An experimental study of entrepreneurial exploitation

Steven E. Phelan
G. Stoney Alder
Department of Management, University of Nevada Las Vegas

Abstract
Nexus theory (Venkataraman 1997, Shane and Venkataraman 2000, Shane 2003) predicts that entrepreneurial behavior will result from an interaction of environment, psychological characteristics and experience. In this paper, we utilized a laboratory bargaining experiment to partially test nexus theory, focusing exclusively on the resource acquisition phase of the entrepreneurial process. As predicted, we found that possession of a bundle of entrepreneurial traits we labeled ‘entrepreneurial competence’ improved profit performance on a bargaining game but only for subjects with previous task experience.

INTRODUCTION

Until recently, the prevailing wisdom in entrepreneurship has been that psychological characteristics do not reliably distinguish entrepreneurs from non-entrepreneurs (Brockhaus and Horwitz 1986, Gartner 1988). In fact, even the most promising traits (such as need for achievement or locus of control) have not distinguished entrepreneurs from managers or other successful people (Low and MacMillan 1988, Busenitz and Barney 1997). Recently, however, there has been a renewed interest in research on entrepreneurial traits driven by greater methodological sophistication and a more nuanced examination of the entrepreneur and the entrepreneurial process (Stewart, et al. 1999, Stewart and Roth 2001, Ciavarella, et al. 2004, Collins, et al. 2004).

One response to this trend has been the development of “individual-opportunity nexus” theory (referred to hereafter simply as Nexus theory) (Venkataraman 1997, Shane and Venkataraman 2000, Eckhardt and Shane 2003, Shane 2003). In nexus theory, the discovery and exploitation of an opportunity is conditioned by (among other things) prior experience and psychological characteristics. One implication of the theory is that the possession of relevant psychological characteristics will not predict opportunity identification, venture formation, or venture success. Rather, it is the interaction of prior knowledge with relevant psychological traits that drives entrepreneurial behavior (Shane 2000). Moreover, the relevant mix of knowledge and traits might vary across entrepreneurial stages. To date, entrepreneurship research has assumed that “factors that lead to entrepreneurial activity also enhance performance” but this may not be the case (Shane 2003, p. 265).

The purpose of this study is to provide a direct, albeit partial, test of nexus theory. Specifically, we argue that entrepreneurial behavior is driven by an interaction between psychological characteristics and prior experience. We deliberately restrict the scope of the study to the resource acquisition aspect of opportunity exploitation, which has been described as “perhaps the most under-researched aspect of the individual and venture
creation” (Shook, et al. 2003, p. 390). We argue that the characteristics for successful resource acquisition should vary from the traits associated with other entrepreneurial stages. These issues are explored with the use of an experimental bargaining game that allows us to systematically vary the task experience among participants and directly measure resource acquisition performance.

THEORY AND HYPOTHESES

In this section, we first define entrepreneurship and describe the type of entrepreneur we are interested in studying. We then examine opportunity exploitation in the context of entrepreneurship with a particular focus on the resource acquisition phase. Finally, we consider the role of individual differences in opportunity exploitation, including psychological traits, prior knowledge, and the nexus of traits and knowledge.

Definitions

In line with Austrian/Schumpeterian economics, we define entrepreneurship as “the recombination of resources in the expectation of profit” (Schumpeter 1934, Hayek 1945, Kirzner 1973, Casson 1982, Shane 2003). These new combinations may include new products, new markets, new processes, or new ways of organizing. However, unlike other views on entrepreneurship, our definition does not necessarily imply the creation of new ventures (see Gartner 1988). In our view, speculators and corporate venturers are just as ‘entrepreneurial’ as small business owners and inventors (Vesper 1980, Casson 1982).

Entrepreneurial profit arises when the value of the resources in their new use exceeds the value of the resources in their old use (Barney 1986). Interestingly, there is an assumption that the gains will always flow to the entrepreneur but this is only true if the entrepreneur had complete ex ante control of the relevant resources before the recombination occurred. Otherwise, some of this value may have to be shared with the prior owners of the resources, or strategic factor owners (Barney 1986). In fact, entrepreneurs rarely have complete control over all of their resources. Some resources, such as human capital, cannot be owned, and thus ongoing bargaining with stakeholders is the norm (Coff 1999). The total value of an entrepreneurial initiative to the entrepreneur is thus the capitalized value of the residual entrepreneurial profits after such bargaining (Lewin and Phelan 1999).

It follows that an entrepreneur is one who undertakes entrepreneurship, or the recombination of resources in the expectation of entrepreneurial profit. There is a difference between expected and realized profit because of the inevitable passage of time required to assemble and deploy resources to their new uses. Thus, entrepreneurs usually bear some risk in their activities. Entrepreneurs tolerate these risks because of their desire for profit. The desire for profit distinguishes our entrepreneur from other types of entrepreneurs, such as Smith’s craft entrepreneur or Carland’s small business owner who pursue self-employment for personal (i.e. non-profit) motives (Smith 1967, Carland, et al. 1984).
Government and society represents another stakeholder in the entrepreneurial process. Historically, capitalist societies have resisted alienating all entrepreneurial profit because, in the long run, entrepreneurial behavior serves to allocate society’s resources to more (socially) efficient uses (Hayek 1945). Through the invisible hand (Smith 1776) or its handmaiden, creative destruction (Schumpeter 1934), entrepreneurs serve to increase the general well-being of society. However, we reject Davidsson’s (2003) claim that entrepreneurs intend to create both private and public wealth whereas arbitrageurs intend to create only private wealth. We prefer Adam Smith’s observation that “…by directing that industry in such a manner as its produce may be of the greatest value, [the entrepreneur] intends only his own gain, and he is in this, as in many other cases, led by an invisible hand to promote an end which was no part of his intention” (Smith 1776, Book IV).

