental unpredictability and instability (Wolff and Pett, 2006; Zahra and Neubaum, 1998). They have visions that others do not or dare not have (Begley and Boyd, 1987) and they proactively act upon their visions to change the environment (Astley and Van de Ven, 1983). As a result, entrepreneurial managers may perceive more industrial instability than there is and predict a more unstable environment due to their own proactive behaviors.

If the over-perception mode does exist among entrepreneurial firms, we plan to examine whether accurate perception or over-perception will lead to better performance. Specifically, we investigate the relationship between the perceptual acuity of industrial instability and both objective and subjective firm performance. Our findings disclose that perceptual acuity has different impacts on objective and subjective firm performance. Both accurate perception mode and over-perception mode benefit firm performance, but in different ways. Our findings provide important insights in studying and understanding the discrepancy between what entrepreneurial managers *want* to achieve and what they *can* achieve in a volatile environment.

By investigating the above two issues, we contribute to entrepreneurship research in the following ways. First, entrepreneurial performance has rarely been associated with or interpreted from a perceptual-acuity perspective, although this perspective is widely adopted in strategic management. We thus fill this gap, and our study, for the first time, theoretically explains and empirically verifies the existence of the entrepreneurial pattern in perceiving industrial instability — an over-perception mode. Second, we assess the value of both the entrepreneurial over-perception mode and the accurate-perception mode to firm performance. We find that an accurate perception of industrial instability contributes to the objective firm performance while an over-perception of industrial instability contributes to the organizational effectiveness evaluated by top managers. As such, our study helps to reconcile the discrepancy between normative strategic management studies and entrepreneurship studies in terms of which perceptual mode will most likely improve firm performance.

To this end, we next build our hypotheses on an extensive review of literatures on uncertainty perceptions, entrepreneurship, and strategic management. Data collected from both primary and secondary sources in China were employed to test hypotheses. Additional analysis is conducted and implications are provided at the end.

THEORY AND HYPOTHESES

EO and Perceptual Acuity

Researchers have observed that there lacks congruence between the objective instability measured by archival industrial data and the perceptual instability of chief managers (Downey *et al.*, 1977). This incongruence may be due to inadequate measurement instruments (Tosi *et al.*, 1973); it may also reflect the fact that managers' perceptions are filtered and biased by multiple factors that are specific to the individual or the organization (Duncan, 1972). Perceptions are determined, at least partly, by the individual's, particularly top managers', psychological characteristics (Bourgeois, 1985; Downey and Slocum, 1975). However, the effect of psychological factors on perceptual acuity at the top management team level is largely unknown (Sutcliffe, 1994), especially when new findings emerging from entrepreneurship research keep challenging the conventional wisdom.

The importance of studying the discrepancy between external objectivity and managers' perceptions of this objectivity is highlighted by their different roles in determining firm performance. It is believed that managers' perceptions determine the manner in which an organization responds to the environment (Bourgeois, 1985; Downey *et al.*, 1977), while external objectivity determines if this manner is proper or not (Downey and Slocum, 1975). Therefore, a central proposition in strategic management is that an accurate perception of the environment is the premise for attaining a better performance (Andrews, 1971; Sutcliffe, 1994).

Notwithstanding the centrality of this proposition in strategic management, surprisingly few empirical studies have systematically examined its validity. In his paper, Bourgeois (1985) hypothesized that when the congruence between managers' perceptions of instability and the true environmental instability was higher, when the homogeneity of the management team members' perceptions was higher, or when the goal consensus of management team members was higher, the firms' economic performance would be better. With correlation statistics provided by fewer than 20 cases, the above hypotheses were generally supported. However, owing to limited

sample size, this study did not identify the directional relationship from perceptual acuity to performance. Sutcliffe (1994), instead of examining the outcomes of perceptual acuity, studied the antecedents that influenced the accuracy of managers' perceptions of both industrial munificence and instability. The demographic characteristics of a top management team such as functional diversity and tenure, as well as organizational characteristics such as organizational scanning, performance monitoring, and centralization were examined. Although not included in her paper, Sutcliffe (1994) believed that managers' psychological characteristics, such as tolerance for ambiguity, cognition complexity, and internal versus external locus of control were among the top-ranking factors that would influence perceptual acuity.

Our research, therefore, investigates the effect of top managers' entrepreneurial orientation on their perceptual acuity of industrial instability. *Entrepreneurial orientation* (EO), a concept closely related to tolerance for ambiguity, is defined as the extent to which "top managers are inclined to take business-related risks, to favor change and innovation in order to obtain a competitive advantage for their firm, and to compete aggressively with other firms" (Covin and Slevin, 1988: 218).

