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COGNITIVE CONTROL BIAS AND DECISION-MAKING IN CONTEXT: IMPLICATIONS FOR ENTREPRENEURIAL FOUNDERS OF SMALL FIRMS

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ABSTRACT

Quality decision-making for founders of small firms can be critically important for firm success and survival. Using a longitudinal sample of 164 small firm founders, we examine the main and moderating effects of illusions of control, time stress, and prior industry experience on the decision quality associated with a business decision. As predicted, illusions of control have a negative effect on decision quality. Additionally, both time stress and prior industry experience significantly enhance this relationship, such that higher levels of stress and experience lead to much lower decision quality for founders of small firms.

INTRODUCTION

Humans tend to exaggerate the degree of control they have over events, discounting the role of luck (Lovallo & Kahneman, 2003). Entrepreneurs are particularly susceptible to these “positive illusions” (Simon, Houghton, Aquino, 2000; Taylor & Brown, 1988). The entrepreneurial situation is characterized by risk and uncertainty (Knight, 1921; McMullen & Shepherd, 2006; Miller, 2007), with illusion of control constituting a very effective mechanism to reduce this uncertainty (Baron, 1998). Moreover, entrepreneurs face high novelty, strong emotions, high time pressure, and fatigue (Baron, 1998).

These conditions lead to an increased susceptibility to biases and heuristics when entrepreneurs make critical decisions regarding their businesses. Many of the decisions that the entrepreneur makes can be characterized as “hot” decisions (Janis & Mann, 1977), which represent decisions that are either vital and/or affect-laden in contrast to routine problem solving within their businesses. These types of “hot” decisions exist because they can represent critical instances that could potentially involve the survival of the firm (Altman, 1968), with the entrepreneur generally invested emotionally into their venture (Baron, 2007; Baron, 2008). Friedland, Keinen and Regev (1992) explain that the need to compensate for the stress produced through loss of perceived control leads to increased illusion of control. Specifically, those authors claim in reference to Anderson (1976) and Vroom (1964) that stress effects a narrowing of attention and leads to an inward focus. This internally-oriented perspective can lead to a number of negative effects when it comes to making decisions, plans and predictions (Kahneman & Lovallo, 1993; Kahneman & Tversky, 1979). Additionally, this stress-induced inward focus may result in the entrepreneur ignoring a number of important factors, such as competitors.

Moreover, the particular cognitive make-up of the entrepreneur affects these decisions. Entrepreneurs have been shown to be different in their cognitive make-up from the rest of the population (Baron, 1998), with research indicating that entrepreneurs are subject to a number of cognitive biases such as overconfidence, representativeness, and optimism (e.g., Cooper, Woo, Dunkelberg, 1988; Baron, 1998; Busenitz & Barney, 1997). In this paper, we are particularly interested in the effects of illusion of control (Langer, 1975) on the quality of decisions that

entrepreneurs make in such hot cognitive contexts. Past research on control biases has been focused on risk (Begley & Boyd, 1987; Brockhaus, 1980; Das & Teng, 1997; Wayne & Roth, 2001). Yet, illusions of control are highly tied to decision making and influence the decision making process directly (Friedland, Keinan, & Regev, 1992). We show that illusion of control is negatively related to entrepreneurial decision making, and that factors such as stress and prior experience can increase this bias, to the detriment of the entrepreneurs and their firms.

THEORETICAL DEVELOPMENT

Entrepreneurs face a number of critical decisions throughout the establishment of their firm. Given the particular circumstances of the entrepreneurial situation, to include scarce resources and “liabilities of newness”, the entrepreneur faces “hot” decisions (Janis & Mann, 1977) that require a careful analysis of alternatives. The quality of these decisions can be crucial for the survival of the company, since they could impact both the evaluation of future opportunities and venture performance.

