



The Role of Gender in Opportunity Identification

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Opportunity identification is rapidly becoming a key focal point of research in the entrepreneurship domain. This study is the first to explore gender differences in opportunity identification. Utilizing two distinct samples (95 senior undergraduate students, 189 entrepreneurs in two high-technology industries), we found that women and men utilize their unique stocks of human capital to identify opportunities and that they use fundamentally different processes of opportunity identification. However, we did not find any difference in the innovativeness of the opportunities identified. This research contributes both to the opportunity identification literature and to theories of social feminism by showing empirically that although women and men utilize different processes to identify opportunities, neither process is inherently superior.

Introduction

Opportunity identification is a fundamental research issue in entrepreneurship research (Gaglio & Katz, 2001; Shane & Venkataraman, 2000). It is viewed as an important entrepreneurial capability (Ardichvili, Cardozo, & Ray, 2003), a source of competitive advantage (Alvarez & Busenitz, 2001), and an important component of entrepreneurship education (DeTienne & Chandler, 2004; Kourilsky, 1995). However, in our attempt to teach opportunity identification in the classroom, we have become aware of apparent gender differences in the processes used. Although an emerging research stream focuses on women entrepreneurs (Baker, Aldrich, & Liou, 1997) and nearly half (48%) of all privately held firms established between 1997 and 2004 in the United States were 50% or more women-owned firms (Center for Women's Business Research, 2004), we found no published research that specifically discussed gender differences in the opportunity identification process.

We turn to human capital theory (Becker, 1975) and social feminist theory (SF) (Carter & Williams, 2003; Fischer, Reuber, & Dyke, 1993; Johnsen & McMahon, 2005) as theoretical frameworks for our research. The evidence of a link between human capital and opportunity identification (Davidsson & Honig, 2003; Ucbasaran, Westhead, Wright, & Binks, 2003) coupled with significant documentation of gender differences in human capital (specifically education, work experience, and industry experience) (Changanti &

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Parasuraman, 1996; Fischer et al., 1993; Kalleberg & Leicht, 1991; Srinivasan, Woo, & Cooper, 1994) suggests that differences in human capital may at least partially explain gender differences in processes of opportunity identification.

Focusing on potential and current entrepreneurs, we investigate four specific interrelated questions. First, do women and men possess different types of both general human capital—knowledge and skills of individuals that are useful in more than one job or firm, (Becker, 1975)—and specific human capital—knowledge and skills often accumulated on-the-job (Barron, Black, & Loewenstein, 1989; Becker, 1975)? Second, do women and men utilize different types of human capital to identify opportunities? Third, do women and men utilize different opportunity identification processes? And finally, do these different processes have a differential impact on the innovativeness of opportunities identified?

In this article, we report the results of two studies. When hypotheses are supported by multiple studies using diverse samples and methods, they provide stronger evidence to support construct- and criterion-related validity (Messick, 1987). In addition, converging results, derived by using different methods in two very different samples, provide evidence that enhances the conclusion validity and generalizability of our findings (Trochim, 2001). Through the use of different research samples and methodologies, we seek to gain a better understanding of the role gender plays in the opportunity identification process.

The first study is an experiment with a group of entrepreneurship students at a university in the United States. We selected these students because they were receiving training in opportunity identification, and we sought to investigate apparent gender differences in the opportunity identification process. The second study is a survey of business founders in two industries in the United States: electronic measuring instruments and surgical and medical devices. We selected these industries for two primary reasons. First, we desired to study industries with substantial opportunity identification activity, and firms in these industries frequently introduce new products and processes. Second, there are a substantial number of new firm start-ups in these industries. We wanted to specifically focus on the opportunity identification process in start-up firms. Selecting only two industries allows us to control for industry differences while providing adequate opportunity to study opportunity identification processes in start-up firms.

We begin with a literature review of opportunity identification, human capital, and gender, followed by development of hypotheses. Next, we explain the methods, analysis, and results for each study. Finally, we discuss the results of both studies.

Theoretical Perspective

The ability to identify opportunities is a cognitive task that allows some individuals, though not others, to identify opportunities (Shane & Venkataraman, 2000). As described in the Introduction, opportunity identification is rapidly becoming a key focal point of research in the entrepreneurship domain (Gaglio & Katz, 2001). As important as the question is, scholars have not agreed on a definition for what constitutes an entrepreneurial opportunity or whether opportunities are “identified,” “recognized,” or “created.” Some of the inconsistencies in the early research may be due to what Feldman (2004, p. 566) refers to as the failure to “clearly, precisely, and succinctly define key constructs.” Therefore, we begin this section with key definitions and boundary conditions.

We adopt the view of Singh (2001, p. 11), who states that an “entrepreneurial opportunity is a feasible, profit-seeking, potential venture that provides an innovative new product or service to the market, improves on an existing product/service, or imitates a

profitable product/service in a less-than-saturated market.” In addition, we purposefully chose the word “identification” rather than “recognition” or “creation.” Recognition carries with it a presumed ontological perspective that opportunities “exist out there” and it is the entrepreneur’s role to recognize them (Drucker, 1998). Creation limits opportunities to only those that the entrepreneur creates (Shackle, 1961). Identification is a more inclusive term that encompasses both potential opportunities already existing in the environment and opportunities that are created by entrepreneurs. Although opportunity identification also occurs in established organizations, this current research is concerned primarily with opportunity identification in new, start-up firms.