**Opportunity Exploitation**

While much attention has been focused on the discovery and decision to exploit an opportunity (i.e. to start a new venture), must less attention has been focused on the actual exploitation phase of the entrepreneurial process (Shane 2003, Shook, et al. 2003). Clearly, a number of steps are required to launch and operate a venture beyond simply taking the decision to exploit an opportunity. Shane (2003) lists four steps beyond the decision to exploit: resource acquisition, entrepreneurial strategy, organizing process, and performance. Similarly, Gartner (1985) lists five behaviors: the entrepreneur accumulates resources, the entrepreneur markets products and services, the entrepreneur produces the product, the entrepreneur builds an organization, and the entrepreneur responds to government and society.

In this study, we restrict our attention solely to the resource acquisition or resource accumulation stage of opportunity exploitation. There are several reasons for this. First, very few businesses operate without having to acquire additional resources. Second, several classes of entrepreneurs, such as traders and speculators, engage exclusively in resource acquisition and disposal and may never build an enduring organization or “product” per se. Their entrepreneurial profits are realized through skilled “resource picking” (Makadok 2001). Third, in his general theory of entrepreneurship, Shane (2003) treats resource acquisition as if it was primarily about obtaining financial capital. However, we believe the term resource acquisition should also be extended to consider the acquisition of non-financial resources such as plant, property, and equipment as well as all forms of human capital (including knowledge, skills, and other people’s social networks). Fourth, as described above, this aspect of entrepreneurship is under-researched and thus represents an important gap in the literature that we seek to begin filling.

Skill at resource-picking is one of only two ways to generate wealth without initial endowments or luck (Makadok 2001). The other way is capability building. Resource picking involves acquiring and using superior resources within established routines (Barney 1986) whereas capability building involves deploying readily available resources in novel ways (Dierickx and Cool 1989). Makadok (2001) argues that these strategies can act as either complements or substitutes for one another at various times.
Nevertheless, acquiring superior resources on favorable terms and utilizing them in novel, inimitable ways will tend to create a strong and sustainable competitive advantage.

Central to the concept of resource picking is the notion that the entrepreneur must maintain some sort of information asymmetry with the resource holder that enables them to obtain the resource on favorable terms (Barney 1986). If the resource holder, or to use Barney’s terminology, the strategic factor holder, were to become aware of the future value of the resource they would adjust their price upwards thus reducing or perhaps even eliminating any residual entrepreneurial profits.

It should also be noted that physical possession of a resource is not required to earn entrepreneurial profits. It is often only necessary that the entrepreneur obtain the right to sell or realize income from a resource (Barzel 1989). For instance, common law assumes that the employer has the right to any inventions made by employees while in their employ. It is not necessary for an employer to “own” an employee to receive this benefit. The creation of an employment contract establishes this right. Another example is the common practice of buying call options on the futures market. A trader may never physically take possession of a stock, simply establishing the right to buy at a given price on a certain day and then liquidating the position on the same day by locating another trader willing to buy above the option’s exercise price. Resource picking therefore entails acquiring property rights over valuable assets, which may or may not include physical ownership or possession.

**Individual Differences in Opportunity Exploitation**

In this section, we consider the effect of individual differences on opportunity exploitation, and resource acquisition in particular. We begin with a review of research on psychological characteristics, move to a discussion of prior experience, and then consider the interaction between characteristics and experience.

**Psychological Characteristics**

A great deal of research over the course of several decades has been dedicated to the study of psychological characteristics that predict entrepreneurial behavior. Studies have tended to compare the traits of entrepreneurs with non-entrepreneurs and other professional groups, typically managers (Brockhaus 1982, Brockhaus and Horwitz 1986, Shane, et al. 2003). The underlying rationale is that entrepreneurs possess traits, dispositions, or motivations that systematically discriminate them from these other groups. While very few studies have examined resource acquisition per se, we can extend this logic to hypothesize that:

H1: The possession of relevant psychological characteristics will improve success at resource acquisition.

The descriptions of the psychological characteristics utilized in this study are presented in Table 1. The list can be divided into three groups: traditional entrepreneurial traits, Machiavellianism, and the Big Five. In the following sections, we discuss the rationale
for the inclusion of each of these groups and a discussion of their likely relevance to the resource acquisition process.

---

**Traditional Traits**

While a wide range of traits has been studied, *need for achievement, risk-taking propensity, locus of control, and propensity for innovation* have probably been the most studied characteristics of entrepreneurs (Stewart, et al. 1999). Recent meta-analytic studies have demonstrated that need for achievement and risk-taking propensity distinguish entrepreneurs from the general population (Stewart and Roth 2001, Collins, et al. 2004). Similarly, several studies have indicated that entrepreneurs possess higher scores on locus of control and innovation than the general population (Shane, 2003). There is an on-going debate on whether founders of small business are distinct from managers (Miner and Raju 2004, Stewart and Roth 2004) but recent evidence indicates that profit-seeking entrepreneurs possess a higher need for achievement, risk-taking propensity, and innovation than managers (Stewart, et al. 1999).