In the entrepreneurship literature, the focus has been on an entrepreneur’s orientation towards risk when making decisions (Begley & Boyd, 1987; Brockhaus, 1980). While it appears reasonable to assume that entrepreneurs have a different risk propensity from non-entrepreneurs or managers (entrepreneurs are risk takers vs. managers are risk bearers), Brockhaus (1980), for instance, could not find a difference in risk propensity between entrepreneurs and managers. It has then been argued that entrepreneurs may be subject to the same risk propensity as non-entrepreneurs but they perceive the risk differently. For example, Mullins and Forlani (2005) analyzed the impact of risk propensity and risk preferences on entrepreneurial decision making, and found that successful entrepreneurs made decisions from a relatively risk-averse standpoint. Interestingly, entrepreneurship research focuses very little on examining decision processes and decision quality (Miller, 2007). Typically, variables such as opportunity identification and evaluation are examined. However, the decision making behavior of entrepreneurs is arguably determinant in this process. To date, little research has examined the biases which affect entrepreneurial decision making behavior. One particular bias that has been linked to the quality of decisions is illusion of control.

Illusion of control is defined as “an expectancy of a personal success probability inappropriately higher than the objective probability would warrant” (Langer, 1975). Langer postulated that illusion of control results from the confusion of uncontrollable and controllable situations. In other words, illusion of control is present whenever people act as if they can attempt to influence outcomes of pure chance events by similar “skillful” actions (Budescu & Bruderman, 1995). Entrepreneurs are associated with illusion of control oftentimes as a result of their tendency to overestimate their ability to succeed in uncertain or unpredictable environmental situations (Teece, 1986; Zajac & Bazerman, 1991). Specifically, there are two recent studies that relate illusion of control to entrepreneurial outcome variables: Simon, Houghton and Aquino (2000) and Keh, Foo and Lim (2002). Keh et al. (2002) find that the effect of illusion of control is fully mediated by risk perception. The latter authors argue that entrepreneurs are able to influence future outcomes and can take the appropriate actions to hedge the risk. Yet, entrepreneurs do not believe that they can control the market given the limited size of their business. Simon et al. (2000) found in their study with MBA students that illusion of control was negatively related to the decision to start a venture. Both studies, however, show a positive relationship of illusion of control with entrepreneurial outcome variables (venture formation and opportunity evaluation respectively). Opportunity evaluation was measured in Keh et al. (2002) in a relatively generic scenario. Although the case vignettes that those authors used are carefully written, we do not learn

much more about the validity or the reasons why the participants determine the business situation to be evaluated as a high potential opportunity or not. The relationship between illusion of control and risk taking has been shown in various other studies (e.g., Horswill & McKenna, 1999). In their study, half of the participants were drivers and passengers of a simulated vehicle. The increased control (for those who were drivers) leads to greater levels of risk taking. In other words, when in control of the situation, the subject will take more risk than when not.

Fenton-O’Creevy et al. (2003) found using a sample of financial traders that are subject to higher illusions of control obtain worse trading results than ones that are subject to lesser illusion of control. Specifically, those authors argue that illusion of control causes traders to persist in primary control behavior (seeking to control the environment) when secondary control behavior (adaptation to the environment) would be more appropriate. Therefore, those authors conclude that traders with higher propensity of illusion of control will be less effective than ones with lower propensity of illusion of control.

Illusion of control has been associated with poor financial outcomes as well. Fellner (2009) showed that illusion of control constitutes a source of poor diversification. Specifically, Fellner illustrates in her experiments that subjects with higher levels of illusion of control excessively invest in a risky alternative when they are in charge. It is interesting that this effect is amplified when self-selection is possible and is mitigated when a well-diversified portfolio is offered. Rarely is the decision quality of a particular decision situation examined in an entrepreneurial context. Yet, research would suggest that when we consider decision quality itself, the heuristics and biases that are in effect for entrepreneurial decision making, such as positive illusions to control, would lead to lower decision quality. This is in line with Kahneman and Tversky’s assumptions that biases are associated with negative effects (Kahneman & Tversky, 1996). We suggest that illusion of control leads entrepreneurial firm founders to consider a limited number of alternatives in the decision making process, and subsequently make less comprehensive decisions which leads to lower decision making quality. Therefore, we propose:

H1: High illusion of control will lead to lower decision quality.