Chief managers with EO are often depicted as a group that is extraordinarily good at screening, sensing, recognizing, capturing, and capitalizing on potential external opportunities (Busenitz, West, Shepherd, Nelson, Chandler and Zacharakis, 2003; Mitchell, Smith, Seawright and Morse, 2000). Entrepreneurial managers are in general more motivated to thoroughly check the environment in order to collect more information and to recognize and identify the potentially profitable market changes that are hidden from other firms (Lumpkin and Dess, 2001). Meanwhile, new approaches to technologies, products, or processes are likely discovered by the thorough review of the environment, and in turn, these new approaches help firms to develop learning capabilities and further advance their screening capabilities (McGrath, 2001). The benefits and capacities attained from thoroughly scanning the external environment prompt firms to exchange information with the environment even more frequently (Tushman and Nadler, 1978). As the frequency of exchanging information between organizations and the environment increases, entrepreneurial managers are likely to perceive the environmental changes more and more accurately.

However, entrepreneurial managers are not just passive information recipients. The difference between entrepreneurial managers and others is that the former also tend to change and manipulate their surroundings "through political negotiation to fit the objectives of top management" and thus, the external environment is not merely "a set of intractable constraints" (Astley

and Van de Ven, 1983: 249). Entrepreneurial managers concentrate on their own goals and rely on their own benchmarks to evaluate achievements, regardless of the current environmental constraints that are imposed on them (Stevenson, Roberts and Grousbeck, 1989). Besides searching for opportunities, successful entrepreneurial managers also create opportunities. The goal of entrepreneurial managers is to lead market trends by creating changes that others will follow (Hall, 1980). As a result, the level of environmental changes that is perceived by firms with strong EO is likely to be higher than the current industrial level.

A similar perspective is also held by prospect theory, in which risk assessment is based more on the decision-maker's reference point than on probable outcomes (Kahneman and Tversky, 1979; Busenize *et al.*, 2003). Managers with strong EO tend to use their goals rather than current industrial standards as the reference point (Bird, 1988; Busenize *et al.*, 2003). Thus, they may perceive more industrial instability than there is. This over-estimated industrial instability can be beneficial to firms, as it encourages entrepreneurial managers to undertake potentially difficult courses of action with the enthusiasm, effort, and self-confidence necessary to bring about success (Sutcliffe, 1994).

In summary of the above discussion, we conclude that as the level of EO increases, entrepreneurial managers tend to collect more information than others and as a result, perceive industrial instability more accurately. However, as EO keeps increasing to an excessive level, entrepreneurial managers tend to manipulate the environment and create more changes to their favorite directions, which will produce an over-perceived industrial instability. Therefore, an inverted U-shape relationship between EO and perceptual acuity in industrial instability can be hypothesized:

Hypothesis 1: Entrepreneurial orientation has an inverse U-shape relationship with the managers' perceptual acuity in industrial instability.

Perceptual Acuity and Firm Performance

Managers are only able to respond and react to what they perceive; environmental conditions that are not noticed or perceived will not influence management's decisions or actions (Bourgeois, 1985; Ettlie and Bridges, 1982). As a result, when organizations perceive the same "objective" environment differently, they may apply different strategies or employ different structural designs, which consequently lead to different performance (Snow, 1976).

Following this rationale, it has been assumed in strategic management literature that when top managers' perceptions accurately reflect industrial instability (i.e. when perceptual instability and objective instability converge), better performance is expected (Bourgeois, 1985; Summer *et al.*, 1990). However, previous empirical findings on the benefits of the organization-environment "fit" were inconsistent. On one hand, through different conceptualizations and operationalizations (Venkatraman and Camillus, 1984), a match between external and internal contingencies was found to indeed improve organizational competitiveness in the market as well as organizational effectiveness in achieving organizational goals (Baligh Burton and Obel, 1996, Chandler, 1962; Nadler and Tushman, 1979; Drazin and Van de Ven, 1985; Miller, 1991; Naman and Slevin, 1993). On the other hand, Pennings (1973) could not explain the variance in organizational effectiveness by the goodness of fit between organizations' structural factors and environmental characteristics in a brokerage business setting. Kokerg and Ungson (1987), in an investigation of two diverse industries (education and petroleum), also found that even though organizational structure was significantly related to environmental characteristics, performance could not be explained by the fit between environments and organizational structures. Furthermore, recent developments in the entrepreneurship field seem to imply that an over-perception of industrial instability may help to bring about entrepreneurial successes (Astley and Van de Ven, 1983).