Evidence also suggests that need for achievement and locus of control are important contributors to venture success, as measured by firm survival and sales growth (Shane 2003, Ciavarella, et al. 2004). Similarly, Utsch and Rauch (2000) report that entrepreneurs with higher innovation scores experience higher employment and profit growth. However, Shane (2003) reports that higher risk taking has been negatively associated with firm performance.

There is very little evidence in the entrepreneurship literature on the role of traditional traits in resource acquisition. Ongoing venture performance may be a function of either effective resource picking and/or successful organizing so the effects of personality on resource acquisition are confounded with organizing ability.

Fortunately, negotiations research examines the effect of these variables on bargaining performance (Rubin and Brown 1975, Spector 1977, Greenhalgh, et al. 1985a). Bargaining has been defined as “the interaction between individuals over some sale or purchase” (Rubin & Brown, 1975, p. 2). Resource acquisition is thus arguably a subset of bargaining behavior. Bargaining research indicates that need for achievement, locus of control, and risk-taking are associated with a more competitive style of bargaining, which often ignores interpersonal cues and exploits opponents whenever possible (Rubin and Brown 1975).

Extending the research on entrepreneurship and negotiations, we argue that each of these variables should have a positive effect on research acquisition performance. For instance, a high need for achievement provides the motivation to achieve superior performance while a high locus of control provides the belief in personal control over the situation. Similarly, high risk represents a willingness to take more risks to achieve higher returns, while innovators will seek out novel approaches to gaining high returns.
H1a: Traditional entrepreneurial traits will be positively associated with resource acquisition performance

**Machiavellianism**
Phelan (2000) argued that successful entrepreneurs possess an ability to obtain resources on favorable terms from resource holders by manipulating expectations about the future value of resources. The ability to manipulate others forms the basis of the Machiavellianism personality construct. While Machiavellianism and manipulation have negative social connotations, the Jackson Personality Inventory labels the trait “Social Astuteness” and places it in the Opportunistic personality cluster. Similarly, Rubin and Brown (1975) found that high Mach subjects exhibit a complex, competitive interpersonal orientation. They argue that high Machs do not exclusively seek to exploit opponents but rather adjust their style based on both situational factors and opponent bargaining style. Christie and Geis (1970) likewise report that high Machs can be charming and are often natural leaders.

Machiavellianism has also been associated with superior bargaining performance (Christie and Geis 1970, Wilson, et al. 1996). Christie and Geis, for instance, reported that high Machs were present in all winning coalitions in a coalition bargaining game and were able to outperform others on a profit-sharing game by exploiting low Machs. Fry (1985) likewise reported that high Machs outperformed low Machs on face-to-face bargaining tasks, primarily through the use of emotional appeals. The bargaining paradigm has generally been concerned with the maximization of joint gain and has not directed a great deal of attention to personal profit seeking. However, Jones and White (1985) demonstrated that high Machs are equally adept at win-lose and win-win strategies. This reinforces the observation by Rubin and Brown (1975) that high Machs are flexible bargainers. On the basis of the existing theory and evidence we expect that:

H1b: Machiavellianism will be positively associated with resource acquisition performance.

**Big Five**
The Big Five measures of personality have been popular in organizational behavior and psychological research because of their independence (loading onto five distinct factors) and stability (Goldberg 1990). Recently, the Big Five measures of personality have been used to differentiate entrepreneurs from managers and the general population (Nicholson 1998, Ciavarella, et al. 2004). Ciavarella et al (2004) reported that long-term venture survival was positively associated with conscientiousness and negatively associated with openness to experience. Moreover, Nicholson (1998) reported that successful entrepreneurs scored higher on conscientiousness and assertiveness (a facet of extraversion) than managers. He also found that managers and entrepreneurs scored higher than the general population on extraversion and conscientiousness but lower on neuroticism and agreeableness.
Barry and Friedman (1998) examined the Big Five factors in integrative and distributive bargaining situations. They found that agreeableness was negatively associated with distributive bargaining performance while extraversion was positively related to economic gain. They concluded that a subject’s approach to social interaction was important in distributive bargaining situations. Despite hypothesizing that conscientiousness should be related to integrative bargaining performance, they reported no other significant findings in either distributive or integrative bargaining.

Extraversion clearly plays a role in facilitating social interaction and seems to be important for effective bargaining and entrepreneurial success. Conscientiousness is related to task persistence and should be related to superior performance. Agreeableness, on the other hand, implies a willingness to concede to the demands of others and suggests weaker bargaining outcomes. As such, we predict:

H1c: Extraversion and conscientiousness will be positively associated with resource acquisition performance.
H1d: Agreeableness will be negatively associated with resource acquisition performance.

Prior experience
Quite a body of evidence has been assembled on the effects of various life experiences on the decision to exploit an entrepreneurial opportunity. In a wide-ranging review of the literature, Shane (2003) finds positive links between income, unemployment, marital status, education, social networks, and career experience (the latter category including general business experience, functional experience, industry experience, and start up experience). Shane (2003) also presents evidence of a positive relationship between new venture success (i.e. growth, profitability, and survival) and prior experience, particularly career experience and education.

Prior experience can create “knowledge corridors” that make some opportunities evident to people from certain backgrounds and virtually invisible to those without the right training and experience (Venkataraman 1997, Shane 2000). To the extent that we all have different experiences, we will all react to new information in different ways. However, Shane and Khurana (2003) argue that career experience may be one of the most important influences linking individual processes to firm foundings. Similarly, Stuart and Abetti (1990) have presented evidence that entrepreneurial experience has a positive effect on early startup performance.

