

**Antecedents of Business Opportunity Identification and Innovation: Investigating the  
Interplay of Information Processing and Information Acquisition**

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**Applied Psychology: An International Review, in press**

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**Keywords:** Entrepreneurship, opportunity identification, innovation, creativity, entrepreneurial knowledge, information processing, information acquisition, South Africa

**Acknowledgements:** This research was partially supported by National University of Singapore (R-317-000-084-133) and by the National University of Singapore Academic Research Fund (AcRF) (R-317-000-095-112). We would like to thank the Western Cape Business Opportunities Forum (WECBOF) for the fruitful cooperation and their support of this study. Special thanks go to Lesley Africa and Glenda Sampson. Britta Kappel gratefully acknowledges the support by the Studienstiftung des Deutschen Volkes.

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**Abstract**

Building on conceptual frameworks of entrepreneurial discovery, we argue that active information search compensates for a lack of entrepreneurial experience and enhances the effects of divergent thinking and general mental ability (GMA) on opportunity identification. We sampled 100 business owners in South Africa. Results confirmed the hypothesized moderating effects of active information search on the relationships of entrepreneurial experience and divergent thinking on opportunity identification. Furthermore, we found direct effects of opportunity identification and conditional indirect effects of divergent thinking on innovativeness of product/service innovations. Our findings suggest that a joint examination of entrepreneurial experience and divergent thinking with active information search helps to better understand opportunity identification.

## INTRODUCTION

Entrepreneurship is about opportunity discovery and exploitation (Shane & Venkataraman, 2000). One facet of this central issue for entrepreneurship is to explain why some people discover business opportunities while others do not (Baron, 2004; Shane & Venkataraman, 2000). According to Kirzner's (1979, 1997) theory, entrepreneurial discovery depends on people's entrepreneurial alertness and on information related to business opportunities. Kirzner (1979) has defined entrepreneurial alertness as the ability to notice business opportunities without search. Entrepreneurial alertness still receives wide attention in the entrepreneurship literature to explain business opportunity identification (e.g., Baron, 2007a; R. K. Mitchell et al., 2007; Tang, Kacmar, & Busenitz, 2012). However, scholars have criticized the "fuzziness" of the construct (Tang, Kacmar, & Busenitz, 2012, p. 90). The construct is "fuzzy" for two reasons: First, Kirzner's (1979) conceptualization of entrepreneurial alertness can only be used as a post-hoc explanation (if somebody has identified an opportunity, then he or she was alert; if not, then he or she was not alert) which implies that the construct has no meaning a priori (McMullen & Shepherd, 2006). Second, the construct of entrepreneurial alertness remains broad and unspecific with the consequence that scholars have adopted inconsistent approaches to measure entrepreneurial alertness (cf., Busenitz, 1996; Gaglio, 2004; Gaglio & Katz, 2001; Kaish & Gilad, 1991; Kirzner, 2009).

Shane and Venkataraman (2000) as well as other scholars have elaborated on Kirzner's (1979, 1997) theoretical conception and have emphasized the importance of individual characteristics in entrepreneurial discovery. They have argued that information processing is an important factor in entrepreneurial discovery (Baron, 2007a; Shane, 2003). Information processing is important because it describes the processes of interpreting and combining new information; these processes may lead to new conclusions and the identification of new business opportunities (R. K. Mitchell et al., 2007, 2002; Vaghely & Julien, 2010). With the

aim to further elucidate the construct, scholars have begun to re-emphasize the ability aspect of entrepreneurial alertness and proposed that entrepreneurial alertness rests, at least partly, on the cognitive capacities of prior knowledge and experiences, creativity, and general mental ability (GMA) (Ardichvili, Cardozo, & Ray, 2003; Baron & Ensley, 2006; Shane, 2003; Tang et al., 2012). These cognitive capacities influence how people process information.

Entrepreneurial experience relates to information processing because experience shapes people's mental frameworks; mental frameworks, in turn, influence how people interpret and integrate new information (Fiske & Taylor, 1984). Divergent thinking and GMA relate to information processing as they refer to people's capabilities to comprehend and make associations between complex information (Neisser et al., 1996; Ward, 2004). In this study, we investigate how the factors of entrepreneurial experience, divergent thinking, and GMA affect business opportunity identification. We aim to contribute to the literature on entrepreneurial discovery that seeks to clarify the concept of entrepreneurial alertness. We hypothesize that the entrepreneurial experience, divergent thinking, and GMA are antecedents of people's ability to identify business opportunities. We thus suggest that entrepreneurial alertness, the ability to notice business opportunities, can be better understood from a psychological perspective with a focus on factors related to information processing.

In Kirzner's (1979, 1997) theory of entrepreneurial discovery, information is a second factor central to opportunity identification. Kirzner (1997) has noted that information is not perfectly distributed among all people; this means that some people do not have sufficient information to identify an opportunity. Similarly, Shane and Venkataraman (2000) have stated that, besides information processing, information acquisition is a second factor influencing opportunity identification. Acquiring information, for example about technological or demographic changes, is important because it increases the likelihood of identifying an opportunity based on these changes (Baron, 2006; Fiet, 2007). We investigate information

acquisition in terms of active information search. We develop a theoretical model that hypothesizes moderating effects of active information search on the relationships between entrepreneurial experience, divergent thinking, and GMA with business opportunity identification (see Figure 1). So far, the entrepreneurship literature on joint effects of information processing and information acquisition is limited. A number of studies have provided empirical support for a main effect of experience, creative thinking, or GMA on opportunity identification (Davidsson & Honig, 2003; DeTienne & Chandler, 2004; Shane, 2000; Ucbasaran, Westhead, & Wright, 2008, 2009; Ward, 2004). Similarly, studies have shown that information search is positively related to entrepreneurship and opportunity identification (Busenitz, 1996; Cooper, Folta, & Woo, 1995; Fiet, 2002; Kaish & Gilad, 1991; Ucbasaran et al., 2008). However, the joint effects remain theoretically and empirically unclear. For example, Baron (2006) has noted that when the cognitive capacities that form entrepreneurial alertness are very high, active searches may not be necessary suggesting that the two factors may operate independently of each other. In contrast, Tang et al. (2012) have proposed that examining the interactions between cognitive factors to process information and information acquisition is a promising way forward to better understand business opportunity identification. In this study, we follow Tang et al.'s (2012) call and test a model which predicts that the positive effects of entrepreneurial experience, divergent thinking, and GMA vary with entrepreneurs' level of active information search. Specifically, we hypothesize that active information search moderates the relationship between entrepreneurial experience and opportunity identification in such a manner that active information search compensates for a lack of entrepreneurial experience. Researchers have argued that entrepreneurial experience facilitates opportunity identification (Baron, 2006; Baron & Ensley, 2006; Westhead, Ucbasaran, & Wright, 2009). However, experience may also constitute a barrier leading to a fixedness in thinking and hindering the integration of new information with detrimental

effects on business opportunity identification (Dane, 2010; Walsh, 1995; Ward, 2004). We further hypothesize that active information search moderates the effects of divergent thinking and GMA on opportunity identification in such a manner that active information search enhances the positive effects of divergent thinking and GMA. Shane (2003) and Baron (2006) have argued that creativity and GMA contribute to generating novel ideas for products or services because creativity and GMA help to comprehend and combine information. However, theoretical models of creativity and GMA suggest that only people who possess sufficient information can leverage the full potential of their cognitive capacities (Neisser et al., 1996; Woodman & Schoenfeldt, 1990). By integrating entrepreneurial experience, divergent thinking, GMA, and active information search into a theoretical model, our study extends current theories of entrepreneurial discovery which provide no definite answer to the question how factors related to information processing and information acquisition jointly affect business opportunity identification (Baron, 2006; Kirzner, 1997; Shane, 2003; Shane & Venkataraman, 2000; Tang et al., 2012).

### **The General Role of Active Information Search in Opportunity Identification**

Shane (2003) and Baron (2007a) have noted that access to information is key to opportunity identification. Having information, for example about technological, regulatory, or demographic changes, is the basis for identifying opportunities that emerge from these changes (Baron & Ensley, 2006). Shane (2000) showed that having information about a technological invention triggers opportunity identification. Moreover, it is often not only one piece of information that triggers the identification of an opportunity, but people have to connect several pieces of information (Baron, 2006).

We focus on active information search as an important factor in information acquisition. Active information search should have a positive effect on the amount of information that is available in subsequent steps of information processing (Baron & Tang, 2009; Keh, Nguyen,

& Ng, 2007; Lybaert, 1998; Song, Wang, & Parry, 2010). We note that information search may result as a reaction from situations that imply novelty, inconsistencies with prior beliefs, or problems (Fiske & Taylor, 1984). Such situations disrupt routines and people's habitual approach towards tasks which may result in a phase of reorientation and information seeking (Frese & Zapf, 1994). For example, Daft et al. (1988) showed that chief executives' information search could be predicted by changes in the environment and perceived uncertainty. However, in our study, we take a more general approach towards information search and we do not focus exclusively on information search as a reaction to an external event. Based on an action theory perspective on entrepreneurship (Frese, 2009), we argue that entrepreneurs can generally acquire more information by actively searching for information. Entrepreneurs, who show high levels of active information search, execute more information seeking behavior in a self-starting manner, put more time, effort and other resources into information search, and explore different sources to acquire new information (Frese, 2009). This should lead to having more information. Active information search should thus be beneficial for opportunity identification. Research supports this line of reasoning by showing that information search intensity has a main effect on opportunity identification (Fiet, 2002; Ucbasaran et al., 2008). In our study, we seek to extend this research and focus on a different function of active information search in the opportunity identification process. Based on our line of reasoning that active information search results in having more information, we argue for a moderating effect of active information search on the effects of entrepreneurial experience, divergent thinking, and GMA on business opportunity identification. In the following sections, we develop our hypotheses regarding these moderating effects.

### **Entrepreneurial Experience and the Compensating Effect of Active Information Search**

Entrepreneurial experience can be conceptualized as experience from having owned and managed a business (Cooper et al., 1995). Entrepreneurial experience is the basis for

developing entrepreneurial knowledge. Scholars defined entrepreneurial knowledge as experientially acquired knowledge derived from observation of or participation in events associated with new venture creation which facilitates identifying and exploiting business opportunities (Politis, 2005; Unger, Keith, Hilling, Gielnik, & Frese, 2009). It is important to note that experience does not necessarily lead to knowledge and that a learning process is necessary to transfer experience into knowledge (Sonnentag, 1998). However, scholars have argued that experience is a major determinant of skills and knowledge (Tesluk & Jacobs, 1998) and learning theories ascribe a central role to experience for acquiring new knowledge (Kolb, 1984). Also in the entrepreneurship domain, scholars have argued for the link between experience and knowledge (Rae & Carswell, 2000; Reuber & Fischer, 1999).

The cognitive perspective on entrepreneurship suggests that people's experience and knowledge influence opportunity identification because the comprehension and interpretation of new information is facilitated (R. K. Mitchell et al., 2007, 2002). One theory that explains why knowledge has an effect on people's comprehension and interpretation of new information is social cognition theory (Fiske & Taylor, 1984). Social cognition theory asserts that how people perceive the world and how they integrate information depends on their mental schemas. Mental schemas provide a framework that people use to handle and give meaning to new information (Fiske & Taylor, 1984). In the management literature, scholars have shown how knowledge and schemas influence problem solving, decision making, and information processing in various settings (Hitt & Barr, 1989; Lord & Maher, 1990; Walsh, 1995). Similarly, in the entrepreneurship literature, scholars have emphasized the importance of knowledge for opportunity identification. For example, Shane (2000) showed that knowledge, developed from experience, determines whether or not people are capable of identifying an opportunity. Prior knowledge creates a mental corridor that influences the manner in which people comprehend and interpret new information (Shane, 2000; Vaghely &



Julien, 2010). Consequently, Shane (2000) has argued that one reason why some people identify business opportunities and others do not is because of their different stocks of prior knowledge resulting from their idiosyncratic life experiences.

