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The fit between entrepreneurs' personalities and the profile of the ventures they manage and business success: An exploratory study

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ABSTRACT

Person–Organization fit, the match between individuals and the organizations in which they work, has been extended to the fit between entrepreneurs' personalities (EP) and the profiles of ventures (VP) they manage (EP–VP fit), and its relationship to the venture's success. Eighty eight Israeli entrepreneurs working in new ventures responded to a specially designed questionnaire that included the following parts: (A) provided general data about the new venture; (B) assessed the venture type along two dimensions: Novelty and Technological uncertainty; (C) assessed the entrepreneurs' personality traits and (D) assessed the ventures' success.

Findings revealed that entrepreneurs in high Novelty and high Technological uncertainty ventures had higher education, they love challenges, and they are more committed, entrepreneurial, dreamers, creative, risk-takers, intuitive, investigative, and ambitious than those in low Novelty and low Technological uncertainty ventures. Entrepreneurs in low novelty and low technological uncertainty ventures were found to be more likely to exhibit behaviors characterizing Type A personality. In addition, high novelty high technological uncertainty ventures were found to be significantly more successful on measures reflecting potential for building the future when compared to the low novelty and low technological uncertainty ventures, while on measures reflecting short-term success (meeting economic and budget goals) the results are in favor of the low novelty, low technology groups.

These findings suggest that entrepreneurs are more attracted to ventures that fit their personality and the way they manage the new ventures is affected by their personality traits.

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1. Introduction

The resurgence of the entrepreneurial spirit has been said to be the most significant economic development in recent business history, and interest in entrepreneurship to have never been higher than it is at the beginning of the 21st century (Zimmerer & Scarborough, 2001). Entrepreneurs have been described as "the makers of new worlds" (Czarniawaka & Wolff, 1991) who are "instrumental to the conception of the idea of an enterprise and its implementation" (de Vries, 1996), "innovators are catalysts of change who continuously do things that have not been done before and do not fit established societal patterns" (Schumpeter, 1934; 1965).

Many researchers throughout the world have turned their attention to the study of entrepreneurs and entrepreneurship, coming from different theoretical perspectives and different basic approaches and using different methodologies. The result has been an acknowledgement of the fact that entrepreneurship is a very complex and heterogeneous phenomenon (Cunningham &

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Lischeron, 1991). They proposed that it is not possible to understand the phenomenon of entrepreneurship if one does not consider the individual (the entrepreneur), the venture, the environment and the links between them over time.

Findings have been especially mixed regarding the psychology of entrepreneurs (Deakins, 1999; Geldern, 2000; Watson, Ponthieu & Doster, 1995). So much so, that it has been argued that the trait approach has failed in the case of entrepreneurs (Gartner, 1989) and that the entrepreneurial personality is nothing but a myth (Shaver, 1995). Only in recent years research on the entrepreneurial personality has re-emerged as an important area of interest. Rauch & Frese (2007) argue that entrepreneurship should be an active participant in the revival of personality research, although it should use more sophisticated theories and methodological approaches. In a study conducted (Rauch & Frese, 2005), they used a meta analysis approach to classify studies on entrepreneurs' traits according to the specificity of the of personality assessment. They found that specific traits produced higher relationships with both business creation and business success than global trait measures. Furthermore, recent research on personality and performance has showed that relationships between personality and performance varied depending on what type of class of performance was researched (Rauch & Frese, 2007).

Another explanation for the mixed results can be the difficulty in distinguishing in a meaningful way between different types of new ventures and as a result, the inability to associate specific entrepreneurial traits with the needs of various types of ventures.

Based on the Person–Organization (P–O) fit theory (Caplan, 1987; Chatman, 1989; Kristof, 1996), it can be hypothesized that entrepreneurs with certain personal traits will be attracted to new ventures in which they find such a fit. Furthermore, based on studies showing that individuals are not only attracted to jobs that fit their personality but also tend to be successful in them (Dvir, Sadeh & Pines, 2006), it can be hypothesized that entrepreneurs personal traits will have an effect of the venture success and that effect will vary for different types of ventures.

The current study is one in a series of studies that started with examining the fit between project managers, the type of projects they manage, and the relationship between this fit and project success (Dvir et al., 2006; Pines, Dvir & Sadeh, 2009). In the current study, the notion of Person–Organization fit is extended further to the case of fit between entrepreneurs and the ventures they build (EP–VP fit) and its relationship to venture success.

2. Theoretical background

The modern concept of entrepreneurship was introduced by Schumpeter (1934) who defined entrepreneurship as carrying out of new combinations we call “enterprise” and entrepreneurs are the individuals who carry them out. A person is an entrepreneur only when he actually “carries out new combinations,” and loses that character as soon as he has built up his business and settles down to running it as other people run their businesses (p. 74).

Following Schumpeter's definition, Carland, Hoy, Boulton and Carland (1984) distinguished between the small business owner and the entrepreneur. A small business owner could be considered an entrepreneur when he starts a new business, but loses that title when the business enters the mode of regular operation. Gartner (1988), in response, suggested that rather than trying to define the entrepreneur, we should, instead, be trying to define types of entrepreneurship.

2.1. Venture types

Several attempts were made to classify new ventures in a meaningful way that will enable to study the specific characteristics of the various venture types. According to Bygrave (1995), for example, some would argue that entrepreneurship research focuses on high-potential companies with the prospect for substantial growth because these are organizations that have the potential to make significant contributions of employment and wealth to society. However, Carton, Hofer and Meeks (2004) claim that lower-potential organizations should also be included in entrepreneurship research because by their sheer numbers they make substantial contributions to employment and wealth creation. Both types of ventures undertake essentially the same tasks to form a new organization, accumulate and allocate resources, and build networks.