Opportunity Identification, Human Capital, and Gender

In this newly emerging area of inquiry, several studies have explored the role that human capital plays in opportunity identification (Davidsson & Honig, 2003; Ucbasaran et al., 2003). The human capital literature revolves around individual knowledge and the application of such knowledge (Ulrich, 1998). Knowledge is an idiosyncratic resource that is unequally dispersed among individuals in a society (Hayek, 1945), and individuals are thought to identify opportunities because they possess uniquely different forms of knowledge or human capital (Venkataraman, 1997).

Human capital theory (Becker, 1975) classifies human capital into two categories: general, and firm or industry specific (Becker, 1975; Buchholtz, Ribbens, & Houle, 2003). General human capital refers to knowledge and skills that are useful in more than one job or firm (Becker, 1975) and is usually measured by such items as formal education, age, prior work experiences, and prior entrepreneurial experience (e.g., Gimeno, Folta, Cooper, & Woo, 1997). Empirical research has shown that the ability to identify opportunities is related to such human capital variables as education, work experience, and entrepreneurial experience (Davidsson & Honig, 2003), prior knowledge (Shane, 2000), prior knowledge of customer problems (Shepherd & DeTienne, 2004), experiential knowledge (Dimov, 2003), and previous entrepreneurial experience (Ucbsaran et al., 2003). Ucbsaran et al. found preliminary support for the notion that higher levels of general human capital will lead to the identification of a greater number of opportunities. Davidsson and Honig (2003, p. 305) report a positive relationship between higher levels of human capital and nascent entrepreneurial activities.

In contrast to general human capital, firm- and industry-specific human capital refers to the knowledge and skills (often accumulated on-the-job) that are useful primarily in a single firm (Barron et al., 1989; Becker, 1975) or a single industry (Buchholtz et al., 2003). Shane (2000) found three types of specific human capital that impact the ability to identify opportunities: (1) prior knowledge of markets, (2) prior knowledge of ways to serve markets, and (3) prior knowledge of customer problems. Shepherd and DeTienne (2004, p. 91) established that “prior knowledge of customer problems leads to the identification of more opportunities and opportunities that are more innovative.” Both of these studies indicate that knowledge specific to a given industry (Gimeno et al., 1997) impacts opportunity identification.

Despite the fact that previous research has shown both general and specific human capital to be related to opportunity identification, we found no literature exploring the relationship between gender and opportunity identification. However, previous research indicates that men and women who start businesses possess different human capital at the point in time when businesses are started (Boden & Nucci, 2000; Changanti & Parasuraman, 1996; Srinivasan et al., 1994). For example, in their study of 508 entrepreneurs (40 female), Fischer et al. (1993) indicate that at start-up, men have significantly higher levels

of experience in managing employees, prior industry experience, and prior entrepreneurial experience. Multiple studies have shown that among business founders, men have significantly more years of industry experience (Carter & Williams, 2003; Changanti & Parasuraman, 1996; Cromie & Birley, 1991; Kalleberg & Leicht, 1991). In addition, several studies have shown that at start-up, men have more organizational and managerial experience than women (Boden & Nucci, 2000; Srinivasan et al., 1994). Kalleberg and Leicht 1991 found that men were more likely to be concurrently involved in more than one business venture. Menzies, Diochon, and Gasse (2004) report that although the amount of education does not differ between men and women, the major area of study does differ, with women more likely to be involved in health and natural sciences.

The theoretical framework that we have adopted to help explain gender differences in human capital is SF, which posits that there are differences “between males’ and females’ experiences from the earliest moments of life that result in fundamentally different ways of viewing the world” (Fischer et al., 1993, p. 154). Fundamentally, “social feminism views the genders as different but equal” (Carter & Williams, 2003) and proposes that differences between women and men are due to unique socialization processes (Carter & Williams, 2003; Johnsen & McMahon, 2005). We thus suggest that these distinctive experiences allow men and women to develop unique human capital which in turn impacts opportunity identification. “The possession of useful knowledge varies among individuals and these differences matter. This variable strongly influences the search for and the decision to exploit an opportunity . . .” (Venkataraman, 1997, p. 123). Because potential or nascent entrepreneurs use the individual-specific resources they have available to identify opportunities (Alvarez & Busenitz, 2001) and previous research indicates that men and women have unique human capital due to differential experiences, we propose the following:

Hypothesis 1: Women and men possess different types of both general and specific human capital.

Hypothesis 2: Women and men utilize different types of human capital to identify opportunities.

Gender and Opportunity Identification Processes

SF provides a theoretical framework to suggest a second way in which gender may affect opportunity identification. Because the theoretical roots of SF are derived, at least in part, from social learning theory (Fischer et al., 1993; Johnsen & McMahon, 2005), the theory suggests that men and women are different because of unique learning experiences. According to SF, both men’s and women’s experiences are important to the development of knowledge in a society, yet they develop that knowledge through different processes. Women and men “each have an effective and valid, but distinct, way of thinking and rationalising” (Johnsen & McMahon, 2005, p. 117).

Research supports the supposition that men and women follow different start-up processes. For example, the National Foundation for Women Business Owners (2001) reports that women are less likely than men to have a mentor and are more likely to consult with a larger network of outside sources when creating a new business. Women are more likely than men to balance work and family roles and to consider time and space constraints as they create new firms (Brush, 1992; Carter, Gartner, Shaver, & Gatewood, 2003). In their research into founding strategies, Kalleberg and Leicht (1991) indicate that women were more likely to choose a strategy based upon product

quality, while men were more likely to choose a strategy based upon the breadth of the product or service line.

The gender differences that we have just discussed suggest that women and men may also differ significantly in the processes of opportunity identification. Chandler, Lyon, and DeTienne (2005) identify the following four opportunity identification processes: (1) Learn/Replicate, (2) Learn/Innovate, (3) Learn/Acquire, and (4) Innovate/Educate, and show that differences in human capital are related to the selection and application of different opportunity identification processes.