An idiosyncratic life experience with particular relevance for opportunity identification is entrepreneurial experience. Baron (2006) has reasoned that entrepreneurs develop through entrepreneurial experience effective knowledge structures that facilitate the recognition of patterns of business opportunities in new information. Indeed, Baron and Ensley (2006) have shown that experienced and inexperienced entrepreneurs differ in their mental concepts of a business opportunity. They concluded that entrepreneurial experience results in knowledge structures which help to detect opportunities in a given set of information; inexperienced entrepreneurs will miss these opportunities because they lack these knowledge structures (Baron & Ensley, 2006). This line of reasoning is supported by studies that provided evidence for a positive effect of entrepreneurial experience on opportunity identification (Corbett, 2007; Davidsson & Honig, 2003; Ucbasaran et al., 2008).

We want to go beyond the described main effect of entrepreneurial experience and provide a theoretical rationale for an interaction effect between entrepreneurial experience and active information search. Specifically, based on theoretical notions that experience may lead to a fixedness in thinking and to discarding new information (Dane, 2010; Fiske & Taylor, 1984; Ward, 2004), we hypothesize that active information search moderates the effect of entrepreneurial experience on opportunity identification in such a way that high levels of active information search compensate for a lack of entrepreneurial experience. In general, entrepreneurial experience should contribute to processing information and identifying opportunities. However, experience can also limit entrepreneurs in a way that they do not make full use of the information available to them – even when they have actively sought the information. Experience may be associated with cognitive entrenchment, stereotyped

thinking, and discounting information that is not consistent with people's existing preconceptions (Baron, 1998; Dane, 2010; Walsh, 1995). Based on social cognition theory (Fiske & Taylor, 1984), Shepherd and DeTienne (2005) noted that experienced entrepreneurs may fall into "mental ruts" (p. 104). This means that entrepreneurs' experience can lead to a functional fixedness which inhibits using and combining information in novel ways because they make associations only in a habitual manner (Ward, 2004). For example, experience in markets, ways to serve the market, and customer problems direct entrepreneurs' train of thoughts along existing paths when they acquire new information; this may be helpful for discovering a specific opportunity but it may also lead to being unreceptive for other opportunities and to discovering only a limited number of new opportunities (Shane, 2000; Shepherd & DeTienne, 2005). Research has shown that experienced entrepreneurs discard new information and they are more likely to rely on past experience even when new perspectives are needed because of changing circumstances (Minniti & Bygrave, 2001; Parker, 2006; Rerup, 2005; Wright, Robbie, & Ennew, 1997). In conclusion, we argue that with entrepreneurial experience, high levels of active information search become less beneficial because with entrepreneurial experience, entrepreneurs are less likely to use the full set of information they have acquired. High levels of active information search should thus compensate for a lack of entrepreneurial experience because with less entrepreneurial experience, entrepreneurs are more likely to use all available information.

**Hypothesis 1:** Active information search moderates the effect of entrepreneurial experience on opportunity identification in a way that high levels of active information search compensate for entrepreneurial experience. In statistical terms, this means that there is a positive relationship between entrepreneurial experience and opportunity identification in case of low levels but not in case of high levels of active information search.

**Divergent Thinking, GMA, and the Enhancing Effect of Active Information Search**

The cognitive perspective on entrepreneurship suggests that entrepreneurs' cognitive capacities to process and to piece together information are central to opportunity identification (R. K. Mitchell et al., 2007, 2002). According to Shane (2003) and Baron (2006), creativity and GMA are two cognitive capacities that are particularly relevant in this process. In our study, we focus on divergent thinking which is an important dimension of creativity (Mumford & Gustafson, 1988; Runco, 2004). Divergent thinking can be defined as an individual's general ability to generate multiple and original ideas (Guilford, 1950). Scholars have suggested that different cognitive processes may underlie idea generation and consequently, they consider divergent thinking to be the end product of more specific cognitive processes, such as conceptual combination/reorganization, analogical reasoning, or abstraction (Mumford, 2003; Ward, 2007; Welling, 2007). Although several different operations may underlie divergent thinking, creativity scholars have argued that a core operation is the combination and reorganization of activated pieces of information (Mumford, Mobley, Uhlman, Reiter-Palmon, & Doares, 1991; Sternberg, 2005). For example, Ward (2007) notes that conceptual combination – the mental merging of two concepts or pieces of information that had been previously separate – is central in the process of generating new and original ideas.

In entrepreneurship, scholars have argued that creativity is important because opportunity identification requires specific abilities to combine various pieces of information to generate ideas for a new product or service; these ideas may then lead to business opportunities (Dimov, 2007; Gielnik, Frese, Graf, & Kampschulte, in press; Shane & Venkataraman, 2000). Research has shown that creativity (Baron & Tang, 2011; DeTienne & Chandler, 2004) and more specifically divergent thinking (Gielnik et al., in press) contribute to opportunity identification.

In addition to divergent thinking, the entrepreneurship literature suggests that GMA has a positive effect on opportunity identification. GMA is the cognitive ability to decompose and understand complex information, to derive conclusions, and to solve problems by reflecting and reasoning (Neisser et al., 1996). GMA should be beneficial for opportunity identification because it helps entrepreneurs to develop a better comprehension of the market, its customers, and their problems (Baron & Ensley, 2006; Shane, 2003). To develop a better comprehension, people have to pay attention to and store important information while ignoring irrelevant information, they have to interpret and understand how the information relates to the status quo, and they have to infer implications from their interpretations and formulate conjectures about how the new information may influence markets and future customer demands (Baron & Ward, 2004; Eckhardt & Shane, 2003; Shane, 2000; Shane & Venkataraman, 2000). Research showed that GMA is strongly related to these capabilities and therefore GMA should contribute to opportunity identification (Colom et al., 2004; Engle, Tuholski, Laughlin, & Conway, 1999; Gottfredson, 1997; Sternberg & Kalmar, 1997).

In our study, we suggest that taking into account active information search provides a better understanding of the effects of divergent thinking and GMA on opportunity identification. We hypothesize that active information search moderates the positive effects of divergent thinking and GMA on opportunity identification. Specifically, we propose that entrepreneurs can leverage the full potential of their cognitive capacities by showing high levels of active information search. In contrast, low levels of active information search should reduce the positive effect of creativity and GMA on opportunity identification because a broad information basis is lacking.

We expect a moderating effect of active information search on the relationship between divergent thinking and opportunity identification because the creativity literature emphasizes the importance of divergent thinking in combination with informational input as necessary

factors for creative performance (Mumford et al., 1991; Ward, Smith, & Finke, 1999). For example, in their interactionist model of creativity, Woodman and Schoenfeldt (1990) have argued that individuals must have the necessary abilities to achieve creative outcomes but depending on contextual factors, such as the availability of information, their creative achievements might be enhanced or reduced. Research has supported this line of reasoning by showing that creativity is inhibited when the access to information is confined (Perttula & Sipila, 2007). With respect to opportunity identification, this means that entrepreneurs who search less actively for information and who have thus less information available would not be able to make full use of their divergent thinking abilities with detrimental effects on opportunity identification (Dimov, 2007). Thus, active information search should provide the necessary input for subsequent steps of creatively piecing together the information to identify business opportunities (Fiet, 2007; R. K. Mitchell et al., 2002).

**Hypothesis 2a:** Active information search moderates the relationship between divergent thinking and business opportunity identification. In case of high active information search, divergent thinking has a strong effect on business opportunity identification. In case of low active information search, divergent thinking has a weak effect on business opportunity identification.

Similarly, GMA might not result in the identification of a business opportunity if the necessary informational input is lacking. GMA helps people to comprehend markets and customers and to make true conjectures about how new information (e.g., about changes in the environment) might affect markets or customer needs (Shane, 2003). Comprehending and formulating conjectures depends on selecting, encoding, and interpreting information that people have previously acquired (Neisser et al., 1996). Entrepreneurs who seek more actively information should have available more information about customers, competitors, and other stakeholders (Keh et al., 2007). Accordingly, in subsequent processes of selecting, encoding,

and interpreting the information, they can make full use of their GMA to develop a comprehensive understanding of the market and make valid forecasts about future developments. This should increase the likelihood of identifying business opportunities. Without the necessary information base, subsequent steps of processing the information should be less effective (Keh et al., 2007; Song et al., 2010).

**Hypothesis 2b:** Active information search moderates the relationship between GMA and business opportunity identification. In case of high active information search, GMA has a strong effect on business opportunity identification. In case of low active information search, GMA has a weak effect on business opportunity identification.

#### **Direct and Indirect Effects on Innovativeness of Product/Service Innovations**

Entrepreneurship scholars stress the importance of lead entrepreneurs' characteristics for firm level outcomes (Baum, Locke, & Smith, 2001; Frese et al., 2007; Rauch & Frese, 2007). In our study, we focus on the firm level outcome of innovativeness of product/service innovations. Innovativeness is important because products or services that are more innovative are more likely to offer unique benefits to customers or to occupy a niche and be unrivalled in the market (Fiet, 2002; Gaglio & Katz, 2001; Shepherd & DeTienne, 2005). Thus, highly innovative products or services should provide a stronger competitive advantage contributing to the firm's general performance (Porter, 1980). Additionally, research showed that the degree of innovativeness of new products and services is important as it is a driving factor for growth and wealth creation (Kirchhoff, 1991; Mueller, 2007).

We hypothesize that the number of identified business opportunities is positively related to the innovativeness of product/service innovations. Simonton (1989) showed that the generation of innovative outcomes can be understood in stochastic terms. The chance that among a pool of identified opportunities is an exceptionally innovative opportunity leading to a highly innovative product or service increases by the number of identified opportunities.

Shepherd and DeTienne (2005) support this reasoning by providing evidence for a strong relationship between number and innovativeness of identified opportunities. It is important to note that the identification of a business opportunity is not sufficient for the successful implementation of this opportunity. Entrepreneurs have to invest considerable effort to develop and pursue the opportunity (Carter, Gartner, & Reynolds, 1996; Dimov, 2007; Gartner, 1985). Only identifying opportunities without fully exploiting them should not result in innovations. However, entrepreneurs who identify more opportunities should have an advantage over their competitors with regard to potential opportunities that may result in innovative products or services. We therefore hypothesize:

**Hypothesis 3:** Business opportunity identification is positively related to the innovativeness of product/service innovations.

Individual characteristics of the entrepreneur should exert an influence on firm outcomes only through the entrepreneurs' actions or strategic choices that are closely related to the development and operation of their firms (Baron, 2007a; Frese, 2009). Based on Shane (2000; 2003), we argue that identifying business opportunities is an action that mediates the effect of entrepreneurs' characteristics in terms of entrepreneurial experience on the innovativeness of product/service innovations. As outlined above, entrepreneurial experience and active information search jointly influence business opportunity identification. We hypothesized that active information search compensates for lack of entrepreneurial experience. This means that there is a positive effect of entrepreneurial experience on opportunity identification in case of low levels but not in case of high levels of active information search. Given that entrepreneurial experience has a positive effect on opportunity identification in case of low levels of active information search and that business opportunity identification affects introducing innovative products/services, we hypothesize:

**Hypothesis 4a:** There is an indirect effect of entrepreneurial experience on the innovativeness of product/service innovations through business opportunity identification in case of low levels of active information search but not in case of high levels of active information search.

Similarly, entrepreneurs' characteristics in terms of divergent thinking and GMA should influence firm level outcomes only through entrepreneurs' actions and strategic choices closely related to the development and operation of the firms (Baron, 2007a; Frese, 2009). Based on Shane (2003) and Baron (2006), we argue that identifying business opportunities is an action influencing the development and operation of firms and that it is one mechanism through which divergent thinking and GMA exert an influence on the innovativeness of product/service innovations. We hypothesized that active information search enhances the effects of divergent thinking and GMA on business opportunity identification. We argued that there will be only an effect of divergent thinking and GMA on business opportunity identification in case of high levels of active information. Consequently, only entrepreneurs high on active information search are able to make use of their cognitive capacities to identify business opportunities and eventually introduce innovative products/services. We hypothesize:

**Hypothesis 4b:** There is an indirect effect of divergent thinking and GMA on the innovativeness of product/service innovations through business opportunity identification in case of high levels of active information search but not in case of low levels of active information search.