Kunkel (2001) provided a different perspective on new ventures. Following the classical definition of market pull innovations vs. technology pushed innovations, he differentiated between Need-Driven New Venturing and Technology-Driven New Venturing. The high growth-potential new venturing is “Need-Driven.” It finds its *raison d'être* in the marketplace. An entrepreneur or entrepreneurial team notices an unfulfilled need in the marketplace and sets out to fill it. The entrepreneur may know little about the technology or the product, but he/she can see the need. This fixation on the need frequently leads practitioners of Need-Driven New Venturing to find new and unique ways of satisfying that need, breaking or rewriting the pre-established “rules of the game.” The second type of high growth-potential entrepreneurial activity is “Technology-Driven New Venturing” which comes into being because of the entrepreneur's desire to make the technology accessible. Many of the high-flyers in the leading-edge technologies are Technology-Driven New Ventures. Rather than seeing a need and looking for a way to fulfill that need, the founders of technology-driven new ventures begin with the technology and then find a way to make the technology need-fulfilling in the marketplace. Henderson and Clark (1990) have suggested another distinction between autonomous and systemic innovations and between modular and architectural change. According to their study, the success of architectural innovation is greatly based on cooperation and strategic alliance using the best kinds of knowledge and capabilities of their partner firms (Teece, 2000, pp. 63–64).

Although, the above cited references propose different approaches for classifying new ventures and innovations, they all use one-dimensional scheme for that purpose, whether it is a distinction between low-potential innovations to high-potential

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innovation, market-driven vs. technology-driven, autonomous and systemic innovations or the distinction between modular and architectural change.

Shenhar and Dvir (2007), who studied project management, suggest a multidimensional conceptual framework for classifying projects. Their framework includes four dimensions: Novelty, Technology, Complexity and Pace (NTCP)

Novelty	How novel is the product to its intended customers?
Technology	How much new technology is required, from low-tech to super high-tech?
Complexity	How complicated are the product, the process and the project?
Pace	How urgent is the work? Is the timing normal, fast/competitive, time-critical or blitz?

Each dimension of the NTCP framework is divided into three or four categories that enable to define more accurately the specific project at hand. For example, the novelty dimension is divided into three categories: Breakthrough, Platform and Derivative, in correspondence to the level of newness of the product developed to its intended users.

The OECD (1991) defines an innovation as an iterative process initiated by the perception of a new market and/or new service opportunity for a technology based invention which leads to development, production, and marketing tasks striving for the commercial success of the invention. According to that definition, it is clear that except for the initial phase of innovation where the entrepreneur has to secure the funds needed for starting development, all following activities actually describe a project aimed at the development, production and marketing of a product or service. From that point of view it is only natural to use a similar classification scheme to assess entrepreneurial activities.

Kunkel (2001), as we have seen, distinguishes between need-driven and technology-driven new venturing. However, in real life most entrepreneurial activities are not either need-driven or technology-driven but rather a spectrum of entrepreneurial activities driven by a combination of a market need that has a technological solution. The first two dimensions of the NTCP framework, novelty and technology provide a convenient way to describe the spectrum of different types of entrepreneurship, from pure technology-driven new venturing, through various combinations of market need and technological capabilities to solve that need to a need that has not yet a technological solution. Novelty addresses the market dimension and describes how new the idea developed by the new venture is to its potential users (market) or in other words, the gap between the entrepreneur's understanding of the market needs and the actual needs of potential customers. A breakthrough idea is completely new to the market; the customers do not have a clue for what purpose or how to use the new product. On the other side of the spectrum, there are derivative products that provide only minor improvements to an existing product and the customers do not have any difficulty in adopting and using them.

The technology dimension corresponds to the level of technological uncertainty that exists at the onset of the new venture, or in other words, how many new technologies the venture has to master in order to be able to build the new product in a way that would answer the customers' needs. Low-Tech new ventures have in-house all the technologies required for the new product, while on the other side of the technology spectrum there are new ventures that have to develop completely new technologies to meet the functional capabilities of the new product. The level of technological uncertainty is related to the industry the new venture is operating in; while a specific technology might be considered High-Tech for one industry, it might be considered only Medium-Tech in another, more developed industry.

2.2. Personal characteristics of entrepreneurs

Considerable attention has been given in the literature to the personality of entrepreneurs, trying to identify traits that characterize entrepreneurs. The personality traits most frequently cited as being characteristic of entrepreneurs include the desire for independence (Collins & Moore, 1964) locus of control (Brockhaus, 1980; Brockhaus & Horwitz, 1986; Shapero, 1975) creativity (Wilken, 1979) risk-taking propensity (Rauch & Frese, 2005; Begley & Boyd, 1987; Brockhaus, 1980; Wilken, 1979), need for achievement (Rauch & Frese, 2005; Begley & Boyd, 1987; McClelland, 1961), and credible role models (Bygrave, 1995; Shapero, 1975). However, these traits have not been conclusively shown to be related to new venture performance, but, they have been shown to have an influence in new venture formation (Dvir et al., 2006; Mitchell, 1994). In addition, it is extremely difficult to demonstrate a causal relationship between personality traits and entrepreneurial behavior and success (Brockhaus & Horwitz, 1986; Cooper, Dunkelberg & Woo, 1988). Borman and Motowidlo (1997) who showed that personality factors have contributed more strongly to contextual performance than task performance, is an exception.