The Learn/Replicate sequence begins with an individual(s), working in or associated with an industry, who identifies unmet market demand and replicates and delivers the product to an underserved market. The Learn/Innovate sequence begins with an individual(s), working in or associated with an industry, who identifies a customer need that is not being adequately met and develops a product that represents a significant innovation to that which currently exists in the market. The Learn/Acquire sequence begins with an individual(s) who identifies a successful business concept and takes advantage of existing income stream opportunities by acquiring the business—through spin-offs, buyouts, and/or licensing agreements. The Innovate/Educate sequence begins with an individual(s) who creatively develops a new product and then educates potential customers about the benefits the product provides.

Thus, based on the predictions of SF and the results of previous research, a logical extension to our first two hypotheses is the notion that men and women will use different processes to identify opportunities. Therefore, we hypothesize:

Hypothesis 3: Women and men utilize different opportunity identification processes.

Gender and Creativity of Opportunities

In addition to knowledge about the processes that are gained through experience, human capital also includes the flexibility and creativity of individuals, their ability to learn and develop skills over time, and to respond in a motivated way in different contexts (Davenport, 1999). Scholars and managers agree that the ability to think creatively is critical for organizational success (Elsbach & Kramer, 2003; Mumford & Simonton, 1997).

Opportunity identification has long been linked with creativity (Hills, Shrader, & Lumpkin, 1999; Lee, Florida, & Acs, 2004; Long & McMullan, 1984). For example, Long and McMullan (1984) describe opportunity identification as a creative structuring process. In their survey of 165 entrepreneurs, Hills et al. (1999, p. 224) found that opportunity recognition is “essentially a creative process.” Lee et al. (2004) established that creativity is positively related to new firm formation. Utilizing generativity theory of creativity, DeTienne and Chandler (2004) show that creativity training can improve both the number of ideas generated and the innovativeness of those ideas.

In his research into adaptation and innovation, Kirton (1976) contends that, on average, men tend to be innovators and women tend to be adaptors, suggesting gender differences in the creativity aspect of human capital. In addition, there is some evidence that women are less likely to be involved in highly innovative firms. For example, in their study of 468 women entrepreneurs, Hisrich and Brush (1984) report that these ventures were founded using modifications to existing products rather than product innovation. Therefore, we propose the following:

Hypothesis 4: Opportunities identified by women are less innovative than those identified by men.

Table 1**Hypotheses and Operationalizations from Studies 1 and 2**

Hypotheses	Study 1	Study 2	Study 1 operationalization	Study 2 operationalization
1—Women and men possess different types of both general and specific human capital.	X	X	General human capital Employment history (number of jobs) Entrepreneurial experience (number of ventures) Specific human capital Employment history (specific industry experience—retail trade, professional services, food services, and agriculture)	General human capital Age of the entrepreneur Entrepreneurial experience (number of years) Specific human capital Industry experience (number of years) Industry experience (similarity to current venture) Technical experience
2—Women and men utilize different types of human capital to identify opportunities.	X		Dependent variable Number of opportunities identified Independent variables General human capital Employment history (number of jobs) Entrepreneurial experience (number of ventures) Specific human capital Employment history (specific industry experience—retail trade, professional services, food services, and agriculture)	
3—Women and men utilize different opportunity identification processes.	X			Dependent variable Opportunity identification sequences Independent variables— general human capital Age of the entrepreneur Entrepreneurial experience (number of years) Independent variables— specific human capital Industry experience (number of years) Industry experience (similarity to current venture) Technical experience
4—Opportunities identified by women are less innovative than those identified by men.	X	X	Gender Level of innovation	Gender Level of innovation

Research Studies

We test these hypotheses in two separate studies. The first is an experiment conducted with 95 undergraduate students, and the second includes a survey of 189 founding entrepreneurs in two industry categories. Table 1 lists each of the hypotheses tested in this research. It designates in which study the hypothesis is tested and the operationalization of the variables. Subsequently, we will discuss the findings of both studies. We now turn to the specifics of the first study.

Study 1 Methodology

Study Participants

The participants in Study 1 were 95 senior-level undergraduate business students who were enrolled in a required capstone business course at a 4-year university in the western United States. The mean age of the participants was 24 years, and 44% of the participants were female. In the 3 years prior to the study, participants held an average of 2.98 jobs that lasted longer than 3 months. Twenty-four percent of the students indicated that they had been involved in the creation of a business that created new wealth.

Procedures

We conducted a pilot study of the instrument used in this research with 18 graduate students in a masters in human resources degree program. After reviewing comments from these individuals, we made minor modifications to the instrument. Study participants were given the following explanation for the purpose of the study: “The following pages are an effort to combine research into how business opportunities are identified and classroom experiential exercises. The research will be used to better understand how individuals recognize business opportunities, which is an important topic to entrepreneurship scholars and researchers.” The participants were not given any extra incentive to take part in the study and had the choice of whether or not to participate. The participants were assured that their answers would be kept confidential. Approval to conduct the study was obtained from the Institutional Review Board.

The participants were asked to “Think back for a moment over the events and activities of your last 24 hours. These might include: commuting, social encounters, classes, homework, hobbies, work, family or organizations in which you are involved. Please list below any business opportunities that you have observed. List any and all ideas that come to mind—it is not necessary to critically evaluate those opportunities as to potential success.”