Impact of Perceived Time Pressure or Stress

Due to factors related to running a small business, the entrepreneur is under relatively high time stress constraints. First, the volume of the business operations of the firm may not justify the employment of different people for the various functions, and the firm may not be able to employ many people due to resource constraints. The effect of this will be that the entrepreneur will do several jobs at a time in the early stages of the company’s development. Entrepreneurs may need to raise more capital while paying attention to the ongoing business operations. Doing all those things simultaneously and worrying about the development of the company will lead to fatigue in the entrepreneur and hence at a certain point may slow down cognitive processing (Baron, 1998). This then increases the perception of time pressure. Second, the entrepreneur may be subject to higher time stress because of the fact that entrepreneurs experience more regret for missed opportunities than for opportunities that they exploited and failed: “Entrepreneurs are especially vulnerable to the missing-the-boat risk: their first chance is often their last” (Das & Teng, 1998, p. 73). This can further add to the founder’s perceived time stress.

Other factors, to include escalation of commitment (McCarthy, Schoorman & Cooper, 1993), may require the entrepreneur to invest more and more time into their firm and less in their personal relationships. These factors pertaining to the entrepreneurial situation and the cognitive

and behavioral make-up of the entrepreneur suggest that the entrepreneur is subject to increased time pressure. We assume that this increased time pressure can lead to a decrease in decision quality. It seems reasonable that under general circumstances, a decision that is taken faster is less comprehensive. Less comprehensive decisions are generally associated with lower decision quality (Fredrickson, 1984; Fredrickson & Mitchell, 1984). Therefore, we assume that the perceived time pressure of the entrepreneur increases the negative effect that illusion of control has on decision quality.

(H1a) Perceived time stress will moderate the relationship between illusions of control and decision-making quality, such that the negative relationship between illusions of control and decision quality will be stronger when time stress is higher rather than lower

Impact of Prior Experience

Entrepreneurs who have started various ventures, so called habitual or serial entrepreneurs, are likely to have gained knowledge in the various areas of the venture process such as knowledge about financing sources (Starr & Bygrave, 1991) and managerial and technical skills (Wright, Westhead & Sohl, 1998). Entrepreneurial experience is relevant in many ways. Zhao, Seibert and Hills (2005) demonstrate that entrepreneurial experience increases self-efficacy, which in turn leads to better decision quality.

Interestingly, Hmieleski and Baron (2009), in their study of the effect of entrepreneurial optimism on new venture performance, found a strong negative moderating effect of entrepreneurial experience. They suggest that people that are optimistic are also likely to be prone to confirmation bias. The combination of optimism and confirmation bias will lead to the entrepreneurs focusing more and more only on positive information. Ultimately, more experience enhances this cognitive bias because only the positive aspects of any decision are reinforced and reasons that could yield negative results are overlooked.

Baron (2004) explains this process in psychological terms: the cognitive profile or schemas of individuals can be shaped by experience. Yet, this experience can be a hindrance to learning. Particularly, prior failure can restrict motivation to try again (Shepherd, 2003). Several studies such as Ucbasaran, Westhead, & Wright (2009) find a positive effect of experience on their dependent variable. Those authors showed that experienced entrepreneurs identified more opportunities and the opportunities they exploited were more innovative. It has to be noted that errors of omission and commission are not part of these types of analysis and hence it is hard to compare the results to the current study of decision quality.

Fenton et al. (2003) explain that learning effects influence the illusion of control in several ways. If the entrepreneurial founder has substantial experience in the field of his start-up business, the entrepreneur will be less attentive and more complacent, since they are likely to use their past experience to “short-cut” the need to be vigilant in their decision-making. We suggest that complacency will increase with experience and attention to the detail of the decision situation will decrease. Firm founders that have prior experience may overly generalize from their prior business experience to the new situation without studying the new decision situation at hand in depth. Therefore, we propose:

(H1b) Prior experience will moderate the relationship between illusions of control and decision-making quality, such that the negative relationship between illusions of control and decision quality will be stronger when experience is higher.