### **The Context of South Africa: Poverty Alleviation through Entrepreneurship**

In our study, we seek to identify factors that influence the entrepreneurial success of small businesses; this should contribute to efforts to provide policy makers with effective means to increase economic development and alleviate poverty. Research has shown that



entrepreneurship and the development of small businesses help to promote economic development and alleviate poverty through the creation of employment and wealth (Acs, Desai, & Hessels, 2008; Mead & Liedholm, 1998). Specifically, research has provided evidence that small businesses have the highest percentage growth in employment compared to other business units and business ownership positively affects growth in productivity, value added, and national GDP (Carree & Thurik, 2008; van Praag & Versloot, 2007). Consequently, policy makers in African and other developing countries have changed their strategic approach and now focus on supporting the creation of small businesses by private individuals instead of establishing large industrial complexes (Nelson & Johnson, 1997; Nkirina, 2010).

Recently the emphasis on small business has been called into question because there is a minority of high growth firms that produce (by definition) more work places than small firms that stay small (which is the majority) (Shane, 2009). How far Shane's (2009) comments are right for the developing countries is unclear at the moment. Of course, all high growth firms have started small at some point in time. We agree, however, that it is useful to develop research efforts to understand how high growth appears. We suggest that one way to understand high growth is to understand how innovativeness is developed – this is the current study's objective. Indeed, Rosenbusch, Brinckmann, and Bausch (2011) have shown that innovativeness is particularly important for firm performance for new ventures and for firms in collectivistic environment, such as Africa.

South Africa is still suffering from poverty, particularly among the formerly disadvantaged population (Statistics South Africa, 2000) and a high unemployment rate (23.5% in the first quarter of 2009; Statistics South Africa, 2009). To improve the employment situation and per capita income, the government of South Africa adopted a policy with a strong focus on the promotion of small enterprises (Department of Trade and

Industry, 1995). Part of the new strategy is the redressing of discrimination against black people who were actively discouraged to run enterprises by the apartheid regime's repressive measures (Rogerson, 2000). The objective is to create a supportive environment that allows private enterprises to thrive and that is equally conducive towards all enterprises. However, the government's initiative can only create favorable conditions. Opportunities which emerge from the initiative must be identified and exploited by the people. Therefore, it is important to identify factors on the individual level that facilitate the identification of opportunities and that lead to entrepreneurial behavior. Research showed that innovative ideas contribute to economic development (Mueller, 2007). Unfortunately, entrepreneurship in South Africa is characterized by a high rate of copying existing products or services and by a low propensity towards introducing innovations (Maas & Herrington, 2008). Identifying factors that enhance opportunity identification and innovativeness may offer additional approaches for taking action to alleviate unemployment and poverty in South Africa.

## **METHOD**

### **Sample and Procedure**

We interviewed 100 small business owners in Cape Town, South Africa, and surrounding suburbs. The number of participants is in line with previous research in the same setting (Unger et al., 2009). All participants had founded their business and were running the business as general manager or chief executive officer. Because of our practical focus on poverty alleviation among the formerly disadvantaged people, we included only small business owners from this population in our sample. To meet the definition of small businesses, we interviewed only business owners who had between one and 50 employees. Furthermore, the businesses had to operate for at least one year. As many small businesses are not registered or listed in directories, we used several approaches to acquire our sample. First, we used a random walk procedure in different industrial areas. In the industrial areas the

interviewers selected randomly a route or a specific part and asked every business owners to participate in our study if they met our criteria. Second, we used the data base of the Western Cape Business Opportunities Forum (WECBOF) to contact business owners. The interviewers contacted randomly business owners from the data base. Third, we used a snowball system and asked business owners who had participated in our study to introduce us to further business owners who might take part in the study. Across all three approaches the refusal rate was 27.5%. We recruited 49% of our sample through the random walk procedure, 20% through the WECBOF data base, 24% through the snowball approach, and 7% of our sample was an overlap of the WECBOF and snowball approach (these participants were introduced to us but we had also contacted them as part of the WECBOF data base). In our sample, 78% of the business owners were male. On average, the business owners were 43 years old. In terms of education, 33% of the sample held a university degree, the majority of our participants held a high school degree (41%), and the remaining 26% had 11 years of schooling or less. 30% of our sample had been self-employed before and our participants had been self-employed on average for 11 years. On average, our participants employed nine employees, they generated revenue of 410,766 USD, and their businesses were operating for eight years. Of the total sample, 73% were in the tertiary sector (service and trade) and the remaining 27% were engaged in the primary or secondary sector (manufacturing and farming). Typical businesses from the tertiary sector were retailers or consultants (e.g., IT or marketing). Typical businesses from the primary or secondary sector were manufacturers of clothing and textiles, repair and mechanical workshops, or food processing businesses.

We collected data on the basis of structured face-to-face interviews and a questionnaire that participants filled-in after the interview. The interviews were conducted by two Master students of psychology who had received a thorough interviewer training. The training included sessions on interview techniques to probe participants' answers, the appropriate use

of prompts to clarify vague statements, on note taking, and on typical interviewer errors, such as non-verbal agreement. The interviews took place in the offices or workshops of the business owners. The interviewers were told to take verbatim notes during the interviews and to produce a typed protocol of each interview. The interview included questions with a closed answer format and two parts with an open answer format. The two parts with an open answer format were our measures for creativity and innovativeness of product/service innovations. To code the participants' answers to the open questions, two independent raters used the protocols and coded the answers by using standardized coding schemes. For our measure of divergent thinking, we used the standardized coding scheme developed by Mumford et al. (1998). For our measure of innovativeness of product/service innovations, we used a coding scheme based on DeTienne and Chandler (2004) and Romijn and Albaladejo (2002), respectively. The coding schemes are described in more detail in the following section on the study measures. To determine inter-rater reliabilities between the two raters, we calculated intra-class correlation coefficients (ICC; Shrout & Fleiss, 1979). The ICCs ranged between .98 and 1.00 indicating good inter-rater reliabilities. Justified by the good inter-rater reliabilities, we computed the mean across the two raters for each variable rated (Shrout & Fleiss, 1979).

### **Study Measures**

**Entrepreneurial experience.** We measured entrepreneurial experience during the interview using two different operationalizations of entrepreneurial experience. First, to measure *prior start-up experience*, we asked the participants' whether they had been self-employed before they started the current business. We coded participants' responses as 1 for yes and 0 for no. Second, to measure *years of entrepreneurial experience*, we asked the participants for the number of years they were running the current business and for the

number of years they had been running previous businesses. We added up both numbers to get participants' total years of entrepreneurial experience.

**Divergent thinking.** During the interview, we applied the consequences test by Christensen et al. (1953) to assess participants' divergent thinking. The consequences test measures an individual's divergent thinking ability which creativity scholars consider to reflect an individual's creative potential (Runco & Chand, 1995). We selected the consequences test because it captures aspects of creativity that are relevant to occupational settings (Mumford et al., 1998). Furthermore, the measure has been recently used by Gielnik et al. (in press) to measure divergent thinking in a study on small business owners' creativity and business idea generation. The consequences test asks participants to list as many consequences as they can to fictional incidents. The explicit instruction to list as many consequences as possible should elicit maximum performance, and therefore, our measure should mainly capture the ability aspect of divergent thinking (DuBois, Sackett, Zedeck, & Fogli, 1993). An example for a fictional incident is "*What would be the result if human life continued on earth without death?*". For each fictional incident, participants got four sample responses (for the example above: *overpopulation, more old people, housing shortage, and no more funerals*). In line with previous studies (e.g., Vincent, Decker, & Mumford, 2002), we set a time limit of two minutes and a maximum of 10 potential consequences for each fictional incident. When the participants stopped generating consequences or when the two minutes were over, we presented the next fictional statement and asked again to list as many consequences as possible. In total, they received four fictional incidents. We coded the participants' answers using the scoring guide developed by Mumford et al. (1998). We coded participants' answers for fluency and flexibility. Fluency is the number of responses that are not identical to other responses or to the four sample responses. Two independent raters counted the number of responses that were not identical to other responses or the four sample

responses. ICCs for the four fluency ratings ranged between .99 and 1.00 indicating good inter-rater reliability. We aggregated the four fluency score to one overall fluency score (Cronbach's Alpha = .88). Flexibility is the number of different core themes underlying the participants' responses. Two independent raters counted the number of responses from different core themes. For example, "no headstones" and "no burial grounds" (funerals) or "land shortage" and "food shortage" (shortage of resources) are examples for a core theme. Again, inter-rater reliabilities between the two raters were good (ICCs for the four fictional incidents ranged between .98 and .99). We aggregated the four flexibility scores to one overall flexibility score (Cronbach's Alpha = .84). The final score for divergent thinking was calculated by summing the z-standardized overall scores for fluency and flexibility (Cronbach's Alpha = .95).

**GMA.** At the end of the interview, we administered the short version of the Raven Advanced Progressive Matrices Test (Arthur & Day, 1994). The Raven Advanced Progressive Matrices Test proved to be a valid instrument in general as well as in an African setting (Rushton, Skuy, & Ann Bons, 2004). The short version includes four example matrices to get accustomed to the task. The interviewers explained the principles of the task and demonstrated how to solve the example matrices. Then, the participants were asked to solve 12 test matrices. A correct solution was coded 1 and an incorrect solution was coded 0. We calculated the mean score of correct solutions across the 12 matrices for our measure of GMA (Cronbach's Alpha = .69).

**Active information search.** For our measure of active information search, we used six questionnaire items developed by Tang and colleagues (2012) on the basis of previous works by Kaish and Gilad (1991) and Busenitz (1996). Example items are "*I am always actively looking for new information.*" and "*I have frequent interactions with others to acquire new information.*". Participants answered the items on a 5-point Likert scale ranging from

“*strongly disagree*” to “*strongly agree*”. We computed the mean of the six items to attain the participants’ score for active information search (Cronbach’s Alpha = .85).

**Business opportunity identification.** We followed the approach applied by Hills et al. (1997) and Ucbasaran et al. (2008) to operationalize business opportunity identification. During the interview, we asked the questions “*How many business opportunities for creating or purchasing a business have you identified within the last five years?*” and “*How many business opportunities for creating or purchasing a business have you pursued (that is committed time and resources to) within the last five years?*”. We selected a time period of five years because it can take several years to implement a business opportunity (Carter et al., 1996). According to Ucbasaran et al. (2008), the second question refers to activities to evaluate the costs and benefits of an identified opportunity. Scholars argued that such activities are part of opportunity identification but they also cover aspects of opportunity exploitation (Dimov, 2007). We combined the two questions to our measure of business opportunity identification (Cronbach’s Alpha= .69). In line with Ucbasaran et al. (2008), we collapsed participants’ answers into broader categories to eliminate extreme responses and to approximate a normal distribution. We recoded participants’ responses into five categories: participants with no opportunities received the value of “0”, one opportunity was recoded into “1”, two to four opportunities was recoded into “2”, between four and eight opportunities into “3”, and more than eight opportunities was recoded into “4”.