While personality traits failed to predict entrepreneurial success, background characteristics have been shown to do that rather well. Background characteristics that were shown to be significant in previous literature include: prior managerial experience (Chandler, 1996; Hoad & Rosko, 1964; Lant & Mezias, 1990; Roure, 1986; Roure & Keeley, 1990), prior start-up experience (Langowitz & Minniti, 2007; MacMillan, 1986; Lamont, 1972), prior management team experience (Lumpkin & Dess, 1996; MacMillan, Seigel & Narasimha, 1985; McGee, Dowling & Megginson, 1995; Roure & Keeley, 1990; Roure & Maidique, 1986; Stuart & Abetti, 1990), knowledge, skills and abilities (Chandler & Hanks, 1994; Dutton & Jackson, 1987; Mitchell, 1994), and prior experience in the line of business (Chandler, 1996; Hoad & Rosko, 1964; Roure & Maidique, 1986; Sandberg, 1986). The empirical studies of background characteristics found more significant links to venture performance and successful venture formation, than studies of entrepreneurial personality traits. The most significant determinants of new venture performance that have been shown are venture strategy and industry structure (Kunkel, 2001; Robinson, 1995; Sandberg, 1986).

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The current study revisited the question of the relationship between entrepreneurs' personality traits and their relationship to venture success. But unlike the previous literature (most of it twenty and more years old) the current study did not look at entrepreneurial ventures as one-dimensional, but rather used the Novelty and Technology (NT) dimensions, with the assumption that different ventures have different engineering and managerial needs, and as a result, will be attractive to and appropriate for different types of entrepreneurs and managers, with different personality traits as well as different background.

The study was conducted under the assumption that if it is possible to make a better and more precise distinction between different types of ventures and that it will also be possible to identify the relevant personality traits that the entrepreneur has to posses in order to cope effectively with the challenges the new venture presents.

3. Method

3.1. Hypotheses

Based on Person–Organization fit (P–O fit) theory (Cable & Judge, 1994; Caldwell & O'Reilly, 1990; Caplan, 1987; Collins & Moore, 1964; Judge & Bretz, 1992; Kristof, 1996) and looking from the perspective of the entrepreneurs (rather than the perspective of the new ventures) it was hypothesized that entrepreneurs will be attracted to new ventures that fit their personality.

Based on Contingency theory (Lawrence & Lorsch, 1967; Thompson, 1967) and the classification framework suggested by Shenhar and Dvir (2007), it was further hypothesized that the success of different types of ventures will be related to the venture type and will be manifested by different levels of success along the various success dimensions.

3.2. Sample

Seventy four Israeli new ventures and their entrepreneurs participated in the study. All ventures were in the early stages of their life, ranging from one year from initiation to five years. The ventures were mainly R&D oriented in Internet applications, communication, biotechnology, agriculture, satellite and space. Some of the projects were in entertainment, tourism, and consulting. Most ventures were independent and not part of a bigger organization. Some of the ventures were hosted in "green houses" which provided them the necessary funding and infrastructure before the next stage of funding. Of the 88 entrepreneurs (in several new ventures more than one entrepreneur was interviewed), 78 (89%) were males. Their average age was 39.9 with an average of 16.7 years of formal education. Most of the entrepreneurs have worked in another new venture prior to establishing the current venture.

The ventures were chosen randomly by students who were collecting data for their final project in college, and as such are representative of the population of new ventures in Israel.

3.3. Instrument

The instrument, a self-report measure, included four parts. The first (A) provided general data about the new venture; the second (B) assessed the venture type along two dimensions: Novelty and Technological uncertainty; the third (C) assessed the entrepreneurs' personality and the fourth (D) assessed their ventures' success.

3.3.1. Background

The general data on the new ventures included items such as the industry the venture is active in, when it started operating, size of the team and the role of the entrepreneur in the new venture.

3.3.2. New venture classification

Projects were classified along the two dimensions (NT) of the NCTP classification suggested by Shenhar & Dvir (2007).

3.3.3. Entrepreneurs' personality

Personality traits used in earlier studies to portray project managers and to distinguish among managers and entrepreneurs (Pines, Sadeh, Dvir & Yanai, 2002, Dvir et al., 2006; Pines et al., 2009), were also used in the current study.

Seven of the "Openness to Experiences" items in the Big Five factors of personality (Costa & McCrae, 1992) were used: 6 items that indicate high openness to experiences (e.g., interest in solving problems or complicated riddles, interest in many subjects, thinking differently from others) and one item that indicates low openness to experiences (preference for spending time in a familiar rather than in an unfamiliar environment). Respondents were asked to what extent they agree with the statements on a 7-point scale ranging from 1 = very much disagree to 7 = very much agree. They received one score for openness to experiences.

Risk-Taking was assessed using The Choice Dilemma Questionnaire (Wallach, Kogan & Bem, 1964). Respondents were presented with three hypothetical situations and asked to indicate the lowest probability of success in which they would take the particular risk from 1 out of 10 (the greatest risk) to 9 out of 10 (the lowest risk). The dilemmas included an entrepreneurial risk, (an engineer with a secure position and low salary is offered a challenging position with options for equity shares if the start-up is successful), an investment risk and a managerial risk. Respondents received three risk scores: Entrepreneurial, Managerial, Investment.

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Two measures were chosen for assessing attitudes towards uncertainty: 1. The "Inventor" personality type in Jung's (Jung, 1990) typology. A 20-item measure is based on this typology (Wilde & Labno, 2002). Out of the 20, 10 items were chosen. They included Intuition (e.g., preference for thinking about possibilities rather than dealing with actualities) and Perceiving (e.g., tendency to be flexible rather than pre-planned). 2. The "Investigative" personality type according to Holland's (1997) classification of vocational personalities. The activities that characterize the Investigative type include, for example: reading scientific books and solving math problems. Respondents received one score: Investigative.

In addition, the questionnaire included three other clusters of traits that seemed more generally relevant to the study: entrepreneurial and managerial traits, behaviors associated with Type A personality and attachment styles.