METHOD

The sample was drawn from a panel of small business owners, who participated in a longitudinal study. “Small business owners” were defined as owners of firms with less than 20 employees. The panel is maintained and managed by MarketTools, with demographic information generally mirroring the U.S. Census demography. From the panel of small business owners, 2,500 panelists were randomly selected and asked to participate in both an initial survey that captured the control and independent variables, and a follow-up survey that captured the decision quality dependent variables. 544 small business owners responded to the initial survey, for a wave 1 response rate of 21.8%. After approximately two weeks, the wave 1 respondents were surveyed again, with a follow-up sample size of 247 and overall longitudinal response rate of 10%. The focus of our study is on owner-founders, so a further filtering question was used to generate a sample that consisted of 192 firm founders.

An additional challenge with regards to the sample was the presence of missing data within the industry experience variable, as well as the classification variables used to capture decision quality. The decision quality measure was created through the analysis of responses to several open-ended questions. Not all respondents chose to answer all of the decision quality questions, so we chose to classify those respondents who did not answer a majority of the open-ended questions as missing, as opposed to “0”. As a result, our overall analytic sample was 163 founders.

Measures

Measures used in this study have been adapted from previous research within the entrepreneurship and decision quality literatures. Several control variables were used in the analysis. These variables were included to control for the possibility that individual demographics or firm-related characteristics may influence the proposed relationships. For firm-related controls, we used the number of employees within the firm and the firm age. For individual demographic controls, we included the respondent’s age, educational attainment, gender, and race.

Illusions of control was measured using a three item scale developed by Langer and Roth (1975) and adapted and used by Keh, et al. (2002). These items were developed to capture the accuracy the founder felt in making predictions on their business demand and market. Using a 7 point Likert scale, the items used were “I believe I can accurately predict the total market demand for my firm,” “I believe I can accurately predict when a larger competitor will enter the market,” and “I believe I can succeed at making this firm a success, even though many other businesses like mine will fail.” Consistent with other studies, the Cronbach’s alpha for this scale was .76. Time stress was measured using a four-item scale designed to capture the degree to which activities involving work place founders in a position to feel stressful regarding their time. Using a 7-point Likert scale, the items used were “I have too much work and too little time to do it in”, “I sometimes dread the telephone ringing at home because the call might be job or work-related”, “I feel like I never have a day off”, and “Too many people at my level in the company get burned out by job demands”. Cronbach’s alpha for this scale was .78. As mentioned previously, learning effects are likely to influence the degree to which a firm founder makes quality decisions. For our study, we captured the number of years of personal work experience that the firm founder had in their respective industry, as a measure of this variable.

Janis and Mann’s (1977) conflict model of decision-making developed seven procedural criteria to capture decision quality in situations that were deemed to involve or arouse “hot” cognitions. “Hot” cognitions would typically involve decision-making situations where one is

faced with potentially vital or critical concerns, such as one's safety, security, or health. These conditions could also involve situations where things of value or importance are in play, and may be threatened should a poor decision be made. The conflict model of decision-making is quite appropriate for small firm owners/founders since they may face decision scenarios that could represent significant personal loss. Since small firms often do not have the resource slack necessary to survive poor decisions, when faced with decision-making situations that arouse "hot" cognitive states the model would predict that quality decisions are made when founders follow an information processing approach that capitalizes on seven procedural criteria.