**Innovativeness of product/service innovations.** To assess the innovativeness of new products or services the business owners had introduced, we asked during the interview: “*In the last year have you introduced any new, innovative products or services?*”. If they had introduced a new product or service we further asked them to give a detailed description of the new product or service. The business owners’ description was subsequently rated for innovativeness. We concentrated on product/service innovations because these are the most

common forms of innovations among small businesses (Hoffman, Parejo, Bessant, & Perren, 1998). To rate the degree of innovativeness we used a 6-point scale based on DeTienne and Chandler (2004) and Romijn and Albaladejo (2002). The scale ranged from a value of zero for “*no innovation introduced*” to a value of five for “*first mover, a new-to-South-Africa product/service*”. Before the start of our study, we conducted pilot interviews with six expert entrepreneurs to discuss the coding scheme for our ratings of innovativeness. The six entrepreneurs were identified as experts of venture performance and introduction of product/service innovations through WECBOF which is an organization involved in the development of small businesses in the Western Cape region in South Africa. Based on the discussion with the expert entrepreneurs, we adapted the scale by DeTienne and Chandler (2004) and Romijn and Albaladejo (2002), respectively, to fit it to the South African context. For example, the highest value of the initial scale required a new to the world product or service. The discussions with the expert entrepreneurs revealed that this can only be very infrequently observed in South Africa which prompted us to modify the scale. During the pilot interviews with the expert entrepreneurs, we also generated examples of product/service innovations for each value of innovativeness. We used this information for our ratings of the innovativeness of product/service innovations introduced by our participants. The ratings were done by two independent raters. To further familiarize the raters with product/service innovations in South Africa, the two raters discussed the research project and our measurement of innovativeness of product/service innovations with two South African portfolio entrepreneurs and one consultant for innovation management to get a better understanding of business opportunities and innovations in the South African context. The inter-rater reliability between the two raters was good (ICC = .98).

**Controls.** All controls were ascertained during the interview. On the individual level, we ascertained *age of the business owner*, *gender of the business owner*, and two variables to



measure participant's motivation. Since the business owners' might differ in their motivation to identify new business opportunities to grow the business, we assessed their priority of wealth attainment and their satisfaction with their current income. Amit et al. (2001) argued that wealth attainment is an important motive for initiating business growth. We measured *priority of wealth attainment* by employing Lang and Carstensen's (1996) card-sort task. During the interview, we presented and explained the meaning of seven cards reading different motives for running a business (wealth, contribution, legacy, independence, challenge, personal satisfaction, and innovation). We then asked the participants to rank the cards according to the personal importance to them. If the participants prioritized wealth as the first or second most important motive, we asked them on a 7-point Likert scale how committed they were to this goal (1 = a little; 7 = a lot) and the extent to which they were striving to achieve this goal (1 = a little; 7 = a lot). If wealth was not among the top two motives, we assigned a score of 1 for the respective items. We then computed the mean based on the ranking (reverse coded) and the two additional items (Cronbach's Alpha = .94). To measure *satisfaction with income*, we asked the participants on a 7-point Likert scale during the interview how satisfied they were with their current income. Previous research argued that attitude toward personal income is a driver for growth willingness (Wiklund, Davidsson, & Delmar, 2003). Satisfaction can be reliably measured with a single-item measure (Wanous, Reichers, & Hudy, 1997). On the firm level, we controlled for *line of industry* (manufacturing vs. service) because of potential differences in the prevalence of business opportunities. We also controlled for *business size* (measured by an index of generated revenue, the value of the business assets, and the number of employees) because larger businesses may have more resources available to facilitate opportunity identification and exploitation (Thornhill, 2006).

### **Method of Analysis**

According to the conceptualization by Preacher et al. (2007), our model corresponds to a moderated mediation model. We used the statistical procedure developed by Preacher et al. (2007) to test our hypotheses. The statistical procedure is a SPSS macro to test direct and conditional indirect effects in regression analyses. The output of the macro provides regression coefficients for the main and interaction effects that are identical to linear regression analyses. Additionally, the macro uses the bootstrapping method to provide indirect effects of the independent variables on the dependent variable through the mediator to test mediating effects. The macro also provides indirect effects of the independent variable on the dependent variable through the mediator for different levels of the moderator. These conditional indirect effects show how the indirect effect of the independent variable on the dependent variable varies with different levels of the moderator. The conditional indirect effects also show at which level of the moderator the independent variable has a significant indirect effect on the dependent variable. The macro by Preacher et al. (2007) is thus useful to simultaneously test our hypotheses. In line with the macro's specifications, we analyzed separate models each including one of the four hypothesized interaction effects. Tables 2 and 3 display the results of the analyses.

## RESULTS

Table 1 presents the descriptive statistics and zero-order correlations for the study variables. Active information search ( $r = .20$ ;  $p < .05$ ) and divergent thinking ( $r = .33$ ;  $p < .01$ ) were positively and significantly related to business opportunity identification. Prior start-up experience ( $r = .07$ ; n.s.), years of entrepreneurial experience ( $r = .02$ ; n.s.), and GMA ( $r = .05$ ; n.s.) did not show a significant relationship with business opportunity identification. Active information search was significantly related to prior start-up experience ( $r = .27$ ,  $p < .01$ ). Furthermore, the correlation between business opportunity identification and innovativeness of product/service innovations was positive and significant ( $r = .21$ ;  $p < .05$ ).

### **Test of Hypotheses**

To test hypothesis 1 (active information search moderates the effect of entrepreneurial experience on business opportunity identification), we used Preacher et al.'s (2007) macro and conducted separate analyses for prior start-up experience and for years of entrepreneurial experience (see Model 1 and Model 2 in Table 2). The results showed that the interaction of prior start-up experience and active information search (Model 1) was significant and negative ( $\beta = -.22, p < .05$ ). Including the interaction term into the model explained additional 4% of variance in business opportunity identification compared to a model without the interaction term (Model 0 in Table 2). To illustrate the nature of the interaction term, we followed suggestions by Aiken and West (1991) and computed and plotted values of business opportunity identification for high levels (one standard deviation above the mean) and low levels (one standard deviation below the mean) of prior start-up experience and active information search (see Figure 2). The plot shows that there is a positive relationship between prior start-up experience and business opportunity identification in case of low levels of active information search. A simple slope analysis (Jaccard, Wan, & Turrisi, 1990) showed that the slope was significant ( $t = 1.97, p < .05$ ). In case of high levels of active information search, the relationship was weak and non-significant (simple slope analysis:  $t = -0.66, n.s.$ ). The analysis for the interaction term between years of entrepreneurial experience and active information search (Model 2) revealed the same pattern of results. The interaction term was marginally significant ( $\beta = -.18, p < .10$ ) and explained additional 3% of variance in business opportunity identification compared to a model without the interaction term (Model 0 in Table 2). Hypothesis 1 is thus supported for prior start-up experience and marginally supported for years of entrepreneurial experience.

To test hypotheses 2a and 2b, which stated that active information search moderates the effects of divergent thinking and GMA on business opportunity identification, we used

Preacher et al.'s (2007) macro and computed two models (Model 3 and Model 4 in Table 2). The results showed that the interaction term between active information search and divergent thinking (Model 3) was positive and significant ( $\beta = .21, p < .05$ ). Including the interaction term into the model explained additional 4% of variance in business opportunity identification compared to a model without the interaction term (Model 0 in Table 2). Based on high and low levels of divergent thinking and active information search (one standard deviation above and below the mean; Aiken & West, 1991), we computed and plotted values of business opportunity identification (see Figure 3). The plot shows that there is strong and positive relationship between divergent thinking and business opportunity identification in case of high levels of active information search. A simple slope analysis (Jaccard et al., 1990) revealed that the slope was significant ( $t = 3.96, p < .01$ ). In case of low levels of active information search, the plot and simple slope analysis showed that the slope was weaker and non-significant ( $t = 0.99, n.s.$ ). The results provide support for hypothesis 2a that active information search enhances the positive effect of divergent thinking on business opportunity identification. The analysis to test the moderating effect of active information search on the relationship between GMA and business opportunity identification (Model 4) showed that the interaction term was not significant ( $\beta = -.04, n.s.$ ). Including the interaction term into the model did not explain additional variance in business opportunity identification compared to a model without the interaction term (Model 0 in Table 2). Thus, hypothesis 2b is not supported by our data.

To test hypothesis 3, we used Preacher et al.'s (2007) macro and analyzed the effects of business opportunity identification on innovativeness of product/service innovations over and above the other main and interaction effects. The results are displayed in Table 2. The results showed that in all four models, business opportunity identification was positively and significantly related to innovativeness of product/service innovations (all  $\beta$ 's between .23 and

.24, all  $p$ 's < .05). These findings support hypothesis 3. Hypotheses 4a and 4b stated that there are indirect effects of entrepreneurial experience, divergent thinking, and GMA on innovativeness of product/service innovations through business opportunity identification conditional on active information search. We tested these hypotheses on the basis of the conditional indirect effects provided by the macro by Preacher et al. (2007). Table 3 displays the conditional indirect effects of prior start-up experience, years of entrepreneurial experience, and divergent thinking on innovativeness of product/service innovations through business opportunity identification. Displayed are the conditional indirect effects at values of active information search one standard deviation above and below the mean as well as at arbitrary values of active information search that are within the data range. We did not compute conditional indirect effects of GMA because the regression analysis showed that there was no significant moderation effect of active information search on the relationship between GMA and business opportunity identification. The results showed that there were no significant indirect effects of prior start-up experience and years of entrepreneurial experience at any value of active information search. Hypothesis 4a was thus not supported by our data. Regarding divergent thinking, the results showed there were marginally significant indirect effects at the mean value and one standard deviation above the mean of active information search (indirect effect at mean value = .17,  $p$  < .10; indirect effect at one standard deviation above the mean = .29,  $p$  < .10). The indirect effects at arbitrary values showed that the indirect effect of divergent thinking on innovativeness of product/service innovations became significant at a value of 0.61 standard deviations above the mean of active information search (indirect effect = .24,  $p$  < .05). Thus, the data supported hypothesis 4b.

#### **Addressing issues of common method variance**

We obtained all data from the business owners which might lead to problems of common method variance. However, we note that the main focus of our study is the

moderating effect of active information search on the effects of entrepreneurial experience, divergent thinking, and GMA on business opportunity identification. These interactions should not be affected by common method variance. Using a Monte Carlo approach, Evans (1985), concluded that artifactual interactions cannot be created by common method variance and true interactions can only be attenuated. The interaction term in regression analyses is not biased due to common method variance because the main effects in the regression equation serve as a control for the effects of common method variance (Evans, 1985; Schriesheim & DeNisi, 1981).

We followed recommendations by previous research to control for common method variance in our significant relationships of divergent thinking on business opportunity identification and of business opportunity identification on innovativeness of product/service innovations (P. M. Podsakoff, MacKenzie, Lee, & Podsakoff, 2003; Zapf, Dormann, & Frese, 1996). We used structural equation modeling and tested whether the main effects remained significant when an unmeasured latent method factor loading on the indicators of the constructs was included in the model. The model with the unmeasured latent method factor showed a good model fit ( $\chi^2(16)=22.45$ , RMSEA=.05, CFI=.99, SRMR=.05); the fit of this model was significantly better than the model without the unmeasured latent method factor ( $\chi^2$  difference (8)=94.18,  $p < .01$ ). However, and more importantly, the path coefficients of the relationships between divergent thinking and business opportunity identification ( $\beta=.36$ ,  $p < .05$ ) and between business opportunity identification and innovativeness of product/service innovations ( $\beta=.31$ ,  $p < .01$ ) remained significant in the model with the unmeasured latent method factor. These findings indicate that common method variance is unlikely to fully explain our findings.

## DISCUSSION

In this study, we sought to investigate antecedents of business owners' ability to identify business opportunities and of innovativeness of product/service innovations. The ability to identify business opportunities has been considered to be the core of entrepreneurial alertness (Kirzner, 1979, 1997). We adopted a psychological perspective with a focus on information processing and information acquisition. Information processing and information acquisition are two broad factors that should play an important role in the process of opportunity identification and exploitation (Baron, 2007a; Shane & Venkataraman, 2000). While both factors have been examined independently of each other (e.g., Davidsson & Honig, 2003; DeTienne & Chandler, 2004; Ucbasaran et al., 2008), an examination of joint effects of information acquisition and processing is lacking in the entrepreneurship literature. To start addressing this gap, we investigated joint effects of active information search with entrepreneurial experience and with divergent thinking and GMA. We found that active information search moderated the effect of entrepreneurial experience on business opportunity identification such that high levels of active information search compensated for little entrepreneurial experience. Furthermore, we found that active information search enhanced the positive effect of divergent thinking on business opportunity identification. There was no significant interaction between active information search and GMA. Finally, we provided evidence that business opportunity identification was positively related to innovativeness of product/service innovations. We also found support for a moderated mediation. Business opportunity identification transmitted an indirect effect of divergent thinking on innovativeness of product/service innovations which was contingent on active information search.