It thus remains a question how beneficial perceptual acuity can be in improving organizational performance. Or in other words, does perceptual inacuity, especially the over-perception mode existing among entrepreneurial firms, benefit organizational performance at all; and if it does, how? In the present paper, we believe that when the environment is volatile, the virtues of perceptual acuity are undeniable. When the industry is highly unstable and going through turbulent changes, an accurate perception of environmental changes can help top managers to develop an early recognition of market trends and thus, an early adoption of promising products, services, business models (Baum and Wally, 2003; Jones, Lanctot and Teegen, 2000), or efficiency-gaining technologies (Baum, 2000). Perceptual acuity of industrial instability also enables firms to see and catch external opportunities before they disappear or other firms see and act upon them (Stevenson and Gumpert, 1985). Therefore, an accurate perception of industrial instability will help organizations to better recognize what they should do in order to win the market competition. An accurate recognition of environmental changes drives a firm to be more willing to integrate,

build, configure, and reconfigure organizational resources and competences to address external challenges (Teece *et al.*, 1997). Therefore, when the environment is dynamic and unstable, perceptual acuity helps organizations catch opportunities or avoid threats in a timely manner and in turn, improves firm performance.

In contrast, when more industrial instability is perceived by top managers than there actually is, extra time and resources may be spent to collect, exchange, and transfer more information than is necessary, and managers may be overloaded by unnecessary, trivial, or even redundant information (Ellis and Shpielberg, 2003; Siggelkow and Rivkin, 2005). Furthermore, an over-estimation of environmental changes may lead to new strategies that are supposed to meet the requirements of this over-perceived external instability. However, these new strategies exaggerate the current situation and may disrupt the successful routines in a firm's existing domains. Dedicating resources to new strategies (such as testing new ideas or developing new products) may slow down the growth of existing domains while no compensation from new areas is guaranteed to make up this loss; as a result, firm performance suffers (as observed by Benner and Tushman, 2002; Levitt and March, 1988; Mitchell and Singh, 1993). The over-estimation of industrial changes and an over-evaluation of potential opportunities may cause, especially among entrepreneurs, significantly higher failure rates than among other firms (Iyer, LaPlaca and Sharma 2006). In summary, in this paper, we deemed that, consistent with the proposition in normative strategic management, when perceptual acuity is achieved, better performance should be attained. As such:

Hypothesis 2: The managers' perceptual acuity in industrial instability is positively associated with organizational performance.

RESEARCH DESGIN

Sample and Data Collection Procedures

We chose the research setting in China, which has two characteristics that fit our study very well. First, China is the largest emerging economy in the world and is characterized by dramatic changes due to the rapid growth of private sectors and the entry to WTO (Boisot and Child, 1999; Guthrie, 1997; Liu, Luo and Shi, 2003). Second, as Global Entrepreneurship Monitor (GEM) observes, the total entrepreneurial activity (TEA) is more vigorous and dynamic in emerging economies than in mature economies. In particular,

in China, since the central government is loosening restrictions on private enterprises and encouraging self-employment as a way to absorb millions of new laborers each year, a great wave of entrepreneurship has emerged (Chow, 2006). Therefore, China is an ideal place for our research regarding instability and entrepreneurial orientation.

Data were collected from two sources. A field survey provided the data about organizations such as EO, perception of industrial instability, employee number, firm sales, and organizational effectiveness. Following Palmer and Wiseman's (1999) suggestion, the objective industrial instability was calculated from the stock market database.

The survey was conducted in three steps. First, a Chinese national consulting company with headquarters in Beijing was hired to distribute the survey. The company keeps an updated list of small and medium-size firms (SMEs) in northeastern China and it has direct and indirect business relationships with most of these firms. A stratified random selection method was applied to select the participants. According to China Statistical Yearbook (2005), manufacturing industry accounts for about 68.1% of the national GDP. Therefore, 333 firms were randomly selected from manufacturing industries, while 167 firms were randomly chosen from service industries, giving a total of 500 firms. The survey was developed in English and then subjected to a double back-translation process consistent with the framework established by Brislin (1980) for translating international surveys.

After the survey was ready, a pretest was conducted. Eight firms in three industries (electronics, machine manufacturing, and consulting) were randomly chosen for the pretest. One top management team member from each firm participated in the pretest. The top management team member was recognized as chief executive officer, chief finance officer, chief operation officer, chief information officer, or other chief executives who were in charge of one of the main functions and who had substantial knowledge about the firm. In the pretest, a few items were identified as "ambiguous." We reworded and submitted them for another round of double back-translation. The process was continued until all eight respondents were satisfied.

Lastly, all 500 SMEs were contacted by the consulting firm through telephone and/or email to ask if they were willing to participate in the survey. A dozen firms declined, explaining that "Our CEO is too busy to participate" or "We are not interested." When a firm declined, another firm was randomly selected from the same industry to replace it. After we received confirmation, the questionnaire was uploaded online and the website was released to all 500 firms through phone and/or email. One top management

team member from each firm completed and submitted the survey online.

