

## **Creativity in the opportunity identification process and the moderating effect of diversity of information**

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Keywords: entrepreneurship; opportunity identification; creativity; divergent thinking; diverse information; experiment

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### **Abstract**

We employ two study designs for a more detailed examination of creativity in the opportunity identification process. We employ a correlational field study to test the hypothesis that divergent thinking affects venture growth through business idea generation. We use an experimental design to test the hypothesis that diversity of information moderates the effect of divergent thinking on business idea generation. Analyses based on 98 business owners across both study designs supported our hypotheses. Combining the findings from both designs points to boundary conditions of theories suggesting constraining information; this may weaken the indirect effect of divergent thinking on venture growth.

## 1. Executive summary

Entrepreneurship scholars agree that creativity is linked to entrepreneurship because creativity should promote identifying new opportunities (e.g., Shane, 2003). However, a detailed examination of creativity in the opportunity identification process is lacking and empirical findings are mixed (e.g., DeTienne & Chandler, 2004; Heunks, 1998). Dimov (2007) argued that the mixed findings are due to an imprecise conceptualization of the effects of creativity in the entrepreneurial process. Creativity is a process of divergent and convergent thinking (Hennessey & Amabile, 2010). In our study, we focus on the initial stage of the creative process and examine the effect of divergent thinking on generating multiple and original business ideas. We provide a theoretical basis for why divergent thinking is indirectly related to venture growth through business owners' generation of business ideas. To investigate this relationship we conducted a correlational field study. Furthermore, we take an interactionist approach to investigate the interplay of divergent thinking and diversity of information in the opportunity identification process. We focus on the diversity of information because theoretical perspectives in the entrepreneurship literature suggested that constraining information to domains in which one is knowledgeable is helpful because the new information can be linked to one's prior knowledge (Fiet, 2002). However, the creativity literature suggests that constraining information at the initial stage of the creative process may be detrimental (Ward, 2004). Instead, diverse information should be helpful because it promotes broader associational processes. We go beyond the discussion of the main effects and draw on interactionist models of creativity (Amabile, 1983) to hypothesize that divergent thinking should have a positive effect on business idea generation only in the case of diverse information. Constrained information should fix the thinking to one domain thus weakening the effect of divergent thinking on business idea generation. We employed an experimental design manipulating diversity of information to investigate this part of our study.

The correlational field study and the experimental design were both applied to the same sample of 98 Ugandan business owners. Data collection was based on face-to-face interviews. During the interview we employed a hypothetical scenario stating that there is a new trend of life-long learning. In a first step, we asked the business owners to generate business ideas to profit from the new trend. This measure of business idea generation was not affected by our experimental manipulation and we used it for the correlational field study. In a second step, the business owners received additional information related to the scenario and we asked them again to generate business ideas. The additional information constituted the experimental manipulation. The business owners were randomly assigned to one of two experimental groups (diverse versus constrained information). We used the generated business ideas after they had received the additional information for our experimental study. We used the consequences test to measure divergent thinking (Christensen et al., 1953). Finally, venture growth was measured as the percentage of increase or decrease of profits, sales, and customers.

Our analyses supported our hypotheses. Divergent thinking was indirectly related to venture growth through the generation of original business ideas. We further found that diversity of information interacted with divergent thinking. There was a strong effect of divergent thinking on business idea generation in the case of diverse information. The relationship was nonsignificant in case of constrained information. The direct effect of divergent thinking on business idea generation was thus contingent on the diversity of information. The results point to potential boundary conditions of theories favoring constrained information. Business owners high on divergent thinking generate only multiple and original business ideas in case of diverse information. The positive effect of divergent thinking was weakened in case of constrained information. Combining the findings from the correlational field study with the experimental findings leads to the conclusion that business

owners' exposure to diverse or constrained information may influence the indirect effect of divergent thinking on venture growth through the generation of original business ideas.