Entrepreneurial traits: personality traits that were found in previous research to characterize high-technology entrepreneurs (love of challenge and risk-taking) and successful managers (e.g. commitment, involvement, and love of management) (Pines et al., 2002). A 15-item measure was used. It included 8 items characterizing entrepreneurs and 7 items characterizing managers. The items were presented randomly and respondents were asked to rate to what extent these traits characterize them on a 7-point scale.

The activities that characterize the enterprising type according to Holland's (1997) classification of vocational personalities include, for example, running an independent business. Participants received one score: Enterprising.

Type A personality refers to driven individual who feels oppressed by time (Friedman & Rosenman, 1974). This is the person for whom punctuality is a supreme value; who barks at sluggish salesclerks, and feels compelled to do several things at once. Items that measure aspects of Type A behavior that seemed relevant for the current study were chosen (e.g. viewing absolute punctuality as of highest importance, doing and thinking two things at once, hastening the speech of others, getting overly angry when forced to wait in line, getting impatient when watching others who seem to be doing things too slowly.) Respondents were asked to what extent these behaviors characterize them on a 7-pont scale from 1 = very little to 7 = very much. They received one score.

Secure attachment: Based on the assumption that in order to succeed, entrepreneurs need to feel self confident and secure, on Bowlby's (1969; 1973; 1980) attachment theory and the measure of attachment styles developed by Hazan and Shaver (1987), three short paragraphs were presented: for secure attachment style: "It is relatively easy for me to become close to people"…for avoidant attachment style: "I am somewhat uncomfortable getting close to people"….for anxious/ambivalent attachment style: "People are reluctant to get as close as I would like..." Respondents received three scores: Secure, Avoidant and Anxious/ Ambivalent.

3.3.4. Success criteria

New venture success was measured along three dimensions: Meeting planning goals, Business results and creating Future opportunities and a measure of overall success. These success dimensions and measures were developed following a framework developed by Shenhar, Dvir, Levy and Maltz (2001) for measuring the success of projects (see Table 1).

3.4. Venture types

The ventures were classified into three groups based on their level of novelty and technological uncertainty. Out of the twelve possible combinations, only three groups were selected due to the limited size of the sample and small number of projects. Since the sample did not include breakthrough or super high-tech products, six possible cells were eliminated. In the second phase, three groups of ventures were defined according to the type of products they developed:

1. *Low to medium-tech, derivative products* (products or services that present only modest improvements relative to older products with respect to the market and level of technology used).
2. *Low to medium-tech, platform products* (a new generation of products, with low to medium technological uncertainty).
3. *High-tech, platform products* (a new generation of high-tech products).

Table 1
Success dimensions and measures.

Success dimensions	Success measures
Meeting planning goals	Met planned budget
	Met planned schedule
	Met major milestones
Business results	Met economic goals
	Market introduction rate as planned
	Sufficient financial resources
Future opportunities	Potential to create a new market
	Potential to create a new product line
	Created new technological infrastructure
	Created new operational infrastructure
	Created knowledge for new products
Overall success	

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4. Results

Analysis of the data included descriptive statistics (means and standard deviations) for the entire sample and an analysis of variance for the differences among the three groups of ventures that differed in their novelty and technological uncertainty (from low novelty and low technology in group 1 to high novelty and high technology in group 3). The comparisons included the entrepreneurs' background and personality and their venture's success. Mean values for each group and the mean for the three groups combined are provided for each variable. Pair- wise comparisons between the mean values of groups, using LSD post-hoc test and the levels of significance are also presented. The F statistic and the corresponding p values for the MANOVA results are reported as well.

4.1. Entrepreneurs' background

The background information presented in Table 2 reveals a significant difference among the three groups ($F=7.88$; $p<.00$) in level of education. Not surprisingly, the entrepreneurs who started high novelty high-technology ventures had significantly higher education than the entrepreneurs who started low novelty low technology ventures. Mean years of education in group 3 was 18 and in group 1–15.1 years. The entrepreneurs in group 3 were also older than the entrepreneurs in group 1. In addition, the percentage of women among entrepreneurs in all three groups was rather low (about 11%).

4.2. Entrepreneurs' personality traits

There were several interesting findings related to the personality traits that characterized entrepreneurs in the different types of ventures (see Table 3). Entrepreneurs in high novelty and high technological uncertainty ventures (group 3) were found to love challenges significantly more and be significantly more committed, entrepreneurial, dreamers, creative, risk-taking, intuitive, investigative, and more ambitious than entrepreneurs in low novelty and low technological uncertainty ventures (group 1).

Entrepreneurs in low innovation and low technologically uncertainty ventures (group 1) were found to be more likely to exhibit behaviors characterizing Type A personality (punctual and mad when waiting in line) than those in higher novelty and uncertainty ventures, however, these differences are not significant. A significant difference was found in one behavior characterizing Type A personality (Does several things at a time), but in this case the relationship is U shaped, where the mean level of group 2 is the lowest.

4.3. Ventures types and success

Table 4 presents the comparison among the three types of groups on the four success dimensions used in the study: *Meeting planning goals (*efficiency*)*, *Business success* (economic goals and market penetration), *Future opportunities* (for new products and new markets) and Overall *success* representing a weighted average of all three success dimensions.

As can be seen in Table 4, there was a significant difference in six out of the seven success measures presented in the table. In the first two measures (meeting economic goals and meeting budget goals) the results are in favor of the low novelty, low technology groups. However, the measures reflecting the potential for benefits in the future (potential to create a new market, new product line, new operational and technological infrastructure and knowledge for new products) are all in favor of the high novelty high technological uncertainty ventures (group 3). The difference was especially notable in the finding that high novelty and high-technology ventures had the potential to create a new product line and have created new technological infrastructures and the knowledge necessary to develop and produce these new product lines.