The data were then entered into a spreadsheet exactly as expressed by the participants and were rated by two independent coders. Coders were identified for their ability to judge opportunities based upon their academic qualifications, prior work experience, and experience in new venture creation. Coder #1 had 27 years of industry experience, a master of business administration (MBA), and had been involved in the creation of four ventures that generated significant wealth. Coder #2 had 18 years of industry experience, a Ph.D. in Strategy and Entrepreneurship, and had been involved in the creation of two ventures that generated significant wealth. Coders assessed each idea expressed by the participants on two dimensions: number of opportunities and innovativeness of opportunities. Using a Pearson bivariate correlation, the interrater reliability for innovativeness of opportunities was .85, indicating high consistency among coders. After a discussion between the raters, they reached full agreement. Data on the distribution characteristics (means and standard deviations), along with the bivariate correlations among the variables (without controls for the effects of other variables) are shown in Table 2.

Measures

Employment History. Employment history was measured by asking individuals to “Use the following table to list your previous employment history, indicating any jobs you have had in the past 3 years that lasted more than 3 months and the industry in which those

Table 2

Descriptive Statistics and Zero-Order Correlations among the Study Variables—Study 1

Variables	Mean	SD	1	2	3	4	5	6	7
Number of opportunities identified	2.17	1.45	—						
Number of previous ventures	.33	.68	.19	—					
Number of previous jobs	2.98	1.26	.21*	.23*	—				
Specific industry—retail	.44	.74	.29**	-.04	.27**	—			
Specific industry—professional services	.24	.54	.06	.22*	.24*	-.14	—		
Specific industry—food services	.23	.51	.02	-.16	.35**	.12	-.09	—	
Specific industry—agriculture	.18	.58	-.04	.01	.08	-.14	-.11	.04	—

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

SD, standard deviation.

businesses operated.” The first part of the question (number of jobs) reflects general human capital (Gimeno et al., 1997). The second part of the question (industry) allowed us to explore how work experience in a particular industry (specific human capital) affected opportunity identification. Respondents were given 15 industry categories to choose from—agriculture, arts, entertainment and recreation, construction, computer manufacturing, other manufacturing, education, finance and insurance, food services, health care, information-publishing and communications, professional services, retail trade, software development, transportation, and other. These categories were chosen based upon Standard Industrial Classification (SIC) Codes as well as the industry classifications of Gimeno et al. Employment in the following sectors occurred most often: (1) retail, (2) professional, (3) food services, and (4) agriculture.

Entrepreneurial Experience. Previous entrepreneurial experience was measured by asking individuals to “List the number of businesses you have started (by yourself or with others) that have created new wealth.” Seventy-six percent of individuals indicated that they had no prior entrepreneurial experience; 18% had been involved with one venture, 5% with two ventures, and 1% with four ventures.

Number of Opportunities. The number of opportunities was the result of a count by the coders (for each participant) of opportunities expressed in the experiment (Shepherd & DeTienne, 2004). Those ideas that fell into the category of “no apparent innovation or not enough information to make a determination” were not included in the final count. For example, one participant expressed, “I could take pictures at my friend’s wedding” and another, “I might get into the insurance business.” Neither of these statements was included in the number of opportunities. The number of ideas listed ranged from zero to eight with 85% of respondents listing between one and three opportunities. The mean number of opportunities listed was 2.1.

Level of Innovation. The level of the innovativeness of the opportunities identified was established based upon a scale developed by Fiet (2002) and revised by DeTienne and

Table 3

Analysis of Variance Results—Study 1

Measure	Men Mean	Men SD	Women Mean	Women SD	df	SS	F
Number of previous entrepreneurial ventures	.44	.64	.14	.65	1,92	2.08	5.05*
Number of previous jobs	2.92	1.31	3.07	1.22	1,92	.51	.32
Specific industry—retail	.23	.55	.12	.63	1,94	.22	.39
Specific industry—professional	.23	.55	.26	.54	1,94	.02	.08
Specific industry—food service	.17	.43	.31	.60	1,94	.43	1.63
Specific industry—agriculture	.23	.55	.12	.63	1,94	.29	.84
Innovativeness of opportunities identified	1.69	.85	1.81	.78	1,92	.36	.54

Men, N = 52; women, N = 42.

* $p < .05$.

SD, standard deviation; df, degree of freedom.

Chandler (2004).¹ To determine the innovativeness of the opportunities, the coders used a 6-point scale based upon the following categories: (1) no apparent innovation or not enough information to make a determination; (2) a product or service identical to an existing product/service, offered to an underserved market; (3) a new application for an existing product/service, with little/no modification or a minor change to an existing product; (4) a significant improvement to an existing product/service; (5) a combination of two or more existing products/services into one unique or new product/service, and (6) a new-to-the world product/service, a pure invention or creation. Category number one was removed from the analysis resulting in a 5-point scale ranging from 1 to 5 with a mean of 1.74.

Analysis and Results

Data for Study 1 were analyzed using analysis of variance (ANOVA) and linear regression. We used ANOVA to test differences in human capital across gender. We found significant differences across gender in entrepreneurial experience providing partial support for hypothesis 1. There was no difference across gender in employment history (see Table 3).

To test the effect of entrepreneurial experience and prior employment history on the number of opportunities identified, we utilized linear regression selecting only women's or men's cases to be analyzed (see Table 4). For women, the number of previous jobs and

1. The wording for the scale as revised by DeTienne and Chandler (2004) is exactly as described by Fiet (2002) except for the following changes: In the first category, Fiet's (2002) description “no apparent innovation” was revised to include “or not enough information to make a determination.” This was simply a clarification for the coders. Fiet's (2002) third category “a new application for an existing product/service, with little/no modification” was revised to include “or a minor change to an existing product.” This was a result of the coder's decision in the prerating session that there really was no category to place those products with minor changes. In the fifth category, DeTienne and Chandler (2004) changed the wording from “different” to “unique or new” to add clarity.