Generally speaking, these seven criteria include 1) canvassing a wide range of alternatives; 2) surveying the range of objectives you have that must be met or fulfilled; 3) carefully weighing the costs and benefits of alternatives; 4) searching for additional information on relevant or appropriate alternatives; 5) taking into account new information that may even contradict prior judgments; 6) re-examining consequences, prior to choosing a final alternative; and 7) making detailed provisions for implementation of the chosen decision, to include contingent plans. For our study, we sought to create a scenario that would place a small business owner in such a cognitive state. Through a series of iterations among the study authors and colleagues at several universities who have conducted research using the conflict model, we developed a short, business-related scenario that we felt would place the firm founder in such an unstable and potentially business-threatening position. The scenario had to be crafted such that business costs were potentially high, and a failure to carefully consider alternatives could place the founder's business in jeopardy. The results of our effort created the following scenario:

"You learn that your primary business competitor is developing a new product or service that is expensive to create and is an improvement over your product or service. You also discover that your competitor is using knowledge critical to your own business to develop their new product or service."

After reading the scenario, respondents were asked seven open-ended questions that captured the seven procedural steps required to make a quality decision as outlined by Janis and Mann (1977). For example, with regards to step two of the conflict model mention above, our question was "How would the goals of your own business relate to the above-described situation?" The open-ended comments were content analyzed and coded jointly by the study authors to the degree that the respondent followed the conflict model step. Again, given the responses to step two, respondents scored a "1" if a goal is simply stated, or a range of scores from 2-4 that captured the degree of elaboration that the respondent gave to link their own business goals related to the scenario. The scores for each of the seven questions were then added, to create a summative scale that captured decision quality. Independent study variables used for hypotheses testing were standardized prior to empirical analysis, to avoid potential multi-collinearity within the results. Hypotheses were tested using hierarchical linear regression, and a cross-product term was used to capture the moderating effect of time stress and prior industry experience with illusions of control on decision quality.

RESULTS

Means, standard deviations, and bivariate correlations for study variables are presented in Table 1. All of the study variables appear correlated in the direction expected.

Regression Results for Time Stress and Prior Industry Experience

Table 2 and Table 3 provide supportive regression results testing the main predictive effect of illusions of control on decision quality ($p < .05$), supporting hypothesis 1. Higher levels of illusions of control led to lower levels of decision quality, in the presence of our control variables. After the inclusion of the controls and primary study variables, the interaction term of illusions of control and time stress was significant and negative ($p < .05$) when predicting decision quality, thus supporting hypothesis 1a. A similar approach was used to test hypothesis 1b with illusions of control and prior experience as the independent and interaction variables. In this case, the interaction term was again significant and negative, thus providing support for hypothesis 1b. Results are presented in Tables 2 and 3.

The significant moderating effects of time stress and prior experience on the illusions of control-decision quality relationship are shown in graphical form in Figures 1 and 2. Based upon visual inspection, both moderating effects were consistent with predictions. Simple slope tests were conducted to determine whether the high or low moderating effects were different from zero, following Aiken and West's (1991) regression approach. Using the mean values of time stress and prior experience respectively, new values were created that were 1 SD above and 1 SD below the mean value, and entered following the same hierarchical regressions steps shown in Tables 2 and 3. In both cases, the effects were strong and supportive of our hypothesized relationships.

DISCUSSION

Our study demonstrates that higher levels of illusion of control among entrepreneurial firm founders are negatively associated decision making quality. In addition, our study showed that additional context factors that closely associated with small firms, such as time stress and prior experience magnify these negative effects between illusion of control and decision quality. Our research contributes to the literature linking entrepreneurial cognition to outcomes by examining these relationships on an understudied yet critically important aspect of a small firm, namely the decision quality they use when making important decisions. The conclusions of our research point to the paradox that exists for some small business owners. While it would appear that experience matters when making decisions, when faced with a critical decision those founders that have high levels of illusion of control may fall back on their own cognitive biases much more easily, and thus make poorer decisions as their experience increases.

Additionally, our study follows the call for more process research in entrepreneurship (e.g., Eckhard & Shane, 2003; Miller, 2007) by taking into account the entrepreneurial decision making process and its quality using a longitudinal survey of small firm founders. We surveyed entrepreneurs and analyzed the effect of illusion of control in a practical decision process. As opposed to existent studies (e.g., Simon et al., 2000; Keh et al., 2002), we chose not to focus on the evaluation of opportunities. We argue that the latter approach would leave the different characteristics of a particular decision under studied.