We think that our findings contribute to the entrepreneurship literature in several ways. We add to theories on entrepreneurial discovery which put a particular focus on the concept of entrepreneurial alertness; entrepreneurial alertness is defined as the ability to identify business

opportunities (Baron, 2006; Kirzner, 1979, 1997; Shane & Venkataraman, 2000). Scholars have noted that entrepreneurial alertness is so far a “fuzzy” construct of only little predictive meaningfulness (McMullen & Shepherd, 2006; Tang et al., 2012). Based on propositions developed within the conceptual framework of entrepreneurial discovery (Baron, 2006; Shane, 2003; Shane & Venkataraman, 2000), we put forward a theoretical model emphasizing the importance of factors related to information processing and information acquisition for opportunity identification and thus for entrepreneurial alertness. Our model suggests that business opportunity identification can be predicted by the interplay of entrepreneurial experience, divergent thinking, and GMA with active information search. Our main finding is that it is important to combine factors related to information processing and information acquisition to better understand opportunity identification. First, we found that in line with our hypothesis, the effect of divergent thinking on business opportunity identification was dependent on active information search. The simple slope analyses revealed that there was a positive effect of divergent thinking on business opportunity identification only in case of medium and high levels of active information search. In case of low levels of active information search, the relationship was weak and non-significant. This finding also contributes to our understanding of factors that enhance or inhibit the generation of creative outcomes. Zhou (2008) noted that an interactional approach investigating context factors that facilitate or restrict creativity would provide useful insights for obtaining a comprehensive understanding of the influence of creativity in the entrepreneurial process. We showed that low levels of active information search make divergent thinking ineffective for opportunity identification. Our results suggest that the direct effect of divergent thinking on business opportunity identification and the indirect effect on innovativeness of product/service innovations were dependent on active information search.



Second, we found that the effect of entrepreneurial experience on business opportunity identification was dependent on active information search. Less experienced entrepreneurs could compensate for their lack of experience by actively searching for information. We found a positive effect of entrepreneurial experience only in case of low levels of active information search; in case of high levels of active information search, the effect was non-significant. These findings support theoretical notions that high levels of experience may lead to discounting new information (Baron, 1998; Minniti & Bygrave, 2001). Entrepreneurial experience may have a positive effect on opportunity identification but this main effect does not hold across different levels of active information search. Our study thus adds to recent studies that question the general positive effect of entrepreneurial experience. Ucbasaran et al. (2009) showed that entrepreneurial experience contributed to opportunity identification but only up to a certain point. After the inflection point, entrepreneurial experience was negatively related to opportunity identification. The findings by our study and by Ucbasaran et al. (2009) suggest that going beyond the perspective of a purely linear relationship between entrepreneurial experience and business opportunity identification provides a better understanding of the underlying mechanisms linking these two constructs.

Some of our non-significant findings need further interpretation. We did not find support for our hypothesis that GMA has effects on business opportunity identification. In our study, the main effect of GMA and the interaction effect with active information search on business opportunity identification were not significant. This is in contrast to theoretical considerations in the entrepreneurship literature (cf., Baron, 2006; Shane, 2003). GMA might have a smaller impact on opportunity identification than expected. People with high levels of GMA should be better able to understand markets and to solve customer problems which might help them to come up with new ideas for products or services. However, high levels of GMA are also related to high levels of deductive reasoning and convergent thinking (Runco,

Dow, & Smith, 2006). Deductive reasoning and convergent thinking may lead to conventional answers. They may also be related to providing a one best strategy. Yet, identifying business opportunities is a process that is less characterized by finding one best way than by making creative decisions and creating non-conventional means-ends relations (Eckhardt & Shane, 2003). Thus, the process of identifying business opportunities might correspond to a larger extent to divergent thinking. In fact, studies investigating the relationship between GMA and business opportunity identification are rare in the entrepreneurship literature. Although de Wit and van Winden (1989) found an effect of GMA on the status of self-employment (see also van Praag & Cramer, 2001), a more direct examination is lacking. Our results suggest that the relationship between GMA and opportunity identification may be more complex than a purely linear relationship.

We did not find support for our hypothesis that entrepreneurial experience has an indirect effect on innovativeness of product/service innovations in case of low levels of active information search. In case of low levels of active information search, experienced entrepreneurs outperform inexperienced entrepreneurs in terms of business opportunity identification but this advantage does not affect the innovativeness of product/service innovations. A possible explanation is that, in case of low levels of active information search, entrepreneurs with high levels of entrepreneurial experience are better able to recognize opportunities because of their superior mental frameworks but these opportunities may be less original and innovative. They may be less able to make associations beyond their existing knowledge and rely to a larger extent on opportunities that are similar to opportunities that worked in the past (Baron & Ensley, 2006; Ward, 2004).

### **Strengths and Limitations**

As in all studies, there are also limitations in our study that prevent an unambiguous interpretation of the study findings. We have to note that we sampled business owners from

the population of formerly disadvantaged people in South Africa which may compromise the generalizability of our findings. However, we think that our findings can be generalized to other contexts. We derived our hypotheses from a cognitive perspective on entrepreneurship emphasizing the importance of information processing for opportunity identification and entrepreneurship (R. K. Mitchell et al., 2007, 2002). Research showed that entrepreneurs' cognitions are similar across different cultures and contexts (R. K. Mitchell, Smith, Seawright, & Morse, 2000; J. B. Smith, Mitchell, & Mitchell, 2009). We therefore think that our results may also generalize to non-African countries. It is also important to note that our sample of business owners is of particular importance to alleviate poverty and unemployment in South Africa. Scholars have recently argued that it is important to go beyond current research settings and extend management research to settings that are characterized by poverty and economic underdevelopment (e.g., Arnett, 2008; Bruton, 2010). Such research provides insights into the general applicability of theories developed in more developed parts of the world.

One might argue that our non-significant findings are due to a lack of statistical power. In general, detecting moderating effects in field studies is difficult and therefore scholars suggested to accept higher levels of Type I errors (e.g., increase p-level up to .10) (McClelland & Judd, 1993). Other scholars argued for examining the effect size of the interaction term and suggested that explaining additional 1% of variance in the dependent variable constitutes a substantial effect (Frese, 1999). In our study, we applied the more conservative p-value of .05 and reported the amount of additional variance explained by the interaction terms. We found significant moderating effects of active information search on the effects of prior start-up experience and divergent thinking on business opportunity identification. In both cases, the interaction terms explained additional 4% of variance. Furthermore, we found a marginally significant interaction effect between active information

search and years of entrepreneurial experience (which would have been significant applying McClelland and Judd's (1993) criterion). The interaction term explained additional 3% of variance in business opportunity identification. Only the interaction between active information search and GMA did not reach levels of significance and including the interaction term into the model explained 0% additional variance in business opportunity identification. The lack of additional variance explained by this interaction term indicates that the non-significant finding was not due to a power problem but rather due to lack of a substantial effect of the interaction between active information search and GMA on business opportunity identification.

A limitation concerns the cross-sectional design of our study. We argued that the joint effects of entrepreneurial experience, creativity, and GMA with active information search lead to business opportunity identification and that business opportunity identification results in innovative product/service innovations. We cannot rule out a reverse causal direction of the proposed relationships. However, our hypothesized model is in line with models of the entrepreneurial process that assume that individual characteristics contribute to opportunity identification and that opportunity identification is an antecedent of product/service innovations (Baron, 2007b). With regard to the study design, we also note that other macro factors, such as the research and development intensity or the dynamism within an industry might affect firm-level innovation (Thornhill, 2006). Similarly, there is meta-analytic evidence that innovation (which is part of the entrepreneurial orientation construct) is a mediator between environment and firm growth (Rosenbusch, Rauch, & Bausch, in press). Our study shows that there is an important person-information processing interaction. Further interactions of person and environmental factors may help to develop a more comprehensive perspective on opportunity identification and innovation in the small business domain (see also Hmieleski & Baron, 2009).

**Practical implications**

Baron (2006) has noted that when entrepreneurs' capacity to recognize opportunities "is very high, active searches for opportunities may not be necessary; entrepreneurs are so sensitive to them that they do not have to engage in formal, systematic search processes" (pp. 112). Our findings suggest that entrepreneurs should engage in active search – even when their cognitive capacities are very high. In case of an active approach towards information search, entrepreneurs high in divergent thinking can leverage the full potential of their cognitive capacities and discover more opportunities. In case of a less active information search, the advantage of entrepreneurs high in divergent thinking is less pronounced because the necessary informational input for opportunity identification is lacking.

Furthermore, our findings suggest that even entrepreneurs with little experience can identify a high number of business opportunities when they engage in active information search. Active information search compensates for a lack of experience. This is particularly relevant for policy makers, consultants, and venture capitalists who are interested in promoting entrepreneurship. Previous research has suggested to target assistance to experienced entrepreneurs to increase investment returns because experienced entrepreneurs identify more opportunities (Westhead et al., 2009). However, policy makers, consultants, and venture capitalist who focus only on entrepreneurs' experience may miss opportunities to support promising novice entrepreneurs who identify the same number of opportunities because of their high levels of active information search. Thus, considering joint effects of entrepreneurial experience and active information search should lead to better predictions regarding the number of opportunities identified by entrepreneurs.

**REFERENCES**

- Acs, Z. J., Desai, S., & Hessels, J. (2008). Entrepreneurship, economic development and institutions. *Small Business Economics*, *31*(3), 219-234.
- Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions*. Newbury Park, CA: Sage.
- Amit, R., MacCrimmon, K. R., & Zietsma, C. (2001). Does money matter?: Wealth attainment as the motive for initiating growth-oriented technology ventures. *Journal of Business Venturing*, *16*(2), 119-143.
- Ardichvili, A., Cardozo, R., & Ray, S. (2003). A theory of entrepreneurial opportunity identification and development. *Journal of Business Venturing*, *18*(1), 105-123.
- Arnett, J. J. (2008). The Neglected 95% Why American Psychology Needs to Become Less American. *American Psychologist*, *63*(7), 602-614.
- Arthur, W., & Day, D. V. (1994). Development of a Short-Form for the Raven Advanced Progressive Matrices Test. *Educational and Psychological Measurement*, *54*(2), 394-403.
- Baron, R. A. (1998). Cognitive mechanisms in entrepreneurship: Why and when entrepreneurs think differently than other people. *Journal of Business Venturing*, *13*(4), 275-294.
- Baron, R. A. (2004). The cognitive perspective: a valuable tool for answering entrepreneurship's basic "why" questions. *Journal of Business Venturing*, *19*(2), 221-239.
- Baron, R. A. (2006). Opportunity recognition as pattern recognition: How entrepreneurs "connect the dots" to identify new business opportunities. *Academy of Management Perspectives*, *20*(1), 104-119.
- Baron, R. A. (2007a). Behavioral and cognitive factors in entrepreneurship: Entrepreneurs as the active element in new venture creation. *Strategic Entrepreneurship Journal*, *1*(1-2), 167-182.
- Baron, R. A. (2007b). Entrepreneurship: A Process Perspective. In J. R. Baum, M. Frese, & R. A. Baron (Eds.), *The Psychology of Entrepreneurship* (pp. 19-39). Mahwah, NJ: Lawrence Erlbaum.
- Baron, R. A., & Ensley, M. D. (2006). Opportunity recognition as the detection of meaningful patterns: Evidence from comparisons of novice and experienced entrepreneurs. *Management Science*, *52*(9), 1331-1344.
- Baron, R. A., & Tang, J. (2009). Entrepreneurs' Social Skills and New Venture Performance: Mediating Mechanisms and Cultural Generality. *Journal of Management*, *35*(2), 282-306.