5. Discussion and conclusion

The comparison between the entrepreneurs in high novelty high-technology ventures and in low novelty low technology ventures enabled a testing of the first hypothesis of the study. The findings that revealed that the former were significantly more entrepreneurial, creative, risk-taking, investigative committed and challenge lovers while the latter were more likely to exhibit Type A behavior, offers a tentative support of the first hypothesis and of P–O fit theory from which the hypothesis was derived (Cable & Judge, 1994; Caldwell & O'Reilly, 1990; Caplan, 1987; Carton et al., 2004; Judge & Bretz, 1992; Kristof, 1996). The findings

Table 2
Entrepreneurs personal data — all samples and according to venture types ($P\leq 0.10$ is marked by bold face).

Personal traits	Mean Gr. 1	Mean Gr. 2	Mean Gr. 3	Mean All 3	Sig Gr. 1–2	Sig Gr. 1–3	Sig Gr. 2–3	Sig All 3	*F* All 3	SD All 3
Gender (males)	0.85	0.89	0.91	0.89	0.60	0.44	0.82	0.73	0.31	0.32
Age	37.8	38.4	42.7	39.9	0.84	**0.09**	0.12	0.16	1.87	10.85
Education	15.1	16.7	18.0	16.7	**0.04**	**0.00**	**0.08**	**0.00**	7.88	2.96
Place among siblings	1.58	1.71	1.56	1.61	0.56	0.94	0.49	0.76	0.28	0.86
No. of prior ventures	1.19	1.36	1.18	1.24	0.69	0.97	0.64	0.88	0.13	1.49

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Table 3
Entrepreneurs personality traits — all samples and according to venture types ($P \leq 0.10$ is marked by bold face).

Personality traits	Mean Gr. 1	Mean Gr. 2	Mean Gr. 3	Mean all	Sig Gr. 1–2	Sig Gr. 1–3	Sig Gr. 2–3	Sig all	F all	SD all
Entrepreneur's traits										
Loves challenge	5.46	6.21	6.41	6.07	**0.02**	**0.00**	0.49	**0.01**	5.61	1.18
Committed	5.77	6.29	6.53	6.23	**0.08**	**0.01**	0.37	**0.02**	3.88	1.09
Entrepreneurial	6.04	6.36	6.65	6.38	0.15	**0.00**	0.16	**0.02**	4.22	0.83
Independent	6.31	6.36	6.38	6.35	0.84	0.75	0.91	0.95	0.05	0.88
Involved	5.88	5.93	5.97	5.93	0.89	0.77	0.88	0.96	0.04	1.12
Dreamer	4.27	5.54	5.00	4.95	**0.00**	**0.08**	0.19	**0.02**	4.40	1.63
Optimist	5.15	5.79	5.74	5.58	**0.10**	0.11	0.89	0.19	1.71	1.41
Creative	5.65	6.11	6.24	6.02	0.12	**0.04**	0.64	**0.10**	2.37	1.07
Persistent	5.62	5.96	6.00	5.88	0.25	0.19	0.90	0.37	1.01	1.11
Rebellious	4.35	4.93	5.09	4.82	0.20	**0.09**	0.70	0.21	1.60	1.65
Risk taker	4.58	5.32	5.44	5.15	**0.03**	**0.01**	0.70	**0.02**	.4.17	1.26
Manager's traits										
Loves to manage	5.35	5.11	5.18	5.20	0.55	0.66	0.85	0.83	0.19	1.46
Realist	5.65	5.57	5.88	5.72	0.79	0.43	0.28	0.52	0.65	1.11
Needs control	5.00	4.96	5.03	5.00	0.93	0.94	0.87	0.99	0.01	1.58
Confident	5.54	5.89	5.91	5.80	0.17	0.13	0.94	0.25	1.41	0.94
Jung's investigator										
Intuitive	3.08	3.70	3.62	3.46	**0.04**	**0.10**	0.80	**0.10**	2.39	1.14
Holand's										
Investigative	3.38	4.18	5.86	4.38	0.14	**0.00**	**0.00**	**0.00**	9.38	2.56
Enterprising	5.31	5.00	4.57	4.99	0.67	0.36	0.58	0.63	0.46	2.60
Type A behavior										
Does several things at a time	5.96	5.36	5.91	5.75	**0.05**	0.86	**0.06**	**0.08**	2.55	1.14
Gets mad when waiting	4.62	4.75	3.91	4.39	0.77	0.12	**0.06**	0.12	2.20	1.72
Punctual	4.81	4.75	4.24	4.57	0.89	0.17	0.20	0.29	1.26	1.57
Impatient with "slow" others	5.08	4.64	4.79	4.83	0.30	0.48	0.70	0.58	0.56	1.53
Attachment styles										
Secure	5.31	4.93	5.56	5.28	0.44	0.59	0.17	0.39	0.96	1.79
Avoidant	2.65	2.64	2.94	2.76	0.98	0.53	0.50	0.74	0.30	1.72
Openness to Experiences										
Interested in riddles	5.15	5.41	5.57	5.36	0.56	0.37	0.72	0.66	0.42	1.57
Adventurous	4.85	5.11	4.82	4.92	0.51	0.95	0.45	0.71	0.34	1.44
Abides rules (R)	4.27	3.89	4,26	4.15	0.45	0.99	0.43	0.67	0.40	1.82
Ambitious	6.00	6.18	6.41	6.22	0.49	**0.09**	0.33	0.24	1.46	0/94
Looks for excitement	4.73	4.78	5.29	4.91	0.90	0.16	0.19	0.31	1.20	1.34
Curious	5.77	5.89	6.00	5.88	0.67	0.44	0.70	0.73	0.31	0.99

show that entrepreneurs are indeed attracted to new ventures that fit their personality. The differences in mean levels of personal traits that entrepreneurs in low novelty low technology ventures possess vs. entrepreneurs in high novelty high-technology ventures are the largest on being investigative, committed and challenge lover. These traits are probably the best differentiators

Table 4
Mean levels of success — all samples and according to venture types ($P \leq 0.10$ is marked by bold face).