There are several other factors that this study does not yet consider. The decision making styles (e.g., Briggs Myers, 1962), for instance, are very likely to have an impact on decision quality. We suggest that future research goes into these styles in much more detail, using various decision making scenarios in order to assess the decision quality in a more comprehensive manner. This could further generate more generalizability for the current study. Additionally, we believe that the role of other cognitive biases and heuristics may also directly or indirectly impact small firm decision-making. For example, the role of planning fallacy and overconfidence has only recently

been examined using entrepreneurs as subjects. Future research should explore these cognitive biases, in order to further advance our understanding of entrepreneurial decision making.

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TABLE 1

Descriptive Statistics, Reliabilities, and Correlations for Study Variables (n=163)

Variable	Mean	s.d.	1	2	3	4	5	6	7	8	9	10
1. Number of employees	7.95	5.66										
2. Firm age	13.25	9.49	.16*									
3. Education	3.02	1.15	-.02	.16*								
4. Age	50.88	10.36	-.02	.46**	.17*							
5. Gender	1.40	.49	.00	-.14	.23**	.25**						
6. Race	3.06	.71	.13	.10	.01	.09	-.04					
7. Illusions of control	5.09	1.03	.13	.14	.13	.10	.05	.05				
8. Time stress	3.68	1.52	.12	-.07	-.12	.27**	.31**	.01	.24*			
9. Industry experience	21.78	11.06	.06	.49**	.11	.62**	.28**	.05	.06	.16		
10. Decision quality	8.10	5.02	.00	-.03	.14	-.02	.15	.08	-.10	.06	.09	

* $p < .05$; ** $p < .01$

TABLE 2
Results of Multiple Regression Tests of Illusions of Control and Time Stress
Variables on Decision Quality ($n=163$)^a

Predictors	Step 1	Step 2	Step 3
Number of employees	.02	.07	.08
Firm age	-.09	-.06	-.06
Education	.19*	.21*	.21**
Age	.08	.05	.03
Gender	.20*	.26**	.26**
Race	-.07	-.08	-.08
Illusions of control		-.17*	-.17*
Time stress		-.18*	-.19*
Ill. of control x Time stress			-.16*
ΔR^2		.04*	.03*
Total R^2	.07	.11*	.13**

^a Main effect variables standardized, prior to entry.

* $p < .05$; ** $p < .01$

TABLE 3
Results of Multiple Regression Tests of Illusions of Control and Industry
Experience Variables on Decision Quality ($n=154$)^a

Predictors	Step 1	Step 2	Step 3
Number of employees	-.08	-.07	-.08
Firm age	-.01	.02	.03
Education	.17*	.19*	.20*
Age	-.04	-.07	-.08
Gender	.19*	.20*	.19*
Race	-.05	-.06	-.07
Illusions of control		-.16*	-.20*
Industry experience		.04	.05
Ill. of control x Ind. experience			-.16*
ΔR^2		.03	.03*
Total R^2	.06	.09	.12*

^a Main effect variables standardized, prior to entry.