- Baron, R. A., & Tang, J. (2011). The role of entrepreneurs in firm-level innovation: Joint effects of positive affect, creativity, and environmental dynamism. *Journal of Business Venturing*, 26(1), 49-60.
- Baron, R. A., & Ward, T. B. (2004). Expanding entrepreneurial cognition's toolbox: Potential contributions from the field of cognitive science. *Entrepreneurship Theory and Practice*, 28(6), 553-573.
- Baum, J. R., Locke, E. A., & Smith, K. G. (2001). A multidimensional model of venture growth. *Academy of Management Journal*, 44(2), 292-303.
- Bruton, G. D. (2010). Business and the World's Poorest Billion-The Need for an Expanded Examination by Management Scholars. *Academy of Management Perspectives*, 24(3), 6-10.
- Busenitz, L. W. (1996). Research on entrepreneurial alertness - Sampling, measurement, and theoretical issues. *Journal of Small Business Management*, 34(4), 35-44.
- Carree, M. A., & Thurik, A. R. (2008). The lag structure of the impact of business ownership on economic performance in OECD countries. *Small Business Economics*, 30(1), 101-110.
- Carstensen, L. L., & Lang, F. R. (1996). Future Time Perspective Scale. Stanford University.
- Carter, N. M., Gartner, W. B., & Reynolds, P. D. (1996). Exploring start-up event sequences. *Journal of Business Venturing*, 11(3), 151-166.
- Christensen, P. R., Merrifield, P. R., & Guilford, J. P. (1953). *Consequences Form A-1*. Beverly Hills, CA: Sheridan Supply.
- Colom, R., Rebollo, I., Palacios, A., Juan-Espinosa, M., & Kyllonen, P. C. (2004). Working memory is (almost) perfectly predicted by g. *Intelligence*, 32(3), 277-296.
- Cooper, A. C., Folta, T. B., & Woo, C. (1995). Entrepreneurial Information Search. *Journal of Business Venturing*, 10(2), 107-120.
- Corbett, A. C. (2007). Learning asymmetries and the discovery of entrepreneurial opportunities. *Journal of Business Venturing*, 22(1), 97-118.
- Daft, R. L., Sormunen, J., & Parks, D. (1988). Chief Executive Scanning, Environmental Characteristics, and Company Performance - an Empirical-Study. *Strategic Management Journal*, 9(2), 123-139.
- Dane, E. (2010). Reconsidering the Trade-Off between Expertise and Flexibility: A Cognitive Entrenchment Perspective. *Academy of Management Review*, 35(4), 579-603.
- Davidsson, P., & Honig, B. (2003). The role of social and human capital among nascent entrepreneurs. *Journal of Business Venturing*, 18(3), 301-331.

- DeTienne, D. R., & Chandler, G. N. (2004). Opportunity Identification and its Role in the Entrepreneurial Classroom: A pedagogical Approach and Empirical Test. *Academy of Management Learning & Education*, 3(3), 242-257.
- Dimov, D. (2007). Beyond the single-person, single-insight attribution in understanding entrepreneurial opportunities. *Entrepreneurship Theory and Practice*, 31(5), 713-731.
- DuBois, C. L. Z., Sackett, P. R., Zedeck, S., & Fogli, L. (1993). Further Exploration of Typical and Maximum Performance Criteria: Definitional Issues, Prediction, and White-Black Differences. *Journal of Applied Psychology*, 78(2), 205-211.
- Eckhardt, J. T., & Shane, S. (2003). Opportunities and entrepreneurship. *Journal of Management*, 29(3), 333-349.
- Engle, R. W., Tuholski, S. W., Laughlin, J. E., & Conway, A. R. A. (1999). Working memory, short-term memory, and general fluid intelligence: A latent-variable approach. *Journal of Experimental Psychology-General*, 128(3), 309-331.
- Evans, M. G. (1985). A Monte Carlo Study of the Effects of Correlated Method Variance in Moderated Multiple-Regression Analysis. *Organizational Behavior and Human Decision Processes*, 36(3), 305-323.
- Fiet, J. O. (2002). *Systematic Search for Entrepreneurial Discoveries*. Westport, CN: Praeger.
- Fiet, J. O. (2007). A prescriptive analysis of search and discovery. *Journal of Management Studies*, 44(4), 592-611.
- Fiske, S. T., & Taylor, S. E. (1984). *Social cognition*. New York: Random House.
- Frese, M. (1999). Social support as a moderator of the relationship between work stressors and psychological dysfunctioning: A longitudinal study with objective measures. *Journal of Occupational Health Psychology*, 4(3), 179-192.
- Frese, M. (2009). Toward a Psychology of Entrepreneurship – An Action Theory Perspective. *Foundations and Trends in Entrepreneurship*, 5(6), 435-494.
- Frese, M., & Zapf, D. (1994). Action as the core of work psychology: A German approach. In H. C. Triandis, M. D. Dunnette, & L. M. Hough (Eds.), *Handbook of Industrial and Organizational Psychology* (Vol. 4, pp. 271-340). Palo Alto, CA.: Consulting Psychologists Press.
- Frese, M., Krauss, S. I., Keith, N., Escher, S., Grabarkiewicz, R., Luneng, S. T., Heers, C., et al. (2007). Business owners' action planning and its relationship to business success in three African countries. *Journal of Applied Psychology*, 92(6), 1481-1498.
- Gaglio, C. M. (2004). The role of mental simulations and counterfactual thinking in the opportunity identification process. *Entrepreneurship Theory and Practice*, 28(6), 533-552.



- Gaglio, C. M., & Katz, J. A. (2001). The psychological basis of opportunity identification: Entrepreneurial alertness. *Small Business Economics*, 16(2), 95-111.
- Gartner, W. B. (1985). A Conceptual Framework for Describing the Phenomenon of New Venture Creation. *Academy of Management Review*, 10(4), 696-706.
- Gottfredson, L. S. (1997). Why g matters: The complexity of everyday life. *Intelligence*, 24(1), 79-132.
- Guilford, J. P. (1950). Creativity. *American Psychologist*, 5, 444-454.
- Hills, G. E., Lumpkin, G. T., & Singh, R. P. (1997). Opportunity Recognition: Perceptions and Behaviors of Entrepreneurs. In P. D. Reynolds, W. D. Bygrave, N. M. Carter, P. Davidsson, W. B. Gartner, C. M. Mason, & P. P. McDougall (Eds.), *Frontiers of Entrepreneurship Research* (pp. 168-182). Babson Park, MA: Babson College.
- Hitt, M. A., & Barr, S. H. (1989). Managerial Selection Decision Models: Examination of Configural Cue Processing. *Journal of Applied Psychology*, 74(1), 53-61.
- Hmieleski, K. M., & Baron, R. A. (2009). Entrepreneurs' Optimism and New Venture Performance: A Social Cognitive Perspective. *Academy of Management Journal*, 52(3), 473-488.
- Hoffman, K., Parejo, M., Bessant, J., & Perren, L. (1998). Small firms, R&D, technology and innovation in the UK: a literature review. *Technovation*, 18(1), 39-55.
- Jaccard, J., Wan, C. K., & Turrisi, R. (1990). The Detection and Interpretation of Interaction Effects between Continuous-Variables in Multiple-Regression. *Multivariate Behavioral Research*, 25(4), 467-478.
- Kaish, S., & Gilad, B. (1991). Characteristics of Opportunities Search of Entrepreneurs Versus Executives: Sources, Interests, General Alertness. *Journal of Business Venturing*, 6(1), 45-61.
- Keh, H. T., Nguyen, T. T. M., & Ng, H. P. (2007). The effects of entrepreneurial orientation and marketing information on the performance of SMEs. *Journal of Business Venturing*, 22(4), 592-611.
- Kirchhoff, B. A. (1991). Entrepreneurship's contribution to economics. *Entrepreneurship Theory and Practice*, 16(2), 93-112.
- Kirzner, I. M. (1979). *Perception, Opportunity, and Profit*. Chicago: University of Chicago Press.
- Kirzner, I. M. (1997). Entrepreneurial discovery and the competitive market process: An Austrian approach. *Journal of Economic Literature*, 35(1), 60-85.
- Kirzner, I. M. (2009). The alert and creative entrepreneur: a clarification. *Small Business Economics*, 32(2), 145-152.

- Kolb, D. A. (1984). *Experiential Learning: Experience as the Source of Learning and Development*. Englewood Cliffs, NJ: Prentice-Hall.
- Lord, R. G., & Maher, K. J. (1990). Alternative Information-Processing Models and Their Implications for Theory, Research, and Practice. *Academy of Management Review*, 15(1), 9-28.
- Lybaert, N. (1998). The information use in a SME: Its importance and some elements of influence. *Small Business Economics*, 10(2), 171-191.
- Maas, G., & Herrington, M. (2008). Global Entrepreneurship Monitor South African Report 2007. Cape Town, South Africa: UCT Graduate School of Business.
- McClelland, G. H., & Judd, C. M. (1993). Statistical Difficulties of Detecting Interactions and Moderator Effects. *Psychological Bulletin*, 114(2), 376-390.
- McMullen, J. S., & Shepherd, D. A. (2006). Entrepreneurial action and the role of uncertainty in the theory of the entrepreneur. *Academy of Management Review*, 31(1), 132-152.
- Mead, D. C., & Liedholm, C. (1998). The dynamics of micro and small enterprises in developing countries. *World Development*, 26(1), 61-74.
- Minniti, M., & Bygrave, W. (2001). A Dynamic Model of Entrepreneurial Learning. *Entrepreneurship Theory and Practice*, 25(3), 5-16.
- Mitchell, R. K., Busenitz, L. W., Bird, B., Gaglio, C. M., McMullen, J. S., Morse, E. A., & Smith, J. B. (2007). The central question in entrepreneurial cognition research 2007. *Entrepreneurship Theory and Practice*, 31(1), 1-27.
- Mitchell, R. K., Busenitz, L. W., Lant, T., McDougall, P. P., Morse, E. A., & Smith, J. B. (2002). Toward a Theory of Entrepreneurial Cognition: Rethinking the People Side of Entrepreneurship Research. *Entrepreneurship Theory and Practice*, 27(2), 93-104.
- Mitchell, R. K., Smith, J. B., Seawright, K. W., & Morse, E. A. (2000). Cross-cultural cognitions and the venture creation decision. *Academy of Management Journal*, 43(5), 974-993.
- Mueller, P. (2007). Exploiting Entrepreneurial Opportunities: The Impact of Entrepreneurship on Growth. *Small Business Economics*, 28(4), 355-362.
- Mumford, M. D. (2003). Where have we been, where are we going? Taking stock in creativity research. *Creativity Research Journal*, 15(2-3), 107-120.
- Mumford, M. D., & Gustafson, S. B. (1988). Creativity Syndrome: Integration, Application, and Innovation. *Psychological Bulletin*, 103(1), 27-43.
- Mumford, M. D., Marks, M. A., Connelly, M. S., Zaccaro, S. J., & Johnson, J. F. (1998). Domain-based scoring of divergent-thinking tests: Validation evidence in an occupational sample. *Creativity Research Journal*, 11(2), 151-163.