Success measures	Mean Gr. 1	Mean Gr. 2	Mean Gr. 3	Mean all	Sig Gr. 1–2	Sig Gr. 1–3	Sig Gr. 2–3	Sig all	F all	SD all
Met economic goals	5.12	4.22	4.04	4.45	**0.09**	**0.03**	0.73	**0.08**	2.62	1.87
Met budget goals	5.92	5.13	4.45	5.13	0.13	**0.00**	0.18	0.25	1.41	1.79
Potential to create a new market	3.50	5.09	5.87	5.03	**0.01**	**0.00**	0.13	**0.00**	9.08	2.08
Potential to create a new product line	2.79	4.91	6.47	5.08	**0.00**	**0.00**	**0.00**	**0.00**	38.01	2.08
Created new technological infrastructure	3.00	4.43	5.30	4.51	**0.04**	**0.00**	0.13	**0.00**	6.72	2.23
Created new operational infrastructure	3.65	4.57	4.72	4.40	0.14	**0.07**	0.78	**0.17**	1.81	1.94
Created knowledge for new products	3.78	5.33	6.06	5.29	**0.00**	**0.00**	0.11	**0.00**	10.95	1.88
Efficiency	5.24	4.91	4.57	4.89	0.40	**0.08**	0.38	0.22	1.56	1.40
Business goals	5.13	4.29	5.27	4.94	**0.05**	0.70	**0.01**	**0.04**	3.42	1.50
Future opportunities	3.50	4.73	5.73	4.82	**0.01**	**0.00**	**0.02**	**0.00**	14.17	1.77
Overall success	4.62	4.96	5.37	5.02	0.15	**0.00**	**0.05**	**0.00**	5.96	0.89

Last four rows represent success dimensions (comprising each of several measures).

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between entrepreneurs who are attracted to more risky and uncertain new endeavors as opposed to entrepreneurs who prefer more certain ventures that might show results in the near future.

The comparison between high novelty high-technology ventures and low novelty low technology ventures in terms of their level of success enabled a testing of the second hypothesis that was based on Contingency theory (Lawrence & Lorsch, 1967; Thompson, 1967) and on the classification of ventures derived from the conceptual framework suggested by Shenhar and Dvir (2007). Once again, the findings, which showed high novelty high-technology ventures to be significantly more successful when compared to low novelty low technology ventures on almost all measures of success related to creation of future opportunities to the new venture, offer tentative support for the second hypothesis. The creation of future opportunities included a potential to create new markets and product lines, the creation of new technological infrastructure and the creation of knowledge for new products. Low novelty low technology ventures were shown to perform better in terms of meeting budget and economic goals.

The inescapable conclusion is that high novelty high-technology ventures (group 3) are significantly more successful when compared to the low novelty low technological uncertainty ventures (group 1) in terms of creating new opportunities and establishing the necessary infrastructure for exploiting these opportunities. However, when looking at short-term results, low novelty low technology ventures are more efficient and achieve better results in terms of meeting economic and budget goals. These findings offer tentative support for the second hypothesis that the success of different types of ventures will be related to the venture type and will be manifested by different levels of success along the various success dimensions.

Our findings also provide a tentative explanation to the mixed results regarding the psychology of entrepreneurs (Deakins, 1999; Geldern, 2000; Watson et al., 1995). The current study shows that a careful examination of the market and technological uncertainties involved in establishing a new venture may provide a meaningful way to distinguish between different types of new ventures. Using that new conceptual framework for distinguishing among ventures enables to identify and associate specific entrepreneurial traits with the needs of various types of new ventures. These findings support Rauch and Frese (2007) claim that research on personality and performance has showed that relationships between personality and performance varied depending on what type of class of performance was researched. They also support the results of Lee and Tsang (2001) indicating that internal locus of control and need for achievement have positive impact on venture growth.

Another finding that deserves attention has been mentioned very briefly. This is the finding that the percentage of women among entrepreneurs in all groups was rather low (about 11%). This result confirms other studies that show women's entrepreneurship to be significantly lower than that of men (Langowitz & Minniti, 2007), this despite a radical acceleration in the number of women entrepreneurs in recent years (Weiler & Bernasek, 2001). Women's entrepreneurial activity level has global implications because starting a business is an occupational channel for women to advance economically (Izyumov & Razumnova, 2000). There are today a few examples of countries that have started promoting entrepreneurship for both women and men (Bullough, 2006).

As a limitation of the study, the small sample size and limited types of projects are paramount. Other obvious limitations are the reliance on self-report measures and cross-sectional design. Future studies intended to investigate the relationship between entrepreneurs' personality and success of their ventures will require a much larger sample and a larger variety of ventures types, including breakthrough and super high-technology ventures.

References

Begley, M. W., & Boyd, D. P. (1987). Psychological characteristics associated with performance in entrepreneurial firms and small businesses. *Journal of Business Venturing*, *2*, 79—93.

Borman, W. C., & Motowidlo, S. J. (1997). Task and contextual performance: The meaning for personnel selection research. *Human Performance*, *10*, 99—109.

Bowlby, J. (1969). *Attachment and loss, vol. 1, attachment.* New York: Basic Books.

Bowlby, J. (1973). *Attachment and loss, vol. 2, separation, anxiety and anger.* New York: Basic Books.

Bowlby, J. (1980). *Attachment and loss, vol. 3, sadness and depression.* New York: Basic Books.

Brockhaus, R. H. (1980). Psychological and environmental factors which distinguish the successful from unsuccessful entrepreneur: A long study. *Academy of Management Proceedings* (pp. 368—372).