In the bargaining literature, Thompson (1990) has demonstrated that experienced bargainers are able to improve their profit performance over naïve bargainers even on unrelated bargaining tasks. Thus, subjects appeared to be learning better strategies for bargaining and not just learning better ways to exploit a given task. We would argue that the previous observations also extend to the resource acquisition process:

H2: Subjects with more experience on a resource acquisition task will be more successful than naïve subjects.
Nexus Theory
According to Shane (2003), a profit-seeking entrepreneur is more likely to exploit an opportunity as the value of that opportunity increases. He argues that the expected value of an opportunity is influenced by a nexus of three factors: 1) the munificence of the institutional and industry environment, 2) the psychological characteristics of the entrepreneur, and 3) the entrepreneur’s non-psychological characteristics, primarily training and career experience. As such, nexus theory is curiously reminiscent of the person-situation debate in psychology (Kenrick and Funder 1988) and similar debates in leadership (Fiedler 1967, Vroom and Yetton 1973) and negotiation (Greenhalgh, et al. 1985b).

In this study, we control the opportunity. All subjects have equal access to the opportunity. In fact, the payoff for every possible action is fully known to each participant thus the only factors that vary in the design are the subject’s experience and personality. According to nexus theory, relevant experience makes it more likely to identify and exploit an opportunity. However, not all people will be equally motivated. Only those with relevant personality characteristics will choose to exploit the opportunity. This is the nexus or interaction effect between personality and experience.

Moreover, the experience and personality characteristics needed to motivate one to exploit an opportunity might vary from those required to successfully realize the profit opportunity. The characteristics for successful resource acquisition may likewise vary from those required for long term venture success. However, if nexus theory is correct, it follows that:

H3: Experience and relevant entrepreneurial will interact to influence resource acquisition performance.

METHOD

Subjects
A total of 152 students (83 undergraduate and 69 MBA) participated in the study. Of these, 85 were male, 65 were female, and 2 did not specify gender. The average age of the participants was 27.8 years. There was no significant age difference between the undergraduate and MBA students. The average level of work experience for the entire sample was 6.9 years and 10% of the subject pool reported being self-employed at some point in their career. Subjects were self-assigned to participate in one of eight sessions of around twenty students each.

Design
Subjects were randomly assigned to two groups (A and B) on arrival at the assigned session. Group A were assigned to play an exploitation game in one room while Group B played an ultimatum game in another room (see instruments below). After both teams had completed their respective games, they were brought back together and the exploitation
game was played again for higher stakes. Both games involved bargaining and negotiation but the exploitation game involved a free-wheeling multiplayer situation and increased uncertainty over outcomes.

**Instruments**

Prior to coming to the research session, participants were asked to complete a questionnaire that obtained demographic information and measured the personality traits of interest.

**Personality Traits**

We used the International Personality Item Pool (Goldberg 1999, International Personality Item Pool 2001) to assess our personality dimensions. The IPIP places a number of scales in the public domain that correlate highly with the scales on widely used personality inventories usually with higher levels of reliability. Table 2 lists the ten personality traits measured in the study, along with the derivative scale, number of items, and Cronbach alpha’s from our sample.

---

**Behavioral measures**

We used two behavioral instruments to assess the likelihood of subjects commencing a new business in order to further validate our results. The entrepreneurial quotient (EQ) questionnaire was selected as the most effective discriminator between entrepreneurs, owner-managers, and non-entrepreneurs in the extant literature (Hufner, et al. 1996). We also utilized a four-item scale adapted from Singh and DeNdole (2003) that assessed participants’ attitudes toward entrepreneurship and their desire to become entrepreneurs. Sample items for this scale included, “I intend to become self-employed” and “I have the ability to recognize ideas for self employment.” Cronbach’s alpha for this scale with our sample was 0.88.

**Games**

The exploitation game is a variation of the ten dollar game by Christie and Geis (1970). The game combines elements of integrative and distributive bargaining in a multi-player setting and has a readily determined Nash equilibrium (see Appendix 1 for detailed instructions).

In this game, subjects are given one poker chip that they are told will be worth $x at the end of the game ($x was $0.10 in the first round and $0.50 in the second). However, any player that can accumulate ten chips by the end of the game receives a payoff of 2$x per chips or 20$x in total. Players accumulate chips by making side-payments (or agreements) with other players.

What makes the game interesting is that the payoff per chip is not constant, rising linearly between 1 and 10 chips. So, for instance, having five chips at the end of the game will
only result in 1.5x per chip. Players are thus uncertain about the total payoff that they might receive at the end of the game. The Nash equilibrium predicts that one player will accumulate ten chips (for a total payoff of 20x) by making side payments of 2x to nine other players so that all players receive a net profit of 2x (or $1 in the second exploitation game).

The basic ultimatum game (Guth, et al. 1982) entails one player, the initiator, making an offer to split a fixed amount of money with another, the recipient. The recipient can either accept the proposed split, in which case both parties keep the money in the proposed proportions, or the recipient can reject the split, in which case both parties receive nothing. In our case, the amount to be split was ten pennies. The Nash equilibrium for this game is a 9:1 split in favor of the initiator but many studies have demonstrated that subjects tend to make an even split (Roth 1995).

**Dependent variables**

Three aspects of performance on the second entrepreneurial game formed the dependent variables for this study. First, we examined the number of trades participants made in the second exploitation game. Second, we considered the number of poker chips participants possessed at the end of the second game. Our final dimension of performance was participants’ net profit in the second game (net profit = payout based on the number of chips held minus purchases of chips from other players plus sales of chips to other players).