From December of 2005 to February of 2006, 207 firms participated; thus, the response rate was 41.4% (207/500). The responding firms encompass 17 manufacturing and service industries. The number of employees in these companies ranged from 5 to 791, making these firms SMEs as categorized in China. There were five firms that labeled themselves in "other" industries and were thus excluded from analysis for non-identifiable industrial effects. As chief officers are generally very busy, in order to avoid their answering questions in a casual or indifferent manner, we asked a question about one of our dependent variables — firm sales — twice but in different formats. The second question in the survey asked respondents to check one of the following six categories according to their companies' sales: less than 200,000 Chinese Yuan (RMB), 200,000–400,000 RMB, 400,000–600,000 RMB, 600,000–800,000 RMB, 800,000–1 million RMB, and more than 1 million RMB. At the end of the survey, we asked the same question again but in a different format: respondents were asked to fill in the exact number of their companies' sales. Twelve cases were not consistent in answering these two questions and were thus judged as unreliable and excluded from analysis. We found that the remaining 190 cases well represented Chinese industrial distribution: 64.3% of them fall into manufacturing industries, which was about the percentage of manufacturing industries applied nationally (68.1%).

Further investigation found 27 cases missing EO or sales values and thus the final sample included 163 cases. The usable-case response rate was 32.6% (163/500). ANOVA was employed to test the possible bias between the 163 cases and the cases deleted for missing values. No significant difference was found in our key variables such as employee, EO, perception of industrial instability, and performance.

We matched this primary dataset with an archival database, which was provided by *Shenzhen Securities Information Co., Ltd.* (SSIC). SSIC is the oldest professional provider of security information service in China. Backed up by advantageous resources including Shenzhen Stock Exchange and Securities Times, SSIC is empowered by Shenzhen Stock Exchange (SZSE) to authorize real-time quotas as well as to disclose, operate, and manage corporate actions of companies listed on Chinese stock markets. It is also appointed as the sole agent of Securities Times to authorize or license the publishing of its information. Following Palmer and Wiseman's (1999) suggestion, we used the stock market data to approximate the objective industrial instability.

Measures

Entrepreneurial Orientation. Miller's original scale for EO consisting of eight items was used in this study. This set of EO measures has been broadly applied in international entrepreneurship studies (Kreiser, Marino and Weaver, 2002; Steensma, Marino, Weaver and Dickson, 2000; Wiklund and Sheperd, 2005). Miller (1983) created a measure of strategic orientation tailored to SMEs, i.e. entrepreneurship orientation (EO). His measure emphasizes such organizational characteristics as aggressive product-market innovations, risky projects, and a proclivity to pioneer innovations that preempt the competition. All items were based on a 5-point Likert scale ranging from "Strongly disagree" (1) to "Strongly agree" (5). The internal reliability of the EO items measured by Cronbach' alpha was 0.71.

Instability Perceptual Acuity. Perceptual acuity is measured by a difference score between the objective and subjective industrial instability variables. In alignment with previous research, we formulate the objective industrial instability as the unexpected changes in industrial growth (Palmer and Wiseman, 1999). Following the method in prior research (e.g., Dess and Beard, 1984; Keats and Hitt, 1988; Palmer and Wiseman, 1999; Sutcliffe, 1994), the objective instability of each industry was attained by regressing industrial sales and profit against the years 2001–2005. The ratios of the obtained standard error (SE) of the regression slope coefficients to the mean values of dependent variables were used as the objective instability items. As suggested by Sutcliffe (1994), the average of these two items was used as the measure of objective industrial instability. The management's perceived industrial instability was measured by four items created by Miller and Friesen (1982) and revised by Dickson and Weave (1997) and Steensma *et al.* (2000). These scales were used to measure the perceived changes occurring in a firm's operating industry and the unpredictability associated with these changes. The internal reliability of these items measured by Cronbach' alpha was 0.66.

Following Bourgeois' (1985) and Sutcliffe's (1994) research, a continuous measure was calculated by standardizing the perceived environmental instability scores to z-scores and subtracting the already standardized archival industrial instability measure from these z-scores. The formed continuous measure assesses the divergence between the managers' perceived instability and the objective instability. Negative scores signify that firms perceive less instability while positive scores signify that more instability is perceived than the industrial level. The absolute value of this difference

score provides a measure of perceptual inacuity (Sutcliffe, 1994). The larger the value, the more the divergence between objective and perceived measures. Therefore, we subtracted this score from a constant to derive the acuity measure (Sutcliffe, 1994). The higher the score, the more accurate the perception.