Brockhaus, R. H., & Horwitz, P. S., Sr. (1986). The psychology of the entrepreneur. In D. L. Sexton & R. W. Smilor (Eds.), *The Art and Science of Entrepreneurship* (pp. 25—48). Cambridge: Ballinger.

Bullough, A. (2006). *Do women entrepreneurs effect economic growth in developing countries? Proceedings — AIB–SE (USA) Annual Meeting.* FL: Clearwater Beach.

Bygrave, W. D. (1995). Mom-and-pops, high potential strartups, and intrapreneurship: Are they part of the same entrepreneurship paradigm? In J. A. Katz & R. H. Brokhaus (Eds.), *Advances in entrepreneurship, firm emergence and growth* (pp. 1—20). Greenwich, CT: JAI Press.

Cable, D. M., & Judge, T. A. (1994). Pay preferences and job search decisions: A person–organization fit perspective. *Personnel Psychology*, *47*, 317—348.

Caldwell, D. E., & O'Reilly, C. A. (1990). Measuring person–job fit with a profile comparison process. *Journal of Applied Psychology*, *75*, 648—657.

Caplan, R. D. (1987). Person–environment fit theory and organizations: Commensurate dimensions, time perspectives, and mechanisms. *Journal of Vocational Behavior*, *31*, 248—267.

Carton, R. B., Hofer, C. W., & Meeks, M. D. (2004). *The entrepreneur and entrepreneurship: Operational definition of their role in society.* Terry College of Business: The University of Georgia.

Carland, J. W., Hoy, F., Boulton, W. R., & Carland, J. A. C. (1984). Differentiating entrepreneurs from small business owners: A conceptualization. *Academy of Management Review*, *9*, 354—359.

Chandler, G. N. (1996). Business similarity as a moderator of the relationship between pre-ownership experience and venture performance. *Entrepreneurship: Theory and Practice*, *20*, 51—65.

Chandler, G. N., & Hanks, S. H. (1994). Founder competence, the environment, and venture performance. *Entrepreneurship: Theory and Practice*, *18*, 77—89.

Chatman, J. A. (1989). Improving interactional organizational research: A model of person–organization Fit. *Academy of Management Review*, *14*, 333—349.

Collins, O. F., & Moore, D. G. (1964). *The enterprising man.* East Lancing, MI: Michigan State University.

Costa, P. T., Jr., & McCrae, R. R. (1992). Four ways five factors are basic. *Personality and Individual Differences*, *13*, 653—665.

Cooper, A. C., Dunkelberg, W. C., & Woo, C. Y. (1988). *Survival and failure: A longitudinal study, in Frontiers of entrepreneurship research* (pp. 222—237). Babson Park, MA: Babson College.

Cunningham, J. B., & Lischeron, J. (1991). Defining entrepreneurship. *Journal of Small Business Management*, *29*, 45—61.