Table 4

Regression Results—Study 1

Measures	Women		Men	
	B	t-statistic	B	t-statistic
Constant	.68	1.17	2.05	3.73*
Number of ventures	-.08	-.23	.88	2.36*
Number of jobs	.41	2.08*	-.18	-.84
Specific industry—retail	.69	2.69*	.15	.42
Specific industry—professional services	.00	.01	.42	.91
Specific industry—food services	-.28	-.78	.78	1.3
Specific industry—agriculture	-.04	-.11	-.14	-.35
Model R ²			.32	.16
Model adjusted R ²			.20	.05

* $p < .05$.

retail industry experience positively predicted the number of opportunities identified and accounted for 20% of the variance. For men, the base number of previous entrepreneurial ventures they were involved in positively predicted the number of opportunities identified and accounted for a modest 5% of the variance. These findings suggest that women and men utilize different types of human capital to identify opportunities. Hence, the study provides support for hypothesis 2.

To test whether gender makes any difference with regard to level of innovativeness of the ideas generated, we used ANOVA (see Table 3). We found that the level of innovation of the opportunities identified was not significantly different across genders. Thus, there was no support for hypothesis 4. We discuss these results further in the Discussion section.

Study 2 Methodology

The purpose of Study 2 was twofold: (1) to extend the findings of Study 1 to a sample of entrepreneurs and to further explore how human capital affects opportunity identification differentially in men and women, and (2) to increase generalizability by studying entrepreneurs.

Study Participants

The sampling frame for this study came from the 2002 Dun & Bradstreet directory, which contains information on over 132,500 companies (90% of which are private). The database contained contact information and secondary data such as 3 years of sales figures, employment figures, SIC Codes, and start-up date. We selected two four-digit codes—electrical measurement instruments (SIC 3825) and surgical and medical instruments (SIC 3841)—which included 1,334 2- to 5-year old firms. We restricted our sample to two SIC Codes from industries with a high level of innovation and growth because those were the focal points of the study. In addition, there were conflicting explanations

regarding performance differences across gender. Loscocco, Robinson, Hall, and Allen (1991) suggested that performance differences were due to the concentration of women in certain industries. Other researchers (e.g., Menzies et al., 2004) contended that these differences were due to the cross-sectional nature of much of the current research that does not take into consideration the underrepresentation of women in high-technology industries. By restricting our sample to these industries, we controlled for such differential influences.

Procedures

Prior to survey development, we conducted 35 semistructured interviews with entrepreneurs in the sampling frame to establish face validity. We then designed the survey to contain measures that had been established in prior research as well as measures designed specifically for this study. In addition, we pretested the instrument with two relevant groups of individuals. First, we pretested the instrument with 18 members of an on-campus MBA class. We asked them to provide insight into difficult questions, survey design, etc. The initial pretest led to several changes in the survey. We conducted the second pretest with 10 entrepreneurs in the utilized sampling frame. Few changes resulted from the second pretest, indicating entrepreneurs were able to understand and complete the revised survey.

Following the total design method described by Dillman (2000), we mailed questionnaires, accompanied by prepaid return envelopes and cover letters, to the chief executive officers (CEOs) (chairman, CEO, and president) of the firms in the sample frame. The cover letters identified the sponsor of the study and explained its purpose and importance. We assured executives of confidentiality and promised them a report of the aggregated findings once the study was completed. A follow-up postcard and reminder letter with a replacement survey questionnaire followed the initial mailing. In order to improve response rates, we telephoned potential respondents to elicit participation and to ascertain correct mailing addresses. A second wave of surveys was sent to those firms that we could identify as women-owned firms to try to elicit additional participation. We eliminated 272 firms from the sample due to duplications, incorrect addresses, and disconnected phone numbers, leaving a sampling frame of 1,062 firms. One hundred and eighty-nine firms responded with usable surveys for a response rate of 17.7%. Descriptive statistics, by gender, and zero-order correlations are displayed in Table 5.

Measures

General Human Capital

Age of the entrepreneur. The respondents were asked to indicate their age based upon six predetermined categories: (1) less than 25 years old, (2) 25–34 years old, (3) 35–44 years old, (4) 45–54 years old, (5) 55–64 years old, and (6) more than 65 years old. None of the respondents were less than 25; 9% were between 25 and 34; 33% were between 35 and 44; 31% were between 45 and 54; 23% were between 55 and 64, and 5% were older than 65.

Entrepreneurial experience. In this study, entrepreneurial experience is operationalized as number of years of experience in prior entrepreneurial ventures. The respondents were asked to indicate the number of years of experience they had in the management of

Table 5

Descriptive Statistics and Zero-Order Correlations among the Study Variables—Study 2

Variables	Women	Mean	SD	Men	Mean	SD	1	2	3	4	5	6	7	8	9	10
Sequence—Learn/Replicate	2.35	.88	2.31	1.05	—											
Sequence—Learn/Innovate	3.20	1.15	2.77	1.20	-.43**	—										
Sequence—Learn/Acquire	2.65	.88	2.77	.96	-.83**	.12	—									
Sequence—Innovate/Educate	2.25	.91	2.30	.94	-.46**	.20*	-.05	—								
Age of the entrepreneur	3.50	1.29	3.86	.99	-.14	.22**	.08	.04	—							
Entrepreneurial experience	4.17	5.43	5.24	8.01	-.13	.07*	.10	-.01	.29**	—						
Industry experience (number)	7.10	8.83	13.49	11.18	-.06	.07*	-.01	.04	.25**	.06*	—					
Industry experience (similarity)	3.11	1.28	3.36	1.21	-.07	.06	.08	.05	-.02	-.08	.34**	—				
Technical experience	3.32	1.18	3.99	.95	.03	.18*	-.06	-.00	.08	-.02	.35**	.24**	—			
Level of innovation	3.78	1.78	3.41	1.70	-.32**	.69**	.12	.14	.11	.23**	.10	-.18*	-.01	—		

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

SD, standard deviation.

a venture in which they were an owner (prior to this venture). Responses ranged from 0 to 40 with a mean of 5.1 years.