Firm Performance. Two performance measures were applied in this study in order to cross-validate our hypothesis. The first was an objective financial index, the self-reported sales volume (Mann, Samson and Dow, 1998). Sales is one of the most common performance measures in previous studies and it is the basis of other financial performance measures (Collins and Clark, 2003; Mann *et al.*, 1998; Robinson and McDougall, 1998). Sales reflect other performance indices, more or less. Moreover, most Chinese firms were reluctant to report profit or return on assets for tax or other reasons. The raw sales measure was right-skewed and thus the logged sales volume was used in regression equations in order to meet the normality assumption of conducting hierarchical linear regressions.

We also gauged organizational performance through a subjective measure — the weighted organizational effectiveness evaluated by top managers. We asked respondents to evaluate the importance, from 1 "not important at all" to 5 "very important", of the following eight financial goals that are based on firm sales: sales, sales growth, market share, net profit, gross profit, profitability, cash flow, and return on investment. We then asked respondents to assess the achievements of these goals, from 1 "not satisfied at all" to 5 "very satisfied". The sum of the multiplication of each goal's importance and its achievement assessment was used as the weighted organizational effectiveness measure. We believe that this weighted measure should accurately reflect the top managers' evaluation of the organizational effectiveness.

Control Variables. Two variables were controlled for in this study. Previous research has constantly found that *firm size* has a significant relationship with EO and firm performance in SMEs (Walter, Auer and Ritter, 2006; Wiklund and Sheperd, 2004). As Dickson and Weaver (1997) suggested, small, closely held firms would generate more accurate information about employee number than other firm size proxies such as assets. We thus controlled for the number of employees, to approximate firm size in analysis (McKinley, 1987; Keats and Hitt, 1988). We also controlled for *objective instability* in analysis. As perceptual acuity is a difference score of objective and perceptual instability measures, we controlled the objective level to provide a reference level for evaluating perceptual acuity's effect.

ANALYSIS AND RESULT

The analysis was divided into two steps. The first step was to test the inverted U-shape relationship between EO and perceptual acuity in industrial instability (H1). The second step was to test if perceptual acuity led to better performance (H2). We employed hierarchical linear regression in both tests.

Table 1 summarizes the descriptive statistics such as means, standard deviations, and Pearson correlations of the relevant variables in this study. The correlation matrix shows that perceptual acuity is negatively associated with firm size ($r = -0.24$, $p < 0.01$, two-tailed test), which is in alignment with prior research that as a firm grows larger, organizational hierarchy increases, the number of nodes or levels that a piece of information has to go through increases and thus, the probability that the information is biased or deviated from its original meaning increases (Lin and Carley, 1997). Second, there is no correlation among variables that is high enough to cause multicollinearity concern.

Table 2 summarizes the test result of the inverted U-shape relationship between EO and perceptual acuity. We only included control variables in Model 1; we then added EO in Model 2; Model 3 further added the squared-term of EO. This step-by-step procedure allows us to elicit the net variance of perceptual acuity explained by EO and the squared-term of EO, respectively. In order to control for the multicollinearity between EO and its squared-term,

Table 1. Descriptive Statistics.

	1	2	3	4	5	6	7
ME	2.77	92.79	0.86	41.48	2.72	0.18	2.85
SD	0.72	13.35	0.66	49.52	0.39	0.31	0.58
1. Lgsales	1						
2. Organizational effectiveness	0.26***	1					
3. Perceptual acuity	−0.03	−0.25**	1				
4. Size	0.70***	0.40***	−0.24**	1			
5. EO	0.02	0.20*	−0.19*	0.22**	1		
6. Objective instability	0.03	0.13	−0.37***	0.12	0.02	1	
7. Perceptual instability	0.17*	0.31***	−0.29***	0.23**	0.05	−0.09	1

Note: $^{\dagger}p < 0.10$; $^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$, two-tailed test.

Table 2. Inverse U-Shape Test of EO and Perceptual Acuity.

	Model 1	Model 2	Model 3
Dependent Variable = Perceptual Acuity			
Control variables			
Size	−0.20** (0.00)	−0.17* (.00)	−0.14* (0.00)
Objective Instability	−0.35*** (0.15)	−0.35*** (0.15)	−0.37*** (0.15)
Independent variable			
EO		−0.14* (0.12)	−0.04 (0.12)
Square term			
EO^2			−0.32*** (0.16)
Fitness Indices			
R^2	0.18	0.20	0.29
Adj. R^2	0.17	0.18	0.27
F-value	17.41***	13.04***	15.96***
d.f.	(2, 160)	(3, 159)	(4, 158)
ΔR^2		0.02	0.09
Δ F		3.72†	20.02***
Δ d.f.		1	1

Note: $^{\dagger}p < 0.10$; $^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$, one-tailed test. Standard errors are in parentheses.

both items were mean-centered (Cohen, Cohen, West and Aiken, 2003). The inverse U-shape relationship requires that the coefficient of EO-square is negative.