- Mumford, M. D., Mobley, M. I., Uhlman, C. E., Reiter-Palmon, R., & Doares, L. M. (1991). Process Analytic Models of Creative Capacities. *Creativity Research Journal*, 4(2), 91-122.
- Neisser, U., Boodoo, G., Bouchard, T. J., Boykin, A. W., Brody, N., Ceci, S. J., Halpern, D. F., et al. (1996). Intelligence: Knowns and unknowns. *American Psychologist*, 51(2), 77-101.
- Nelson, R. E., & Johnson, S. D. (1997). Entrepreneurship education as a strategic approach to economic growth in Kenya. *Journal of Industrial Teacher Education*, 35(1), 7-21.
- Nkirina, S. P. (2010). The challenges of integrating entrepreneurship education in the vocational training system: An insight from Tanzania's Vocational Education Training Authority. *Journal of European Industrial Training*, 34(2), 153-166.
- Parker, S. C. (2006). Learning about the unknown: How fast do entrepreneurs adjust their beliefs? *Journal of Business Venturing*, 21(1), 1-26.
- Perttula, M., & Sipila, P. (2007). The idea exposure paradigm in design idea generation. *Journal of Engineering Design*, 18(1), 93-102.
- Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, 88(5), 879-903.
- Politis, D. (2005). The process of entrepreneurial learning: A conceptual framework. *Entrepreneurship Theory and Practice*, 29(4), 399-424.
- Porter, M. E. (1980). *Competitive Strategy*. New York: Free Press.
- Preacher, K. J., Rucker, D. D., & Hayes, A. F. (2007). Addressing moderated mediation hypotheses: Theory, methods, and prescriptions. *Multivariate Behavioral Research*, 42(1), 185-227.
- Rae, D., & Carswell, M. (2000). Using a life-story approach in researching entrepreneurial learning: the development of a conceptual model and its implications in the design of learning experiences. *Education and Training*, 42(4/5), 220-227.
- Rauch, A., & Frese, M. (2007). Let's put the person back into entrepreneurship research: A meta-analysis on the relationship between business owners' personality traits, business creation, and success. *European Journal of Work and Organizational Psychology*, 16(4), 353-385.
- Rerup, C. (2005). Learning from past experience: Footnotes on mindfulness and habitual entrepreneurship. *Scandinavian Journal of Management*, 21(4), 451-472.
- Reuber, A. R., & Fischer, E. M. (1999). Understanding The Consequences of Founders' Experience. *Journal of Small Business Management*, 37(2), 30-45.

- Rogerson, C. M. (2000). Emerging from Apartheid's Shadow: South Africa's Informal Economy. *Journal of International Affairs*, 53(2), 673-695.
- Romijn, H., & Albaladejo, M. (2002). Determinants of innovation capability in small electronics and software firms in southeast England. *Research Policy*, 31(7), 1053-1067.
- Rosenbusch, N., Brinckmann, J., & Bausch, A. (2011). Is innovation always beneficial? A meta-analysis of the relationship between innovation and performance in SMEs. *Journal of Business Venturing*, 26(4), 441-457.
- Runco, M. A. (2004). Creativity. *Annual Review of Psychology*, 55, 657-687.
- Runco, M. A., & Chand, I. (1995). Cognition and Creativity. *Educational Psychology Review*, 7(3), 243-267.
- Runco, M. A., Dow, G., & Smith, W. R. (2006). Information, experience, and divergent thinking: An empirical test. *Creativity Research Journal*, 18(3), 269-277.
- Rushton, J. P., Skuy, M., & Ann Bons, T. (2004). Construct validity of Raven's advanced progressive matrices for African and non-African engineering students in South Africa. *International Journal of Selection and Assessment*, 12(3), 220-229.
- Schriesheim, C. A., & DeNisi, A. S. (1981). Task Dimensions as Moderators of the Effects of Instrumental Leadership: A Two-Sample Replicated Test of Path-Goal Leadership Theory. *Journal of Applied Psychology*, 66(5), 589-597.
- Shane, S. (2000). Prior knowledge and the discovery of entrepreneurial opportunities. *Organization Science*, 11(4), 448-469.
- Shane, S. (2003). *A General Theory of Entrepreneurship: The Individual-Opportunity Nexus*. Northampton, MA: Edward Elgar Publishing, Inc.
- Shane, S. (2009). Why encouraging more people to become entrepreneurs is bad public policy. *Small Business Economics*, 33(2), 141-149.
- Shane, S., & Venkataraman, S. (2000). The promise of entrepreneurship as a field of research. *Academy of Management Review*, 25(1), 217-226.
- Shepherd, D. A., & DeTienne, D. R. (2005). Prior knowledge, potential financial reward, and opportunity identification. *Entrepreneurship Theory and Practice*, 29(1), 91-112.
- Shrout, P. E., & Fleiss, J. L. (1979). Intraclass Correlations: Uses in Assessing Rater Reliability. *Psychological Bulletin*, 86(2), 420-428.
- Simonton, D. K. (1989). Chance-configuration theory of scientific creativity. In B. Gholsion, W. R. Shadish Jr., R. A. Neimeyer, & A. C. Houts (Eds.), *Psychology of Science: Contributions to Metascience*. Cambridge: Cambridge University Press.
- Smith, J. B., Mitchell, J. R., & Mitchell, R. K. (2009). Entrepreneurial Scripts and the New Transaction Commitment Mindset: Extending the Expert Information Processing Theory

- Approach to Entrepreneurial Cognition Research. *Entrepreneurship Theory and Practice*, 33(4), 815-844.
- Song, M., Wang, T., & Parry, M. E. (2010). Do market information processes improve new venture performance? *Journal of Business Venturing*, 25(6), 556-568.
- Sonnentag, S. (1998). Expertise in professional software design: A process study. *Journal of Applied Psychology*, 83(5), 703-715.
- Sternberg, R. J. (2005). Creativity or creativities? *International Journal of Human-Computer Studies*, 63(4-5), 370-382.
- Sternberg, R. J., & Kalmar, D. A. (1997). When will the milk spoil? Everyday induction in human intelligence. *Intelligence*, 25(3), 185-203.
- Tang, J., Kacmar, K. M., & Busenitz, L. W. (2012). Entrepreneurial alertness in the pursuit of new opportunities. *Journal of Business Venturing*, 27(1), 77-94.
- Tesluk, P. E., & Jacobs, R. R. (1998). Toward an integrated model of work experience. *Personnel Psychology*, 51(2), 321-355.
- Thornhill, S. (2006). Knowledge, innovation and firm performance in high- and low-technology regimes. *Journal of Business Venturing*, 21(5), 687-703.
- Ucbasaran, D., Westhead, P., & Wright, M. (2008). Opportunity identification and pursuit: Does an entrepreneur's human capital matter? *Small Business Economics*, 30(2), 153-173.
- Ucbasaran, D., Westhead, P., & Wright, M. (2009). The extent and nature of opportunity identification by experienced entrepreneurs. *Journal of Business Venturing*, 24(2), 99-115.
- Unger, J. M., Keith, N., Hilling, C., Gielnik, M. M., & Frese, M. (2009). Deliberate practice among South African small business owners: Relationships with education, cognitive ability, knowledge, and success. *Journal of Occupational and Organizational Psychology*, 82(1), 21-44.
- Vaghely, I. P., & Julien, P. A. (2010). Are opportunities recognized or constructed? An information perspective on entrepreneurial opportunity identification. *Journal of Business Venturing*, 25(1), 73-86.
- Vincent, A. S., Decker, B. P., & Mumford, M. D. (2002). Divergent thinking, intelligence, and expertise: A test of alternative models. *Creativity Research Journal*, 14(2), 163-178.
- Walsh, J. P. (1995). Managerial and organizational cognition: Notes from a trip down memory lane. *Organization Science*, 6(3), 280-321.
- Wanous, J. P., Reichers, A. E., & Hudy, M. J. (1997). Overall job satisfaction: How good are single-item measures? *Journal of Applied Psychology*, 82(2), 247-252.

- Ward, T. B. (2004). Cognition, creativity, and entrepreneurship. *Journal of Business Venturing*, 19(2), 173-188.
- Ward, T. B. (2007). Creative cognition as a window on creativity. *Methods*, 42(1), 28-37.
- Ward, T. B., Smith, S. M., & Finke, R. A. (1999). Creative Cognition. In R. J. Sternberg (Ed.), *Handbook of Creativity* (pp. 189-212). Cambridge: Cambridge University Press.
- Welling, H. (2007). Four mental operations in creative cognition: The importance of abstraction. *Creativity Research Journal*, 19(2-3), 163-177.
- Westhead, P., Ucbasaran, D., & Wright, M. (2009). Information Search and Opportunity Identification: The Importance of Prior Business Ownership Experience. *International Small Business Journal*, 27(6), 659-677.
- Wiklund, J., Davidsson, P., & Delmar, F. (2003). What Do They Think and Feel about Growth? An Expectancy-Value Approach to Small Business Managers' Attitudes Toward Growth. *Entrepreneurship Theory and Practice*, 27(3), 247-270.
- Woodman, R. W., & Schoenfeldt, L. F. (1990). An Interactionist Model of Creative Behavior. *Journal of Creative Behavior*, 24(4), 279-290.
- Wright, M., Robbie, K., & Ennew, C. (1997). Serial Entrepreneurs. *British Journal of Management*, 8(3), 251-268.
- Zapf, D., Dormann, C., & Frese, M. (1996). Longitudinal Studies in Organizational Stress Research: A Review of the Literature With Reference to Methodological Issues. *Journal of Occupational Health Psychology*, 1(2), 145-169.
- Zhou, J. (2008). New Look at Creativity in the Entrepreneurial Process. *Strategic Entrepreneurship Journal*, 2(1), 1-5.
- de Wit, G., & van Winden, F. A. A. M. (1989). An Empirical Analysis of Self-Employment in the Netherlands. *Small Business Economics*, 1(4), 263-272.
- van Praag, C. M., & Cramer, J. S. (2001). The roots of entrepreneurship and labour demand: Individual ability and low risk aversion. *Economica*, 68(269), 45-62.
- van Praag, C. M., & Versloot, P. H. (2007). What is the value of entrepreneurship? A review of recent research. *Small Business Economics*, 29(4), 351-382.

**Additional References**

*(not in Mendeley and therefore on extra page)*

Department of Trade and Industry (1995). White Paper on National Strategy for the Development and Promotion of Small Business in South Africa. Pretoria, South Africa: Department of Trade and Industry.

Gielnik, M M., Frese, M., Graf, J. M., & Kampschulte, A. (in press). Creativity in the opportunity identification process and the moderating effect of diversity of information. *Journal of Business Venturing*.

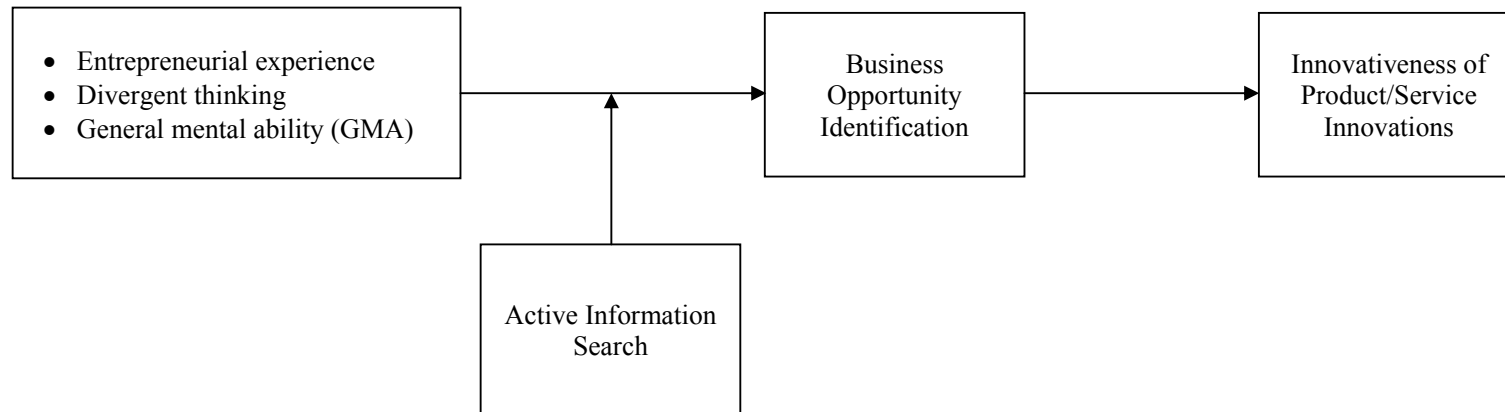
Rosenbusch, N., Rauch, A., & Bausch, A. (in press). The Mediating Role of Entrepreneurial Orientation in the Task Environment-Performance Relationship: A Meta-Analysis. *Journal of Management*

Statistics South Africa (2000). Measuring poverty in South Africa. Pretoria, South Africa: Statistics South Africa.