**Procedure**

On reporting to their assigned session, participants were randomly separated into two groups (A and B). Participants in the first group (A) remained in the original room with one experimenter and played the exploitation game. After receiving the exploitation game instructions and before actually playing the game, participants were asked to respond to a series of questions that assessed their understanding of the instructions, their motivation for doing well at the game, and their expected level of performance. Participants then played the game for 15 minutes.

Participants in the second group (B) went with the other experimenter to another room where they participated in three rounds of the ultimatum game. The first two games were for practice with subjects taking turns as the initiator and receiver of the initial ultimatum. In the third and final game, subjects were able to retain their earnings. After the ultimatum game and first exploitation game, participants were reunited and the entire group played the second exploitation game. The participants from Group A heard the instructions again while the participants from Group B received the instructions for the first time. As before, all participants were asked to indicate the extent to which they understood the instructions, their motivation for doing well at the game, and their expected level of performance. Participants then played the game for 15 minutes. Following the session, participants with chips were compensated based on the number of chips they possessed. All players then paid their debts and received their credits from the other players. At the completion of this stage of the experiment, individuals were
thanked again for their involvement in the study and debriefed concerning the purpose of the study. The entire set of games took about one hour per session.

RESULTS

The descriptive statistics by treatment group (A and B) and correlations among the variables in the study are presented in Table 3. The means for both groups are well above the mid points on all scales consistent with earlier findings that business students differ from the general population on many of these variables. Two tailed t-tests revealed no significant differences between the group means on any of the personality variables.

In general, the subjects did well on the second bargaining task, earning an average of 89.7% of the available cash in each session (in a range from 81% to 100%). This was an improvement from 82.9% in the first run of the exploitation game. Only five subjects (or 3%) earned the minimum of $0.50 for their chip by making no trades. However, overall, the profits of those holding chips at the end of the game were significantly higher than those that did not hold chips (t=2.82, p<0.01). This indicated that those acquiring chips did better than those selling chips.

Insert Table 3 about here

Due to high correlation levels among several of the trait variables, the data were subjected to a factor analysis to limit the effects of multicollinearity. Using varimax rotation on the trait variables (1-10 in Table 2), we identified two factors with eigen values exceeding the standard cutoff of one. The two factors explained 58.2% of the variance among the original variables. The factor loadings and communalities of this analysis are presented in Table 4 along with the correlations of the two extracted factors with the remaining variables in Table 2. Factor loadings in excess of 0.5 are highlighted in bold to facilitate interpretation.

Insert Table 4 about here

The two factor structure of this model is consistent with previous factor analytic studies using similar variables (Carland, et al. 2001). In line with Erikson (2002) we chose to label the two factors entrepreneurial competence and entrepreneurial commitment. In general, variables that loaded on the first factor have traditionally been associated with entrepreneurs – propensity for innovation, openness to experience, risk-taking, and extraversion. Interestingly, Machiavellianism also loaded quite strongly on this factor. Most of these traits have been shown to differentiate entrepreneurs from managers and the general population (Stewart, et al. 1999). As evidence of construct validity, the factor correlated highly with entrepreneurial quotient (EQ, r=0.57, p<0.01), a measure that has distinguished entrepreneurs from non-entrepreneurs in the past (Huefner, Hunt, & Robinson, 1996). The factor also distinguished between those who had been self-employed (or not) in the sample (t=2.24, p<0.05) and was strongly correlated with intentions to start a business (r=0.43, p<0.05).
The second factor, entrepreneurial commitment, loaded on variables such as need for achievement, locus of control, and conscientiousness. This factor also had positive associations with EQ ($r=0.16$, $p<0.10$) and entrepreneurial attitudes ($r=0.16$, $p<0.10$). Previous research has indicated that entrepreneurial commitment seems to be important for venture success and survival but does not uniquely differentiate entrepreneurs from other successful groups, including managers (Shane 2003).

We utilized a series of regression models to test the experimental design. The results of these analyses are presented in Table 5. Our first hypothesis predicted that possession of relevant entrepreneurial traits would enhance resource acquisition performance. The results provide partial support for this prediction. As shown in Table 5, there was a significant main effect for entrepreneurial competence on participants’ expected profit, the number of chips they acquired, and their profits. However, there was no significant effect for entrepreneurial commitment on any of the performance measures. Additionally, the main effect for entrepreneurial disposition must be considered in light of the interaction effect described below.

Our second hypothesis predicted that participants with experience on the resource acquisition task would outperform participants without experience. As shown in Table 5, the results support this hypothesis as there is a significant main effect for group on expected profit, number of chips, and actual profits. Again, this result must be considered in light of the predicted interaction.

Finally, our third hypothesis predicted that experience and entrepreneurial disposition would interact such that those with experience and a high entrepreneurial would be most successful. The results support this hypothesis. As seen in Table 5, the interaction is significant. The nature of the interaction can be clearly seen in the interaction plot of actual profit presented in Figure 1. The figure reveals no significant difference between the performances of those with low entrepreneurial competence in either group, and indeed those with high competence and low experience do not seem to do much better. The standout group is the one with high competence and high experience. A similar pattern was evident for number of chips.

Insert Table 5 about here

Insert Figure 1 about here
DISCUSSION

Our results provide support for one of the key predictions of nexus theory, namely that an interaction effect should exist between experience and personality characteristics. We discovered that subjects with a high entrepreneurial competence expected more profits, but only succeeded in generating higher profits if they had prior experience on the bargaining task. However, experience per se did not lead to higher profits without an entrepreneurial competence. Thus, possessing relevant task experience or relevant psychological characteristics does not automatically guarantee successful exploitation of an entrepreneurial discovery.