Table 2 shows that firm size has a significantly negative relationship with perceptual acuity ($\beta = -0.20$, $p < 0.01$, one-tailed test), as seen in Model 1. The objective industrial instability also exhibits a negative relationship with perceptual acuity ($\beta = -0.35$, $p < 0.001$, one-tailed test) as seen in Model 1, indicating that the more unstable the industry is, the harder to have an accurate perception of this industry. After adding EO into regression, EO manifests a significant and negative relationship with perceptual acuity ($\beta = -0.14$, $p < 0.05$, one-tailed test), as seen in Model 2. However, after adding the squared-term of EO, as seen in Model 3, such a negative relationship vanishes ($\beta = -0.04$, $p > 0.05$, one-tailed test) while the squared-term is significantly and negatively related to perceptual acuity ($\beta = -0.32$, $p < 0.001$, one-tailed test). The VIF values assessing multicollinearity levels are less than 2.28 in all regression equations and thus, multicollinearity does not explain our findings. The mapping of the changes in regression coefficients and R^2 suggests that EO indeed has an inverted U-shape relationship with perceptual acuity. Therefore, H1 is supported.[1]

Table 3. Perceptual Acuity and Firm Performance.

	Lgsales		Organizational Effectiveness	
	Model 1	**Model 2**	**Model 3**	**Model 4**
Control variables				
Size	0.73*** (0.00)	0.76*** (0.00)	0.36*** (0.02)	0.34*** (0.02)
Objective instability	−0.06 (0.13)	−0.02 (0.14)	0.08 (3.16)	0.03 (3.37)
EO	−0.14** (0.11)	−0.12* (0.11)	0.11 (2.53)	0.10 (2.55)
Independent Variable				
Perceptual acuity		0.12* (0.07)		−0.13* (1.63)
Fitness Indices				
R^2	0.51	0.52	0.18	0.19
Adj. R^2	0.50	0.51	0.16	0.17
F-value	54.40***	42.47***	11.37***	9.30***
d.f.	(3, 159)	(4, 158)	(3, 159)	(4, 158)
ΔR^2		0.01		0.01
Δ F		3.79*		2.74†
Δ d.f.		1		1

Note: $^{\dagger}p < 0.10$; $^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$, one-tailed test. Standard errors are in parentheses.

The second test was to examine the relationship between perceptual acuity and firm performance, measured both objectively and subjectively. The left side of Table 3 summarizes the test results with lgsales as the dependent variable. It shows that top managers' perceptual acuity is significantly and positively related with lgsales ($\beta = 0.12$, $p < 0.05$, one-tailed test), as seen in Model 2 in Table 3. However, when weighted organizational effectiveness is applied as the dependent variable, it is significantly but negatively related with top managers' perceptual acuity ($\beta = -0.13$, $p < 0.05$, one-tailed test), as seen in Model 4 in Table 3. Thus, when objective performance index is applied, H2 is supported; while when subjective performance index is applied, H2 is not supported.

CONCLUSION AND IMPLICATIONS

Does an accurate perception of the environment matter to firm performance? In normative strategic management models, an accurate perception of industrial instability is the premise for firms to attain a better performance in a dramatically changing environment. Surprisingly, this proposition has

seldom been empirically validated, especially when new perspectives from entrepreneurship fields begin to challenge it. We fill this gap by investigating entrepreneurial orientation (EO) — an important antecedent of perceptual acuity, perceptual acuity in industrial instability, and firm performance, measured in both subjective and objective ways, in one framework. By doing so, we hope to reconcile the discrepancy between conventional strategic management research and entrepreneurship research, that is, whether an over-perception or an accurate perception of the industrial instability will benefit firm performance. Furthermore, in this study, we extended previous studies, such as those that merely investigated correlational relationships or those that looked only at antecedents but not outcomes of perceptual acuity (Bourgeois, 1985; Sutcliffe, 1994).

The investigation of the antecedental effect of EO on perceptual acuity is complementary to Sutcliffe's work (1994), in which only team demographics and organizational factors were considered. We verified her prediction that top managers' psychological factors influenced their perceptual acuity and found that EO had an inverted U-shape relationship with perceptual acuity. Our finding indicates that only a mediocre level of EO will lead to an accurate perception of industrial instability, while an excessive level of EO will drive firms to envision and create additional changes in the environment, which produces an over-perceived industry instability.