Gender. Gender was determined by asking the respondents to indicate their gender. Thirteen percent (24) of the respondents were women and 87 percent (165) were men.

Specific Human Capital

Industry experience. To measure industry experience, we used two distinct measures. The first measure of industry experience was operationalized as number of years of experience in the current industry. The respondents were asked, "Please indicate the number of years of experience (prior to this venture) in your current industry." Responses ranged from 0 to 75 with a mean of 12.7.

The second measure utilized a scale developed by Chandler (1996) to measure the similarity of the current environment to that previously experienced. The respondents were asked to consider four industry categories—customers, suppliers, competitors, and products—and rate "how similar are the 'customers' in your current venture compared to what you have experienced prior to this venture?" Responses were measured on a 5-point Likert-type scale anchored by "very dissimilar" on one end to "very similar" on the other. The measure has one identifiable factor (eigenvalue = 2.82, 70.4% total variance explained) with a Cronbach's alpha coefficient of .86.

Technical experience. To measure technical experience, the respondents were asked two questions. The first asked respondents to rate "how similar are the technical/functional duties in your current venture compared to what you have experienced prior to this venture?" Responses were measured on a 5-point Likert-type scale anchored by "very dissimilar" on one end to "very similar" on the other. The second question asked respondents, "Based upon your knowledge and experience, please indicate your level of expertise in technical areas." Responses were measured on a 5-point Likert-type scale anchored by "low expertise" on one end to "high expertise" on the other. The measure has one identifiable factor (eigenvalue = 1.45, 72.7% total variance explained) with a Cronbach's alpha coefficient of .62.

Dependent Variables

Opportunity identification sequence. Opportunity identification consisted of four possible sequences (Learn/Replicate, Learn/Innovate, Learn/Acquire, and Innovate/Educate) identified by Chandler et al. (in press). We asked executives to respond to the following question: "Which of the following best describes the sequence of events that occurred prior to starting your business?" Possible responses were (1) "I/we recognized a market need before I/we found or developed the product/service," (2) "I/we found or developed a product or technology and then looked for a market," or (3) "I/we acquired an existing income-stream (e.g., a buyout, a spin-out venture, a portion of an existing venture)." There were very little missing data in this section of the questionnaire, indicating that we used language commensurate with the experience of the respondents (Weick, 1969).

Next, we measured the innovativeness of the idea as described in the following paragraph. These two measures (sequence of events and innovativeness) were combined to develop the four opportunity identification sequences we had previously identified. We utilized a median split on the innovation scale with replication referring to responses one, two, and three as previously mentioned, and innovation referring to responses four, five, and six. We coded the responses as follows: identification of a market combined with

replication resulted in the Learn/Replicate sequence ($n = 31$; 20%); identification of a market combined with an innovative product resulted in the Learn/Innovate sequence ($n = 70$; 45%); identification of an existing revenue stream resulted in the Learn/Acquire sequence ($n = 35$; 22%), and identification of a new product resulted in the Innovate/Educate sequence ($n = 20$; 13%).

Level of innovation. This measure is the innovation part of the identification sequences described earlier. Thus, two of our dependent variables are related. The innovativeness of the opportunities was established based upon a scale developed by Fiet (2002) and utilized by DeTienne and Chandler (2004). We asked, “Which of the following best describes your initial product/service?” Possible responses were: (1) a replication of existing products/services used in similar applications, (2) a new application for an existing product/service with little or no modification (e.g., treatment for migraines also helps with back spasms), (3) a minor modification to an existing product/service (e.g., slight modification to a knee brace), (4) a significant improvement to an existing product/service (e.g., surgical instruments that do not stick to body tissue), (5) a combination of two or more existing products into one unique product/service (e.g., camera and cell phone), and (6) a product/service that is new to the world (e.g., wireless technology). Twenty-seven percent of the respondents indicated that their product was a replication; 2% indicated a new application; 7% indicated a minor modification; 40% indicated a significant improvement; and 12% indicated both a combination and a new-to-the-world product.

Analysis and Results

Data for Study 2 were analyzed using ANOVA and multinomial logistic regression. To test whether human capital varies across gender (hypothesis 1), we used ANOVA (see Table 6 below). We found that human capital significantly varies across gender in two areas: (1) number of years of industry experience with men reporting higher levels and (2) technical expertise with men reporting higher levels. These results provide support for hypothesis 1. We did not find differences in years of entrepreneurial experience or similarity of industry experience.

Table 6

Analysis of Variance Results—Study 2

Measure	Men Mean	Men SD	Women Mean	Women SD	df	SS	F
Previous entrepreneurial experience	5.24	8.02	4.36	5.48	1,179	14.81	.25
Industry experience—number of years	13.49	11.18	6.68	8.87	1,168	781.71	6.52*
Industry experience—similarity to current venture	3.36	1.21	3.06	1.28	1,181	1.69	1.15
Technical experience	3.99	.95	3.33	1.21	1,180	8.03	8.26**
Level of innovation	3.41	1.70	3.91	1.72	1,181	4.82	1.67

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

SD, standard deviation; df, degree of freedom.