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Czarniawaka, J. B., & Wolff, R. (1991). Leaders, managers, entrepreneurs on and off the organizational stage. *Organization Studies*, *12*, 529—546.
de Vries, M. F. R. (1996). The anatomy of the entrepreneur. *Human Relations*, *49*, 853—883.
Deakins, D. (1999). *Entrepreneurship and Small Firms.* London: McGraw-Hill.
Dutton, J. E., & Jackson, S. E. (1987). Categorizing strategic issues: Links to organizational action. *Academy of Management Review*, *12*, 76—90.
Dvir, D., Sadeh, A., & Pines, A. M. (2006). Projects and project managers: The relationship between project managers' personality, project types and project success. *Project Management Journal*, *37*, 36—48.
Friedman, M., & Rosenman, R. (1974). *Type A behavior and your heart.* New York: Knopf.
Gartner, W. B. (1988). "Who is an entrepreneur?" is the wrong question. *American Journal of Small Business*, *12*, 11—32.
Gartner, W. B. (1989). Some suggestions for research on entrepreneurial traits and characteristics, Entrepreneurship. *Theory and Practice*, *14*(l), 27—38.
Geldern, M. V. (2000). Enterprising behavior of ordinary people. *European Journal of Work and Organisational Psychology*, *9*, 81—88.
Hazan, C., & Shaver, P. (1987). Romantic love conceptualized as an attachment process. *Journal of Personality and Social Psychology*, *52*, 511—524.
Hoad, W., & Rosko, P. (1964). *Management factors contributing to the success and failure of new small manufacturers.* Bureau of Business Research: Ann Arbor, MI, University of Michigan.
Henderson, R. M., & Clark, K. B. (1990). Architectural innovation: The reconfiguration of existing product technologies and the failure of established firms. *Administrative Science Quarterly*, *35*, 9—30.
Holland, J. L. (1997). *Making vocational choices: A theory of vocational personalities and work environments*, 3rd Ed. Odessa, FL: Psychological Assessment Resources.
Izyumov, A., & Razumnova, I. (2000). Women entrepreneurs in Russia: Learning to survive the market. *Journal of Development and Entrepreneurship*, *5*, 1—19.
Judge, T. A., & Bretz, R. D., Jr. (1992). Effects of work values on job choice decisions. *Journal of Applied Psychology*, *77*, 261—271.
Jung, C. (1990). *The undiscovered self.* Princeton, NJ: Princeton University Press.
Kristof, A. L. (1996). Person–organization fit: An integrative review of its conceptualizations, measurement, and implications. *Personnel Psychology*, *49*, 1—49.
Kunkel, S. W. (2001, Summer). Toward a Typology of Entrepreneurial Activities. *Academy of Entrepreneurship Journal*, *7*(1).
Lamont, L. (1972). What entrepreneurs learn from experience. *Journal of Small Business Management*, *10*(3), 36—41.
Langowitz, N., & Minniti, M. (2007). The Entrepreneurial Propensity of Women. *Entrepreneurship: Theory and Practice*, *31*, 341—364.
Lant, T. K., & Mezias, S. J. (1990). Managing discontinuous change: A simulation study of organizational learning and entrepreneurship. *Strategic Management Journal*, *11*, 147—179.
Lawrence, P. R., & Lorsch, J. W. (1967). *Organization and Environment: Managing differentiation and integration.* Boston, MA: Harvard Business School Press.
Lee, D. Y., & Tsang, E. W. K. (2001). The effects of entrepreneurial personality, background and network activities on venture growth. *Journal of Management Studies*, *38*(4), 583—602.
Lumpkin, G. T., & Dess, G. G. (1996). Clarifying the entrepreneurial orientation construct and linking it to performance. *Academy of Management Review*, *21*, 135—172.
MacMillan, I. C. (1986). To really learn about entrepreneurship, let's study habitual entrepreneurs. *Journal of Business Venturing*, *l*, 241—243.
MacMillan, I. C., Seigel, R., & Narasimha, S. P. (1985). Criteria used by venture capitalists to evaluate new venture proposals. *Journal of Business Venturing*, *1*, 119—128.
McClelland, D. C. (1961). *The Achieving Society.* Princeton: D: Van Nostrand.
McGee, J. E., Dowling, M. A., & Megginson, W. L. (1995). Cooperative strategy and new venture performance: The role of business strategy and management experience. *Strategic Management Journal*, *16*, 565—580.
Mitchell, R. K. (1994). The composition, classification, and creation of new venture formation expertise. *The University of Utah, Salt Lake City, UT*, unpublished doctoral dissertation.
OECD. (1991). *The nature of innovation and the evolution of the productive systems technology and productivity—the challenge for economic policy.*OECD: Paris 303–14.
Pines, A. M., Sadeh, A., Dvir, D., & Yanai, Y. O. (2002). Entrepreneurs and managers: Similar yet different. *International Journal of Organizational Analysis*, *10*, 172—190.
Pines, A. M., Dvir, D., & Sadeh, A. (2009). Project Managers–Projects (PM–P) fit and Project success. *International Journal of Operations and Production Management*, *29*(3), 268—291.
Rauch, A., & Frese, M. (2005). Effects of human capital and long-term human resources development and utilization on employment growth of small-scale businesses: A causal analysis. *Entrepreneurship: Theory & Practice*, *29*(6), 681—698.
Rauch, A., & Frese, M. (2007). Born to be an entrepreneur? Revisiting the personality approach to entrepreneurship. In J. R. Baum, M. Frese, & R. A. Baron (Eds.), *The psychology of entrepreneurship* (pp. 41—66). Mahwah, NJ: Erlbaum.
Robinson, K. C. (1995). Measures of entrepreneurial value creation: An investigation of the impact of strategy and industry structure on the economic performance of independent new ventures. *The University of Georgia, Athens, GA*, unpublished doctoral dissertation.
Roure, J. (1986). *Success and failure of high-growth technological ventures: The influence of prefunding factors.* Stanford, CA: Stanford University.
Roure, J. B., & Keeley, R. H. (1990). Predictors of success in new technology based ventures. *Journal of Business Venturing*, *5*, 201—220.
Roure, J. B., & Maidique, M. A. (1986). Linking prefunding factors and high-technology venture success: An exploratory study. *Journal of Business Venturing*, *1*, 295—306.
Sandberg, W. R. (1986). *New venture performance: The role of strategy and industry structure.* Lexington, MA: Lexington Books.
Shapero, A. (1975, Nov). The displaced, uncomfortable entrepreneur. *Psychology Today*, 83—88.
Schumpeter, J. A. (1934). *The Theory of Economic Development.* Cambridge, Mass.: Harvard University Press.
Schumpeter, J. A. (1965). Economic theory and entrepreneurial history. In E. C. J. Aiken (Ed.), *Explorations in Enterprise*. Cambridge Mass: Harvard University Press.
Shaver, K. (1995). The entrepreneurial personality myth. *Business and Economic Review*, *41*, 20—23.
Shenhar, A. J., & Dvir, D. (2007). *Reinventing project management: The diamond approach to successful growth and Innovation.* Cambridge, MA: Harvard Business School Press.
Shenhar, A. J., Dvir, D., Levi, O., & Maltz, A. (2001). Project success: A multidimensional strategic concept. *Long-Range Planning*, *34*, 699—725.
Stuart, R., & Abetti, P. A. (1990). Impact of entrepreneurial and management experience on early performance. *Journal of Business Venturing*, *5*, 151—162.
Teece, D. J. (2000). *Managing Intellectual Capital: Organizational, Strategic and Policy Dimensions.* Oxford: Oxford University Press.
Thompson, J. D. (1967). *Organizations in Action.* New York: McGraw-Hill.
Wallach, M. A., Kogan, N., & Bem, D. J. (1964). Diffusion of responsibility and level of risk taking in groups. *Journal of Abnormal and Social Psychology*, *68*, 263—274.
Watson, W., Ponthieu, L., & Doster, J. (1995). Business owner-managers' descriptions of entrepreneurship: A content analysis. *Journal of Constructivist Psychology*, *8*, 33—51.
Weiler, A. S., & Bernasek, A. (2001). Dodging the glass ceiling? Networks and the new wave of women entrepreneurs. *Social Science Journal*, *38*, 85—103.
Wilde, D., & Labno, D. B. (2002). Personality and the creative impulse. *The Journal of Creative Behavior*, *30*, 39—51.
Wilken, P. H. (1979). *Entrepreneurship: A comparative historical study.* Norwood, NJ: Ablex.
Zimmerer, T. W., & Scarborough, N. M. (2001). *Essentials of Entrepreneurship and Small Business Management.* Upper Saddle River New Jersey: Prentice.

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