The study also revealed that Machiavellianism (or social astuteness) appears to be an important trait in resource acquisition. This finding supports Phelan’s (2000) argument that entrepreneurs need to be particularly good at resource picking to overcome the inherent liabilities of smallness and newness common to most entrepreneurial ventures. The finding also suggests that profit-oriented entrepreneurs are prepared to be opportunistic in their approach to resource accumulation as Machiavellianism was associated with other familiar entrepreneurial traits such as risk-taking and innovativeness.

Entrepreneurial commitment, the second factor that emerged from our factor analysis, was not found to be particularly important for success at short-term resource acquisition. It appears that the skills involved in resource picking appear to quite different from the skills required for capability building or organizing. We suspect that possessing an entrepreneurial competence without commitment may lead someone to engage in more speculative ventures or ‘get rich quick’ schemes that don’t require long-term perserverance. It seems logical to posit that both entrepreneurial competence and commitment may be necessary to achieve on-going, or long-term, venture success (Erikson 2002). Certainly, prior studies have associated commitment with venture success and survival (Nicholson 1998, Shane 2003, Ciavarella, et al. 2004).

This suggests a possible tension between the opportunism required for successful resource acquisition and the requirements for on-going venture success. The behavior of high Machs can alienate co-workers even while generating high performance (Ricks and Fraedrich 1999) and opportunistic behavior is unlikely to breed the trust required to create high performing organizations (Ghoshal and Moran 1996). Founders may have to adjust their style or bring in professional management to counter this tendency. The alternative is to hire an opportunist skilled in resource acquisition but this outcome is unlikely as an opportunist might end up appropriating any entrepreneurial profits.

The study has a number of implications for research and practice. First, research on the psychological characteristics of entrepreneurs needs to adopt a contingency approach that controls for differences in experience and opportunity environment. Psychological traits will predict success among entrepreneurs only if they possess relevant experience in a supportive environment. Researchers also need to consider that entrepreneurs can be classified on at least two independent dimensions: an entrepreneurial competence
dimension that appears to distinguish founders from non-founders (particularly if the founding requires resource acquisition) and an entrepreneurial commitment dimension that may be important in predicting success in long-term enterprise building.

On the practice front, would-be entrepreneurs need to appreciate that possessing the entrepreneurial characteristics required to start a new business may not be sufficient for new venture success. The current study suggests that relevant experience also plays a major role in performance and may explain the venture capitalist community’s focus on experience as a primary determinant in funding decisions (Stuart and Abetti 1990). The study also reveals that traits such as assertiveness, social astuteness, risk-taking, and innovativeness are important for assembling the resources required to exploit an opportunity.

The study also opens up a number of avenues for future research. For instance, we would anticipate that entrepreneurs in ventures that emphasize resource-picking (such as traders and speculators) would score higher on Machiavellianism than enterprise builders. It may also be the case that profit-oriented entrepreneurs, in general, score higher on Machiavellianism than small business owners or managers.

From a methodological standpoint, it would be interesting to explore whether the results are consistent across different resource-picking tasks, both in the laboratory and in more naturalistic settings. We are confident that the design of the current study captures some important elements of the real world challenge facing entrepreneurs seeking to exploit an opportunity, but we are equally sure that other methods for studying the resource acquisition process could be explored. A study could also be designed that attempts to demonstrate the effects of persistence on entrepreneurial performance in a controlled laboratory setting. Maximal long-term performance should come from an interaction between entrepreneurial disposition and persistence (controlling, of course, for experience and environment).

In conclusion, laboratory experiments seem to provide a useful way of testing the predictions of nexus theory. The current study has demonstrated that prior experience and relevant psychological characteristics are both important in predicting performance on a resource acquisition task. Machiavellianism has also been shown to be an important trait on this task, but other variables related to persistence were not relevant predictors of task performance despite being implicated in long term venture success. This suggests that the relative importance of any particular psychological trait may vary at different stages of the entrepreneurial process.
REFERENCES


International Personality Item Pool, "A scientific collaboratory for the development of advanced measures of personality traits and other individual differences," (2001).


Phelan, Steven E, "Entrepreneurship as expectations management," Washington DC, (2000),

Ricks, James and John Fraedrich, "The paradox of Machiavellianism: Machiavellianism may make for productive sales but poor management reviews," *Journal of Business Ethics*, 20, 3 (1999), 197-205.


Appendix 1. Exploitation Game Instructions

Name: __________
Student #: __________
Class: __________

You have been given one poker chip. You have 15 minutes to make the most of that chip. You have two main options. First, you may simply hold on to your chip and do nothing. Second, you may buy and sell chips from other players in an effort to maximize your profit. The more chips you have at the end of the game, the more money you will be rewarded for each chip.

The amount of money you receive at the end of the game will be based on the number of chips you have based on the payout chart on the reverse side of this page.

Your net profit is the amount of money you receive from the game administrator plus the sum of sales you made to other players minus the sum of purchases you made from other players. The winner is the individual who has the highest profit at the end of the game.

- **Example:** You hold your chip and do nothing. At the end of the game you will receive a total payoff of $0.10 in exchange for that chip. Your net profit is also $0.10.
- **Example:** You purchase one chip from another player for $0.10 and have a total of two chips at the end of the game. You will be given $0.12 per chip for a total payoff of $0.24. Your net profit is $0.14: your $0.24 payoff minus your total purchases of $0.10.
- **Example:** You purchase one chip from another player for $0.10 and later sell both chips for $0.15 each ($0.30 total). You have no chips to trade in at the end of the game. Your net profit is $0.20: your total sales of $0.30 less purchases of $0.10.
- **Note:** The maximum number of chips an individual may hold is 10 (as a result the maximum payout for anyone is $2.00).