Statistics South Africa (2009). Quarterly Labour Force Survey: Quarter 1, 2009. Pretoria, South Africa: Statistics South Africa.

**FIGURE 1**

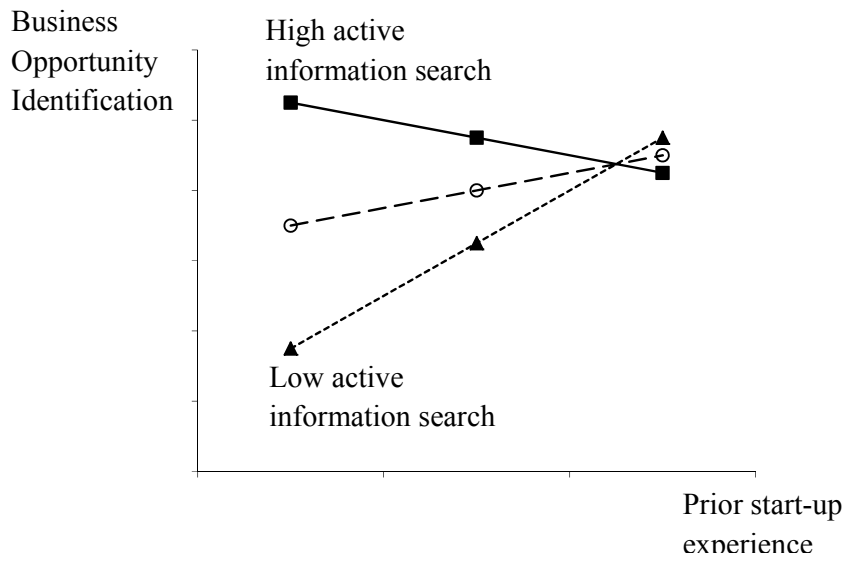
The model guiding our study: the interplay of entrepreneurial experience, divergent thinking, and GMA with active information search on business opportunity identification and innovativeness of product/service innovations.





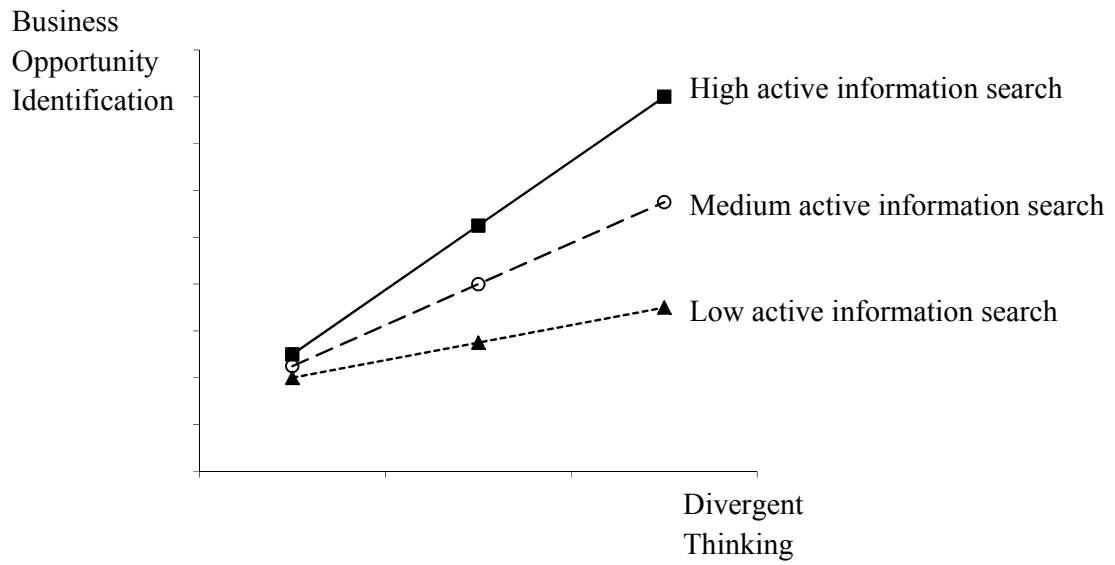
**FIGURE 2**

The moderating effect of active information search on the relationship between prior start-up experience and business opportunity identification.



**FIGURE 3**

The moderating effect of active information search on the relationship between divergent thinking and business opportunity identification.



**TABLE 1**

Descriptive statistics and zero-order correlations.

Variables and Scales	Mean	SD	Range	1	2	3	4	5	6	7	8	9	10	11	12
1. Active Information Search	3.94	0.75	1-5												
2. Prior start-up experience	0.30	0.46	0-1	.27**											
3. Years of entrepreneurial experience	11.44	8.72	1-38	.17	.56**										
4. Divergent thinking <sup>a</sup>	0.00	0.97	-- <sup>d</sup>	.14	.01	-.09									
5. General mental ability (GMA)	0.27	0.20	0-1	-.04	-.17	-.18	.38**								
6. Business opportunity identification	2.03	1.03	0-4	.20*	.07	.02	.33**	.05							
7. Innovativeness of product/service innovations	1.82	2.05	0-5	.16	.00	.00	.01	.05	.21*						
8. Age of business owner	42.83	9.75	24-65	.19	.04	.36**	-.01	-.18	-.02	.10					
9. Gender <sup>b</sup>	0.22	0.42	0-1	-.07	-.03	-.26**	.23*	.03	-.06	-.02	-.12				
10. Satisfaction with income	4.11	1.50	1-7	.02	.11	.08	.09	.07	-.01	.05	.03	-.04			
11. Priority of wealth attainment	2.65	2.14	1-7	-.18	-.05	-.12	.07	.20*	.06	-.26**	-.23**	-.04	-.01		
12. Line of industry <sup>c</sup>	0.27	0.45	0-1	-.11	-.10	-.10	.02	.01	.03	.06	.01	.00	-.10	.12	
13. Business size <sup>a</sup>	0.00	0.80	-- <sup>e</sup>	.05	-.01	.23**	.20*	.08	.19	.23*	.15	-.20*	.14	-.12	.05

**Note:** N = 100; <sup>a</sup> Scale is based on z-standardized variables; <sup>b</sup> 0 = male, 1 = female; <sup>c</sup> 0 = service, 1 = manufacturing; <sup>d</sup> We z-standardized participants' fluency and flexibility scores to be able to combine them to one scale of divergent thinking. We set a limit of maximum 10 responses per scenario. Therefore, the potential range was 0-10. The range in our sample was 0.75-10 for fluency and 0.50-7.38 for flexibility on average across the four scenarios; <sup>e</sup> We z-standardized three measures of business size to compute our index of business size. The three measures were generated revenue (range: 2,500- 5,750,000USD), the value of the business assets (range: 38- 3,875,000USD), and the number of employees (range: 1-48); \* p < .05; \*\* p < .01.

**TABLE 2**  
Results of regression analyses.

	<b>Business Opportunity Identification</b>					<b>Innovativeness of Product/Service Innovations</b>			
	Model 0	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
Intercept	2.47	3.02	3.03	2.69	2.75	0.14	0.17	0.32	0.26
<i>Individual level controls</i>									
Age of business owner	-.07	-.06	-.10	-.09	-.07	.06	.07	.07	.08
Gender	-.11	-.17	-.13	-.09	-.11	.05	.04	.04	.03
Satisfaction with income	-.06	-.10	-.08	-.05	-.06	.06	.05	.04	.05
Priority of wealth attainment	.08	.07	.06	.11	.08	-.26*	-.26*	-.27*	-.26*
<i>Firm level controls</i>									
Line of industry	.02	.02	.03	-.01	.02	.09	.09	.10	.08
Business size	.13	.12	.13	.14	.13	.19†	.19†	.19†	.19†
<i>Entrepreneurial knowledge</i>									
Prior start-up experience	.03	.11	.05	.03	.02	.03	.04	.05	.06
Years of entrepreneurial experience	-.03	-.04	.00	.01	-.02	-.12	-.13	-.13	-.13
<i>Cognitive Capacities</i>									
Divergent thinking	.34**	.32**	.31**	.35**	.34**	-.18	-.17	-.18	-.16
GMA	-.10	-.10	-.09	-.07	-.11	.14	.14	.13	.16
<i>Moderator</i>									
Active information search (AIS)	.16	.12	.16	.24*	.16	.10	.09	.07	.10
<i>Interaction terms</i>									
Prior start-up x AIS		-.22*				.06			
Years of entrepreneurial experience x AIS			-.18†				.04		
Divergent thinking x AIS				.21*				-.05	
GMA x AIS					-.04				.11
<i>Mediator</i>									
Business Opportunity Identification						.24*	.23*	.23*	.23*
R <sup>2</sup>	.18	.22	.21	.22	.18	.20	.19	.20	.20
Change in R <sup>2</sup> compared to Model 0		.04	.03	.04	.00				
F	1.79†	2.07*	1.95*	2.00*	1.64†	1.61†	1.60†	1.60†	1.68†

Note: N = 100; Standardized regression coefficients are reported; † p < .10; \* p < .05; \*\* p < .01.

**TABLE 3**

Conditional indirect effects of entrepreneurial experience and divergent thinking on innovativeness of product/service innovations.

Active information search <sup>a</sup>	Prior start-up experience				Years of entrepreneurial experience				Divergent thinking			
	Boot indirect effect	Boot SE	Boot z	Boot p	Boot indirect effect	Boot SE	Boot z	Boot p	Boot indirect effect	Boot SE	Boot z	Boot p
-1 SD	.19	.14	1.36	0.17	.09	.10	0.90	0.37	.05	.10	0.50	0.62
M	.06	.07	0.86	0.39	.00	.07	0.00	1.00	.17	.09	1.89	0.06
+1 SD	-.07	.09	-0.78	0.44	-.08	.10	-0.80	0.42	.28	.15	1.87	0.06
-1.98	.32	.23	1.39	0.16	.17	.16	1.06	0.29	-.06	.17	-0.35	0.72
-1.78	.29	.21	1.38	0.17	.15	.15	1.00	0.32	-.04	.15	-0.27	0.79
-1.58	.26	.19	1.37	0.17	.14	.13	1.08	0.28	-.02	.13	-0.15	0.88
-1.38	.24	.17	1.41	0.16	.12	.12	1.00	0.32	.01	.12	0.08	0.93
-1.18	.21	.16	1.31	0.19	.10	.11	0.91	0.36	.03	.11	0.27	0.79
-0.99	.19	.14	1.36	0.17	.09	.10	0.90	0.37	.05	.10	0.50	0.62
-0.79	.16	.12	1.33	0.18	.07	.09	0.78	0.44	.08	.09	0.89	0.37
-0.59	.13	.11	1.18	0.24	.05	.08	0.63	0.53	.10	.08	1.25	0.21
-0.39	.11	.10	1.10	0.27	.04	.07	0.57	0.57	.12	.08	1.50	0.13
-0.19	.08	.08	1.00	0.32	.02	.07	0.29	0.77	.15	.09	1.67	0.10
0.01	.06	.07	0.86	0.39	.00	.07	0.00	1.00	.17	.09	1.89	0.06
0.21	.03	.07	0.43	0.67	-.02	.07	-0.29	0.77	.19	.10	1.90	0.06
0.41	.00	.07	0.00	1.00	-.03	.07	-0.43	0.67	.21	.11	1.91	0.06
0.61	-.02	.07	-0.29	0.77	-.05	.08	-0.63	0.53	.24	.12	2.00	0.05
0.81	-.05	.08	-0.63	0.53	-.07	.09	-0.78	0.44	.26	.14	1.86	0.06
1.01	-.07	.09	-0.78	0.44	-.08	.10	-0.80	0.42	.28	.15	1.87	0.06
1.21	-.10	.10	-1.00	0.32	-.10	.11	-0.91	0.36	.31	.17	1.82	0.07
1.41	-.13	.12	-1.08	0.28	-.12	.12	-1.00	0.32	.33	.19	1.74	0.08

Note: N = 100; <sup>a</sup> Range of values is abbreviated compared to the output provided by the macro by Preacher et al. (2007).