The antecedental effect of EO on perceptual acuity calls into question the benefits of perceptual acuity. Do firms need perceptual acuity, as the conventional mainstream strategists insist, to identify and respond to what the environment requires and in turn, to achieve better performance (Bourgeois, 1985)? Can firms, as entrepreneurship research implies, benefit from purposefully deviating the perception from reality and achieve goals that would otherwise seem impossible when external conditions are assessed with utter objectivity (Sutcliffe, 1994)? In order to solve this puzzle, we examined the relationship between perceptual acuity with both subjective (i.e., organizational effectiveness) and objective (i.e., sales volume) firm performance. We found that perceptual acuity does have a positive relationship with firm sales. *However*, the top managers' evaluation of organizational effectiveness seems to deteriorate as perceptual acuity improves.

Before we elaborate on these findings, a few limitations must be addressed to inform the boundaries of the implications. First, we are aware that the findings may be limited to the specific area of Northeastern China. China has its own unique cultural, political, and social climates (Boisot and Child, 1999) and the model may be applied with variations in other cultures (Kim and Lim, 1988). Second, due to the difficulty of collecting data from Chinese

SMEs, we were only able to collect self-reported survey items from one top management member in each firm. The common method variance bias may occur. In order to bolster the validity of our model, we introduced a second, archival data source to calculate industrial instability. In addition, we conducted Harman's one factor test (Podsakoff and Organ, 1986) on the survey items to test for the common method bias. Survey items were entered into one exploratory factor analysis. In analyzing the covariance matrix and employing varimax rotation, we did not find any single factor accounted for the majority of covariance. Thus, common method variance should not be solely responsible for our findings.

Bearing the limitations in mind, there are several interesting findings to report. The first finding relates to the EO impact on perceptual acuity. The inverse U-shape curve implies that if the normative strategic management, which requires an accurate perception to attain a good performance, is correct, a middle level of EO will produce a better performance than both a higher level of EO and a lower level of EO. This finding echoes recent research (Tang *et al.*, 2008) involving two studies in China, which found that EO had an inverse U-shape relationship with firm performance. Different from previous studies in which EO was assumed to have an increasingly linear relationship with firm performance, they found that an excessive level of EO was not endorsed by firm performance in China, and our study might provide the reason — an excessive level of EO would produce an over-exaggerated perception of industrial instability, which twisted the real industrial conditions and generated less optimal performance.

Based on the first finding, we further investigated whether perceptual acuity improved firm performance or not. In other words, will the entrepreneurial perceptual pattern — over-perception — do any good to firms? We find that as perceptual acuity improves, organizational sales performance is boosted, while the top managers' evaluation of organizational effectiveness — the achievement of organizational goals — seems to deteriorate. This raises an interesting question as to how "accurately" top managers evaluate their firms' performance. It is likely that even though a company performs well in terms of its actual sales, it still does not meet the top manager's goal, a goal made when the manager over-estimates the environmental conditions. So the management's evaluation of organizational effectiveness may not actually reflect what the firm can achieve in a certain environment. In other words, perceptual acuity contributes to what an organization is able to achieve, but not what the top manager wants to achieve. The subjective firm performance demonstrates an opposite relationship with perceptual acuity to that of objective firm performance, which provides a window to evaluate the virtues of

Table 4. Perceptual Acuity and Organizational Effectiveness.

	Under-Perceived		Over-Perceived	
	Model 1	**Model 2**	**Model 3**	**Model 4**
Control variables				
Size	0.25** (0.03)	0.26** (0.03)	0.43*** (0.03)	0.37*** (0.03)
Objective instability	0.22 (2.98)	0.27** (3.82)	0.21* (19.61)	0.22* (18.11)
EO	0.23** (3.74)	0.19* (3.79)	06 (3.78)	−0.08 (3.69)
Independent Variable				
Perceptual acuity		0.24* (2.86)		−0.39*** (2.10)
Fitness Indices				
R^2	0.15	0.18	0.25	0.37
Adj. R^2	0.12	0.14	0.22	0.33
F-value	5.37**	4.98***	7.08***	9.24***
d.f.	(3, 92)	(4, 91)	(3, 63)	(4, 62)
ΔR^2		0.03		0.12
Δ F		$3.40^{\dagger}$		12.01***
Δ d.f.		1		1

Note: $^{\dagger}p < 0.10$; $^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$, one-tailed test. Standard errors are in parentheses.

an over-perceived industrial instability. In order to further explore the relationship between the over-perceived industrial instability and organizational effectiveness, we conducted an additional analysis, as shown in Table 4.