To test whether gender makes a difference in the opportunity identification sequence (hypothesis 3), we used multinomial logistic regression. Multinomial logistic regression is appropriate for this study because the dependent variable (opportunity identification sequence) is a four-group categorical variable. Logistic regression classifies subjects based on values of a set of predictor variables through a maximum likelihood procedure and is more robust to violations of assumptions of normality than other analyses (e.g., discriminant analysis). To estimate the fit of the model, we examined the variable significance levels and the pseudo R² (Nagelkerke). Gender is significant ($p < .05$), indicating men and women utilize different opportunity identification sequences, thus providing support for hypothesis 3. The pseudo R² is .18. In order to more fully understand the effect that gender had on each of the different sequences of opportunity identification, we explored the significance levels of the individual parameter estimates. Women were significantly less likely than men to utilize a Learn/Replicate or a Learn/Acquire sequence and were significantly more likely to utilize a Learn/Innovate sequence (see Table 7).

To test whether gender makes any difference with regard to the level of innovation, we used ANOVA (see Table 6). We discovered that the innovativeness of the opportunity was not significantly different across gender. This was consistent with the results in Study 1.

Table 7

Results of the Multinomial Regression—Study 2

		B	SE
Learn/Replicate	Constant	2.71	1.66
	CEO age	-.42	.28
	Entrepreneurial experience	-.05	.04
	Industry experience (number)	-.03	.03
	Industry experience (similarity)	.11	.23
	Technical experience	-.36	.28
	Gender = 0 (women)	-2.34*	1.17
Learn/Acquire	Constant	1.44	1.59
	CEO age	-.14	.27
	Entrepreneurial experience	-.01	.04
	Industry experience (number)	-.03	.03
	Industry experience (similarity)	.52*	.24
	Technical experience	-.65*	.27
	Gender = 0 (women)	-1.98*	.94
Innovate/Educate	Constant	.24	1.91
	CEO age	-.23	.30
	Entrepreneurial experience	-.03	.04
	Industry experience (number)	-.01	.03
	Industry experience (similarity)	.02	.25
	Technical experience	-.04	.32
	Gender = 0 (women)	-.62	.90
Model chi-square	24.7		
CoxSnell R ²	.17		
Nagelkerke R ²	.18		

* $p < .05$; ** $p < .01$; *** $p < .001$.

The reference category is Learn/Innovate.

CEO, chief executive officer; SE, standard error.

Again, hypothesis 4 was not supported. In summary, we found support for hypothesis 1 in both studies, support for hypotheses 2 and 3, and no support for hypothesis 4 in either study.

Discussion

This research makes a contribution not only to the study of opportunity identification, but it also provides support for several of the assumptions of SF. First, we found that women and men, in both samples, have unique stocks of human capital that they use differentially to identify opportunities. Thus, although our evidence is limited by sample characteristics, it supports the central assumption of SF that “women and men have different experiential backgrounds and different ways of thinking” (Carter & Williams, 2003, p. 30). In addition, the results from both samples suggest that although women and men utilize different opportunity identification sequences, there was no difference in the innovativeness of the opportunities they identified. This supports another assumption of SF which suggests that women and men may follow different processes, but “Neither the male nor the female mode of knowing is regarded an innately superior . . .” (Fischer et al., 1993, p. 154).

The SF view is often contrasted with the liberal feminist (LF) view which contends that “. . . men and women are equal, autonomous individuals” (Greer & Greene, 2003, p. 2). In the LF perspective, women have been denied critical resources (e.g., financing, networks) to establish new ventures and the elimination of these discriminatory practices will result in equal opportunities for women (Carter & Williams, 2003). An example of this type of research is the work by Menzies et al. (2004) who, in discussing their findings that women have different educational backgrounds and start ventures that may not be attractive to venture capitalists, state, “These findings are a clear wake-up call for the implementation of new programs and policies to increase the number of females studying computer and engineering sciences. . . .”

Although this is one possible conclusion or directive for future action, we suggest an alternative proposition. An important finding to come out of our research is that results from both samples suggest that women and men utilize different opportunity identification processes with different stores of knowledge. However, ultimately there was no difference in the innovativeness of their venture ideas. Our preliminary evidence, based on admittedly limited samples, may have additional implications. Thus, rather than suggest that women must be more represented in the computer and natural sciences (become more like men), we speculate that there may be a unique role for both men and women in new venture creation. Thus, we believe our results are supportive of the SF view in which one gender does not have to become more like another in order to succeed, but rather each individual should focus on the importance of developing one’s own individual resources.

According to resource-based theory, it is the firm’s or individual’s unique bundle of resources that contributes to competitive advantage (Alvarez & Busenitz, 2001; Barney, 1991). Therefore, both genders should build upon their own unique resources. “Entrepreneurial opportunities are thought to exist when different agents have insight into the value of resources that other agents do not, and the agents with the insight act upon these un-exploited opportunities” (Alvarez & Busenitz, 2001, p. 757). Certainly, further research should be conducted to validate the findings of this research and extend these ideas into other aspects of new venture creation. For example, one area of potentially fruitful research may be the gender makeup of new venture teams. The question then becomes “if men and women bring different resources to the table and utilize different

processes should new venture teams include both genders or would teams made up of one gender be more advantageous?"