## 2. Introduction

Entrepreneurship is defined as identifying and exploiting opportunities and it can be conceptualized along the entrepreneurial process which proceeds from identifying opportunities to achieving venture growth (R. A. Baron, 2007a; Shane & Venkataraman, 2000). Opportunity identification implies that entrepreneurs use creative processes to perceive new ideas and to put them into action (Dimov, 2007). One would assume that creativity is a factor that has been extensively researched in an area that focuses on identifying new opportunities. However, this is not the case and the existing empirical findings are mixed or non-conclusive. DeTienne and Chandler (2004) showed that creativity is positively related to opportunity identification while Hansen et al. (2011) found only partial support for their hypothesis that creativity underlies opportunity identification. The findings by Heunks (1998) even suggest that creativity does not affect opportunity identification and exploitation. Dimov (2007) argued that the mixed findings are due to a conceptual collapse of different entrepreneurial success measures such as business ideas, business opportunities, and venture growth, which scholars have attempted to relate to creativity. The entrepreneurial process, however, is complex, involving several steps which necessitates a more detailed theoretical analysis of why creativity should be conducive to entrepreneurial success (Dimov, 2007). Similarly, Zhou (2008) noted recently that a “more explicit and focused research attention on creativity [...] is critical for understanding and promoting entrepreneurship” (p. 2).

Creativity can be defined as the generation of novel and useful ideas (Hennessey & Amabile, 2010; Runco, 2004). Creativity is best understood as an iterative process of divergent and convergent thinking to generate, evaluate, refine, and eventually come up with a creative idea (Basadur, Graen, & Green, 1982; Brophy, 1998; Mumford, Mobley, Uhlman, Reiter-Palmon, & Doares, 1991; Ward, S. M. Smith, & Finke, 1999). A systematic examination of creativity in the entrepreneurial process would thus require disentangling the different stages of both the creative process and the entrepreneurial process. We contribute to

a more detailed examination of creativity in the entrepreneurial process by focusing on business owners' divergent thinking and its function for generating business ideas and venture growth (see Figure 1, Panel A). Specifically, we focus on divergent thinking because of its importance in the first stage of the creative process in which initial ideas are produced (Basadur et al., 1982; Ward et al., 1999). We focus on business ideas and venture growth because business ideas are precursors of business opportunities and constitute the starting point of the entrepreneurial process which may eventually lead to higher venture growth (Dimov, 2007; Locke & Baum, 2007).

Furthermore, we also contribute to the literature that emphasizes the importance of taking an interactionist approach and investigating contextual factors that enhance or inhibit the positive effect of divergent thinking in the entrepreneurial process (Zhou, 2008). In general, entrepreneurship scholars have noted that it is important to extend current perspectives that mostly focus on personal factors and to combine personal and contextual factors in theoretical models aiming to explain entrepreneurial success (e.g., R. A. Baron, Baum, & Frese, 2007). Recently, research adopted such an interactionist perspective and provided evidence for the superior predictive validity of interactionist models. For example, Brigham and colleagues (Brigham & De Castro, 2003; Brigham, De Castro, & Shepherd, 2007) examined how a fit or misfit between entrepreneurs' cognitive style and organizational characteristics such as formalization and specialization predicted entrepreneurs' exit behavior. Other studies that adopted an interactionist perspective examined how the economic environment, in terms of environmental dynamism, influenced the relationship between CEOs' personal characteristics and venture performance (Ensley, Pearce, & Hmieleski, 2006; Hmieleski & R. A. Baron, 2009; Hmieleski & Ensley, 2007). In our study, we take an interactionist perspective to investigate the interplay between business owners' divergent thinking and type of information (diverse versus constrained) for opportunity identification. Investigating the interplay between divergent thinking and type of information is important to

broaden current theoretical perspectives on the positive and negative function of type of information for opportunity identification. From the dominant perspective in the entrepreneurship literature it follows that a constrained, systematic search for information from a limited number of domains most clearly related to entrepreneurs' prior knowledge should increase the chances of identifying business opportunities (Fiet, 2007; Fiet & Patel, 2008; Fiet, Piskounov, & Patel, 2005; Patel & Fiet, 2009). This perspective is based on theories emphasizing the importance of prior knowledge for opportunity identification (Fiet, 2002; Shane, 2000). However, this perspective contradicts in part research from the creativity literature which has shown that focusing too much on one's domain can become a barrier that reduces people's performance in generating novel and original ideas (Simonton, 2003; Ward, 2004; Wiley, 1998). Rather, a high degree of diverse information should be related to novel and original ideas even if this information goes beyond one's domain of expertise and prior knowledge (Mumford, Baughman, Supinski, & Maher, 1996). The creativity literature also acknowledges the importance of constrained information, for example, at evaluation stages of the creative process (Brown, Tumeo, Larey, & Paulus, 1998; Mumford et al., 1996). However, at initial stages, diverse information should help in generating a pool of original ideas that forms the input for subsequent steps of evaluation and refinement (Mumford & Gustafson, 1988; Mumford et al., 1996; Santanen, Briggs, & De Vreede, 2004).