Throughout the game you must strictly follow two rules:

1. You **may only talk to one person at a time**.
   - **Note:** Although you may talk to only one person at a time, throughout the game you may make as many deals with as many different players as you like. You may also trade with the same player as many times as you would like. You are also not limited as to the number of chips you may sell or purchase in any one deal.

2. Each agreement you make during the session must be completely recorded on the transaction sheet on the reverse side of this page. Both the buyer and the seller should record the transaction on their own sheet and sign the other person’s transaction sheet.
   - **Example:** If you sell two chips to another player for a total of $2.00, you should put a 2 in the number of chips column, $2.00 in the total sales price column and have them initial the last column. The person you sold them to should put a 2 in the number of chips column, $2.00 in the total sales price column and have you initial the last column.

   Please turn this paper over and answer the 5 questions at the top of the page
SCORE SHEET

Expectations

1. On a scale from 1-10, how well do you understand the instructions and how to play the game? (1 = not at all; 10 = completely understand). __________
2. On a scale from 1-10, how motivated are you to do well in this game? (1 = not at all; 10 = extremely motivated). __________
3. How much profit do you expect to make in this game? $ __________
4. How many chips do you expect to have at the end of the game? ___________ chips
5. How many transactions do you expect to make during the game? ___________ transactions

Transaction Record:

<table>
<thead>
<tr>
<th>No. of chips</th>
<th>Total Sales Price</th>
<th>Total Purchase Price</th>
<th>Initials</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Totals $ ___________ $ ___________

Payoff Schedule

<table>
<thead>
<tr>
<th>Chips</th>
<th>0</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>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Payment per chip</td>
<td>$0</td>
<td>$x</td>
<td>$1.2x</td>
<td>$1.3x</td>
<td>$1.4x</td>
<td>$1.5x</td>
<td>$1.6x</td>
<td>$1.7x</td>
<td>$1.8x</td>
<td>$1.9x</td>
<td>$2x</td>
</tr>
<tr>
<td>Total Payoff</td>
<td>0</td>
<td>$x</td>
<td>$2.4x</td>
<td>$3.9x</td>
<td>$5.6x</td>
<td>$7.5x</td>
<td>$9.6x</td>
<td>$11.9x</td>
<td>$14.4x</td>
<td>$17.1x</td>
<td>$20.0x</td>
</tr>
</tbody>
</table>

Note: x=$0.10 in the first game and x=$0.50 in the second game

NET PROFIT = TOTAL PAYOFF + Total Sales – Total Purchases

$ __________ = __________ + __________ - __________
### Table 1. Description of psychological traits

<table>
<thead>
<tr>
<th>Trait</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Need for achievement</td>
<td>A motivation that leads people to undertake activities and tasks that involve personal responsibility for outcomes, demand individual effort and skill, involve moderate risk, and provide clear feedback.</td>
</tr>
<tr>
<td>2. Risk propensity</td>
<td>A person’s willingness to engage in risky activities</td>
</tr>
<tr>
<td>3. Locus of control</td>
<td>A person’s belief that it is possible to influence one’s environment</td>
</tr>
<tr>
<td>4. Propensity for innovation</td>
<td>Identifying, defining, and structuring novel solutions to open-ended problems</td>
</tr>
<tr>
<td>5. Machiavellianism</td>
<td>The willingness or ability to use guile, deceit, and other opportunistic strategies in interpersonal relationships in order to manipulate other people</td>
</tr>
<tr>
<td>6. Openness to experience</td>
<td>Being imaginative, creative, cultured, curious, original, broadminded, intelligent, artistically sensitive</td>
</tr>
<tr>
<td>7. Conscientiousness</td>
<td>Responsible, well-organized, planful, hardworking, achievement oriented, persevering</td>
</tr>
<tr>
<td>8. Extraversion</td>
<td>Sociable, gregarious, assertive, talkative, active</td>
</tr>
<tr>
<td>9. Agreeableness</td>
<td>Being courteous, flexible, trusting, good-natured, cooperative, forgiving, soft-hearted, tolerant</td>
</tr>
<tr>
<td>10. Neuroticism</td>
<td>Calm, even-tempered, self-satisfied, comfortable, stable, unemotional, hardy, confident, effective</td>
</tr>
</tbody>
</table>

Sources: Shane (2003), Ciavarella et al (2004), Rubin and Brown (1975)