We also found that women were more likely to utilize a Learn/Innovate sequence and men were more likely to utilize Learn/Acquire and Learn/Replicate sequences. These significant findings support the hypothesis that women and men use these different processes, but provide little insight into why that may be so. One possible explanation is the differential founding strategies of women and men. Our finding that women are more likely than men to be involved in a Learn/Innovate sequence supports the research that suggests women are more likely to choose a specialist strategy that focuses on offering specially designed, high-quality products (Chaganti & Parasuraman, 1996; Kalleberg & Leicht, 1991). In addition, our findings suggest that men are more likely than women to utilize a Learn/Acquire sequence. One potential explanation for this finding is that men, because of their motivation toward financial success (Carter et al., 2003), are more likely to identify opportunities that allow them to quickly develop a revenue stream (spin-offs, buyouts, and/or licensing opportunities). Future research is necessary to validate these findings and to explore other opportunity identification processes.

Our study is unique to many studies that are cross-sectional studies of men and women. A comparison of start-ups across industries shows that certain industries are typically dominated by men and others typically dominated by women (e.g., Anna, Chandler, Jansen, & Mero, 1999). For example, Kalleberg and Leicht (1991) found that women were significantly more likely to identify opportunities in the healthcare industry. Yet, within the healthcare industry, we would not expect to find innovative differences between genders. Our findings suggest that if women choose to become involved in industries typically dominated by men, they are not less innovative.

Finally, our study indicates that there may be multiple pedagogies that should be employed when teaching or training potential entrepreneurs. Because women and men use different types of human capital and different processes, a "one size fits all" approach may not be meeting the needs of all individuals in a classroom. Further research should explore the pedagogical approaches to opportunity identification. Two different pedagogies have been described in the literature by Fiet (2002) and DeTienne and Chandler (2004). Fiet (2002) argues for a process of reductionism, proposing that students would be best served by developing consideration sets and systematically searching for opportunities within that limited consideration set. However, DeTienne and Chandler (2004) argue that by teaching students to creatively interpret their everyday environment and to train their minds to look at all stimuli as a potential opportunity, individuals will be able to identify more and better opportunities. Although it is likely that both pedagogies contribute to opportunity identification, our findings hint that pedagogical approaches may work differently for women and men. For example, because men are more likely to use a generalist strategy (Kalleberg & Leicht, 1991), they are likely to respond more positively to a holistic approach, while women who use a specialist strategy (Kalleberg & Leicht, 1991) may respond better to a reductionism approach.

Although we have presented the findings of this research, the scarcity of previous research into gender and opportunity identification cautions us against drawing premature conclusions based on these results. Our data have several obvious and important limitations. In the first study, we analyzed students. These students may or may not be representative of aspiring, nascent, or actual business owners. In addition, these students were part of one university. We may be picking up local or cultural differences that are not generalizable to the general population. This threat is somewhat mitigated because we did not rely exclusively on the student sample, but supported the results with a sample of actual business owners.

In the second study, the proportion of women in the sample is relatively small. We have focused on industries that tend to be dominated by men, are technical in nature, and in which firm founders are highly educated. This would suggest that the female founders, who comprise 13% of the total sample, may not be representative of female business founders/owners as a whole. Although the number of women in the sample is consistent with the percentage of women in the population, our findings may be an artifact of the small sample size rather than a true indicator of population propensities.

However, these concerns have been somewhat mitigated by combining two studies. The gender differences in opportunity identification occur in both the sample of students and the sample of entrepreneurs. Because we studied both students and entrepreneurs and found similar results, the evidence suggests that the gender differences exist even in very different contexts. This strengthens the generalizability of the findings.

Another limitation is that several of the items used in this study were self-report items. However, in this research, we believe this problem is somewhat attenuated. First, we compared our self-reported data to secondary data provided by the Dun & Bradstreet database. The self-report information was highly correlated with the Dun & Bradstreet data. For example, in the self report, we asked individuals to list both the number of full and part-time employees. This combined figure was highly correlated (.98; $p < .01$) with the total employee figure provided by Dun & Bradstreet. In addition, the informants are firm founders and should be considered experts and capable of providing valid information. There is also some possibility in the second study of a retrospective bias (March & Sutton, 1997). However, the information we gleaned regarding the opportunity identification sequence is an event of significant importance (Akerlof & Yellen, 1985) and occurs infrequently (Sudman & Bradburn, 1974), both factors that tend to improve the accuracy of recalled information. In addition, we sought to use firms that were relatively new to the market. However, we acknowledge that retrospective bias can be a confounding factor. Finally, our measure of innovation in the sample of founders may be influenced by social desirability. Hence, the innovativeness of the products or services may be overreported. We also concede that both survey and experimental methodologies have limitations that could have been attenuated with the use of qualitative methodologies (e.g., grounded theory).

We acknowledge that this research raises more questions than it answers. However, by so doing, it provides an important foundation on which further research can be built. Specific future research can strengthen the generalizability of our findings by sampling entrepreneurs in different industry sectors and including entrepreneurs with various types of human capital.

Opportunity identification is a relatively new area of research in the entrepreneurship literature; therefore, it is not surprising that previous research has not yet focused on the impact of gender on the process. Yet, this study indicates that gender is important to answering the question of “why, when, and how some people and not others discover and exploit *certain* [emphasis added] . . . opportunities” (Shane & Venkataraman, 2000, p. 218). This study builds upon SF and provides evidence that the women and men in our samples have uniquely different stocks of human capital that they differentially use to identify opportunities. However, even though the processes may be fundamentally different, the level of innovativeness is not, suggesting that the path to new venture success may consist of many different paths rather than one super highway.

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