* $p < .05$; ** $p < .01$

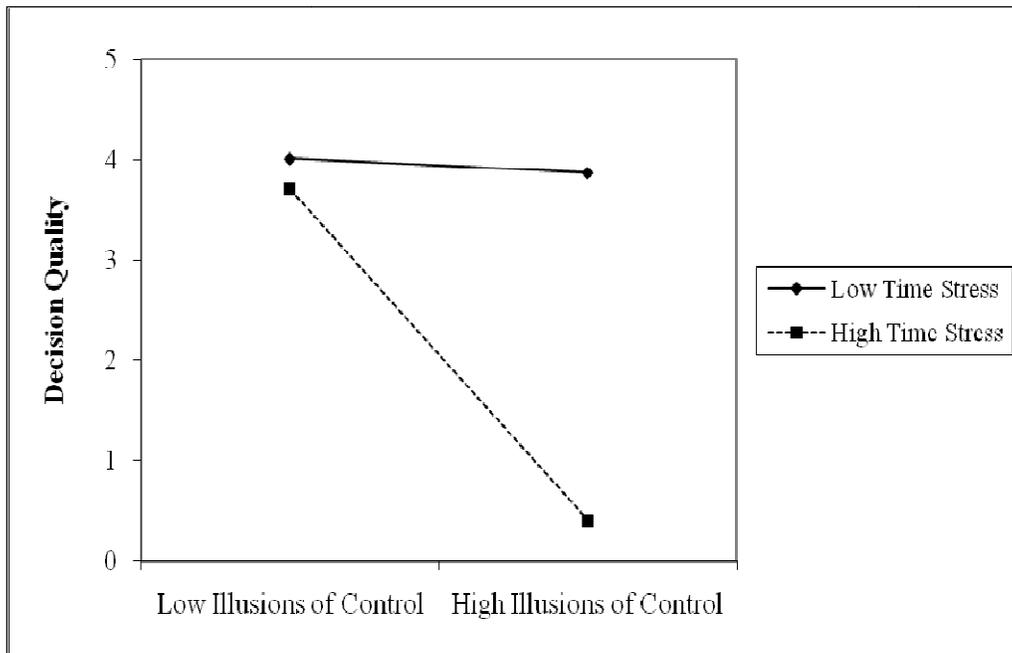


FIGURE 1. Interaction Effects of Illusions of Control and Time Stress on Founder's Decision Quality

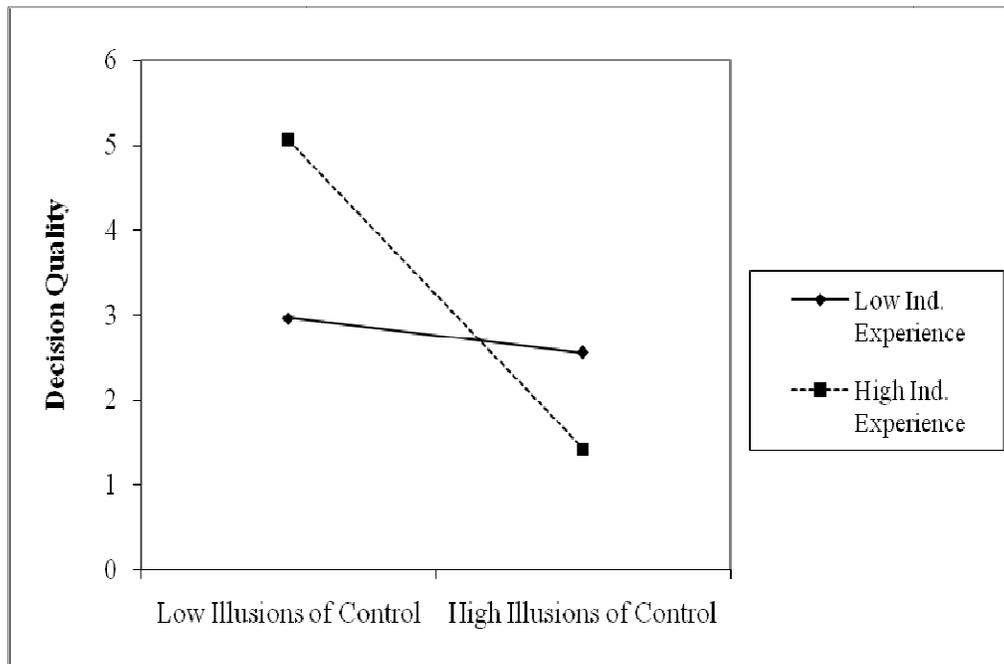


FIGURE 2. Interaction Effects of Illusions of Control and Industry Experience on Founder's Decision Quality