### Table 2. Measurement information on psychological traits

<table>
<thead>
<tr>
<th>Personality Trait (IPIP)</th>
<th>Based on</th>
<th>Items</th>
<th>Sample Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Openness to experience</td>
<td>Big Five Factor V (Intellect or Imagination)</td>
<td>10</td>
<td>0.83</td>
</tr>
<tr>
<td>Conscientiousness</td>
<td>Big Five Factor III (Conscientiousness)</td>
<td>10</td>
<td>0.88</td>
</tr>
<tr>
<td>Extraversion</td>
<td>Big Five Factor I (Surgency or Extraversion)</td>
<td>10</td>
<td>0.91</td>
</tr>
<tr>
<td>Agreeableness</td>
<td>Big Five Factor II (Agreeableness)</td>
<td>10</td>
<td>0.89</td>
</tr>
<tr>
<td>Neuroticism</td>
<td>Big Five Factor IV (Emotional Stability)</td>
<td>10</td>
<td>0.92</td>
</tr>
<tr>
<td>Need for achievement</td>
<td>Six Factor Personality Questionnaire: Achievement</td>
<td>10</td>
<td>0.88</td>
</tr>
<tr>
<td>Risk-taking propensity</td>
<td>Jackson Personality Inventory: Risk-taking</td>
<td>10</td>
<td>0.87</td>
</tr>
<tr>
<td>Locus of control</td>
<td>Personal Attributes Survey: Total Locus of Control</td>
<td>20</td>
<td>0.90</td>
</tr>
<tr>
<td>Propensity for innovation</td>
<td>Jackson Personality Inventory: Innovation</td>
<td>10</td>
<td>0.91</td>
</tr>
<tr>
<td>Machiavellianism</td>
<td>Jackson Personality Inventory: Social Astuteness</td>
<td>6</td>
<td>0.81</td>
</tr>
<tr>
<td>A</td>
<td>B</td>
<td>Mean</td>
<td>1</td>
</tr>
<tr>
<td>-----</td>
<td>-----</td>
<td>------</td>
<td>---</td>
</tr>
<tr>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>0.01</td>
<td>0.02</td>
<td>0.03</td>
<td>0.04</td>
</tr>
<tr>
<td>0.16</td>
<td>0.17</td>
<td>0.18</td>
<td>0.19</td>
</tr>
</tbody>
</table>

Table 3. Descriptives and correlations.
### Table 4. Rotated factor loadings, correlations, and communalities

<table>
<thead>
<tr>
<th>Variables</th>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Communalty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Need for achievement</td>
<td>0.12</td>
<td>0.87</td>
<td>0.76</td>
</tr>
<tr>
<td>Risk-taking propensity</td>
<td>0.66</td>
<td>-0.13</td>
<td>0.45</td>
</tr>
<tr>
<td>Internal locus of control</td>
<td>0.44</td>
<td>0.66</td>
<td>0.63</td>
</tr>
<tr>
<td>Machiavellianism</td>
<td>0.83</td>
<td>-0.03</td>
<td>0.68</td>
</tr>
<tr>
<td>Propensity for innovation</td>
<td>0.80</td>
<td>0.24</td>
<td>0.70</td>
</tr>
<tr>
<td>Openness to experience</td>
<td>0.70</td>
<td>0.39</td>
<td>0.64</td>
</tr>
<tr>
<td>Conscientiousness</td>
<td>-0.02</td>
<td>0.84</td>
<td>0.70</td>
</tr>
<tr>
<td>Extraversion</td>
<td>0.70</td>
<td>0.31</td>
<td>0.58</td>
</tr>
<tr>
<td>Agreeableness</td>
<td>-0.02</td>
<td>0.61</td>
<td>0.37</td>
</tr>
<tr>
<td>Neuroticism</td>
<td>0.25</td>
<td>0.48</td>
<td>0.29</td>
</tr>
<tr>
<td>% Variance explained</td>
<td>30.06%</td>
<td>28.12%</td>
<td>58.18%</td>
</tr>
</tbody>
</table>

**Correlations**

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>EQ Total</td>
<td>0.57**</td>
<td>0.15*</td>
<td></td>
</tr>
<tr>
<td>Expected Profit</td>
<td>0.24**</td>
<td>0.06</td>
<td></td>
</tr>
<tr>
<td>Number of chips</td>
<td>0.22**</td>
<td>0.08</td>
<td></td>
</tr>
<tr>
<td>Actual Profit</td>
<td>0.24**</td>
<td>0.01</td>
<td></td>
</tr>
</tbody>
</table>

* - p<0.1, ** - p<0.01

### Table 5. Regression models

<table>
<thead>
<tr>
<th>Summary Statistics</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependent variable</td>
<td>Expected profit</td>
<td>No. of Chips</td>
<td>Actual profit</td>
</tr>
<tr>
<td>R squared</td>
<td>0.08</td>
<td>0.13</td>
<td>0.15</td>
</tr>
<tr>
<td>Mean of responses</td>
<td>$1.67</td>
<td>0.94</td>
<td>$0.91</td>
</tr>
<tr>
<td>Observations</td>
<td>146</td>
<td>152</td>
<td>152</td>
</tr>
<tr>
<td>F Ratio</td>
<td>3.74**</td>
<td>2.07</td>
<td>4.34**</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parameter Estimates</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>1.65</td>
<td>0.86</td>
<td>0.89</td>
</tr>
<tr>
<td>Group</td>
<td>-0.02</td>
<td>0.48*</td>
<td>0.09*</td>
</tr>
<tr>
<td>Entrepreneurial Competence</td>
<td>0.41*</td>
<td>0.45*</td>
<td>0.10*</td>
</tr>
<tr>
<td>Persistence</td>
<td>0.06</td>
<td>0.09</td>
<td>-0.03</td>
</tr>
<tr>
<td>Group x Entrepreneurial Competence</td>
<td>0.22</td>
<td>0.59**</td>
<td>0.15**</td>
</tr>
<tr>
<td>Group x Entrepreneurial Commitment</td>
<td>0.17</td>
<td>-0.02</td>
<td>0.06</td>
</tr>
<tr>
<td>Competence x Commitment</td>
<td>0.06</td>
<td>-0.01</td>
<td>-0.01</td>
</tr>
</tbody>
</table>

* - p<0.05, ** - p<0.01
Figure 1. Interaction effect