In Table 4, we divided the sample into two sub-samples. The "under-perceived" sub-sample represents the top managers who perceive less industrial instability than there is, and the "over-perceived" sub-sample represents the top managers who perceive more industrial instability than there is. We conducted the same hierarchical linear regression analysis as we did to test the second hypothesis and we found interesting results. In the "under-perceived" sub-sample, organizational effectiveness improves as perceptual acuity increases ($\beta = 0.24$, $p < 0.05$, one-tailed test); however, in the "over-perceived" sub-sample, organizational effectiveness deteriorates as perceptual acuity increases ($\beta = -0.39$, $p < 0.001$, one-tailed test). This suggests that when top managers' perceptions lag behind real environmental changes, the correction of lagging perceptions does help to improve organizational effectiveness, which is in alignment with our hypothesis. However, when top managers are seeing more environmental changes surrounding them than are actually the case, the correction of over-exaggerated perceptions is negatively associated with the managers' evaluation of the organizational

effectiveness. In the "over-perceived" sub-sample, it seems that the more divergent a manager's perception from the reality — the more changes he believes that he can make to the environment — the better he thinks the firm's achievement should be.

Integrating both findings, we are able to offer a possible reason for the discrepancy between the assumptions of conventional strategic management research and entrepreneurship studies. In this project, we find that the objective sales performance does improve as perceptual acuity increases; so does the subjective organizational effectiveness in the "under-perceived" group. The top managers' evaluation of the organizational effectiveness, however, will improve when the gap between the managers' perceptions and the objective instability grows larger in the "over-perceived" group. We suspect that managers who "over-perceive" the external changes tend to be the ones who are more proactive and aggressive, and thus may be more entrepreneurial in leading industrial trends. They use their own subjective standards rather than objective standards to gauge organizational effectiveness. When they expect more but it turns out later that the firm performance is constrained by objective conditions, they may feel frustrated. Thus, when they have to adjust their expectations from high to low, they may feel that the firm does not meet what they originally expected, even though that expectation was not realistic, and a lower evaluation results. Our findings may provide a clue to what the true value of an overly-exaggerated perception is. Over-perceived industrial instability may help to improve the managers' evaluation of the organizational effectiveness, benchmarked to their own standards; however, it may not contribute to the actual objective performance. An organization's actual performance is still constrained by the environmental conditions.

This finding provides important implications for Chinese managers in adjusting their expectations regarding to the difference between what they *can* achieve and what they *want* to achieve. Our study reveals that although the objective organizational performance improves with increased perceptual acuity, the organizational effectiveness assessed by managers worsened as perceptual acuity improves. This inaccurate assessment of organizational effectiveness is largely derived from the unrealistic expectation that managers have for their firms' performance. Our study indicates that no matter how much managers believe that they can change their surroundings and environments to fit their objectives, the reality is that the environment has a significant constraining effect on their firms. Consequently, managers need to be aware of unrealistic expectations of their firms' performance and collect more information so as to accurately perceive the constraints imposed

by the environment. Such an accurate perception is proved to be vital to a firm's success.

Our research has presented interesting results and provides a useful start for future studies in this research venue. We feel that a more comprehensive conclusion about an over-perceived instability can be drawn when more performance assessment instruments are included and evaluated. A long-term advantage may be identified for such an over-estimated perception as entrepreneurial firms are acting "in anticipation of future problems, needs, or changes" (Lumpkin and Dess, 1996: 146). Or, a comprehensive performance measure that includes all business lines of a firm may be able to more precisely identify the entrepreneurial performance advantage as entrepreneurs keep "seeking new opportunities which may or may not be related to the present line of operations, introduction of new products and brands ahead of competition, strategically eliminating operations which are in the mature or declining stages of the life cycle" (Venkatraman, 1989: 949). Given that entrepreneurs often have different goals in market competition, a composite performance measure that covers different aspects of an organization may also help to identify the virtues of an entrepreneurial perception pattern (Baligh *et al.*, 1996).

We realize that we cannot include all the above propositions in this paper and we are hoping that our project can stimulate more interests in this area. We believe that as new management theories and domains, e.g., entrepreneurship, emerge, conventional thoughts may be challenged and new findings will cast fresh perspectives on our understanding of organization systems.

ENDNOTE

[1] We further verified this inverted U-shaped relationship by investigating the relationships between EO and perceptual acuity in both under-perceived and over-perceived subsamples. We found that in under-perceived subsample, as EO increased, instability perception increased and approached to the objective instability level — perceptual acuity improved; while in over-perceived subsample, as EO increased, instability perception increased and deviated away from the objective instability level — perceptual acuity deteriorated. Thus, this result further verified the existence of the over-perception mode among entrepreneurial firms.

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