We argue that a more detailed theoretical conception is necessary to better understand the beneficial or detrimental effects of constrained versus diverse information in the opportunity identification process. As suggested by the creativity literature, it is important to distinguish between the different stages of the creative process; depending on the stage, the different types of information may have beneficial or detrimental effects for people's creative achievements. However, we argue that, also within a particular stage, a more detailed perspective going beyond simple main effects is required. In our study, we focus on the first stage of the creative process in which initial business ideas are generated. In line with Zhou



(2008), we suggest that following an interactionist approach, taking into account personal and contextual factors, is useful for developing a more comprehensive theoretical model explaining business idea generation (see Figure 1, Panel B). Specifically, we hypothesize that constrained information may restrict business owners high in divergent thinking because constrained information directs their thinking to a specific domain limiting the number of domains they would usually draw on to generate ideas. The detrimental effects of constrained information should be less pronounced for business owners low in divergent thinking because they generally lack the cognitive capacities to generate numerous, original ideas. Integrating divergent thinking and type of information into one theoretical model of business idea generation is in line with a cognitive perspective on entrepreneurship emphasizing that information and cognitive capacities to process the information are both needed for opportunity identification (Mitchell et al., 2007, 2002). Thus, a joint investigation of the two factors should lead to a better understanding of the opportunity identification process; however, to our knowledge, there is as yet no research on entrepreneurship adopting such an interactionist perspective.

### **3. Theory**

#### *3.1. Divergent thinking, business idea generation, and venture growth*

Entrepreneurship scholars acknowledge the importance of creative processes for the generation of business ideas and the identification of business opportunities (R. A. Baron, 2006; DeTienne & Chandler, 2004; Dimov, 2007; Shane, 2003). For example, Lumpkin and Lichtenstein (2005) conceptualized opportunity identification as a creative process involving different steps of preparation, incubation, and insight. According to Dimov (2007), opportunity identification is a multi-step process starting with the generation of a business idea which the entrepreneur subsequently develops into a feasible business opportunity. In the present study, we focus on the generation of multiple and original business ideas which is the first step of the opportunity identification process. The generation of ideas involves mainly

creative processes and is a key area of creativity research (Amabile, 1983; Mumford & Gustafson, 1988).

It is important to note that some scholars suggested that creative processes leading to idea generation are diverse in nature. Gardner (1993a; 1993b), in his theory of multiple intelligences, proposed different types of creativity; for example, people are not equally creative in the different domains of science, arts, or technology. Similarly, Csikszentmihalyi (1997) argued that creativity is domain-specific because particularly influential achievements require several years of time and effort invested in a single domain. However, a recent overview concluded that creativity is neither entirely domain-specific nor domain-general (Sternberg, 2005). The input to the creative process in form of knowledge may be domain-specific, but the processes underlying idea generation, such as combination and reorganization, are more universal processes which are applied to different domains.

The process leading to creative ideas involves a sequential application of divergent and convergent thinking with divergent thinking facilitating the generation of multiple, novel, and original ideas and with convergent thinking facilitating the detection of applicable, correct, and useful ideas (Basadur et al., 1982; Brophy, 1998; Cropley, 2006; Mumford et al., 1991). In our study, we focus on divergent thinking because it constitutes the starting point of the creative process. Through divergent thinking, people produce an initial set of multiple and original ideas that form the basis for subsequent stages of evaluation and refinement. There are different cognitive processes underlying divergent thinking; divergent thinking can be understood as the end result of more specific cognitive processes underlying idea generation, such as application of knowledge, analogical reasoning, conceptual combination/reorganization, or abstraction (Mumford, 2003; Ward, 2007). Divergent thinking reflects an individual's general ability to produce multiple and original ideas (Guilford, 1950; Mumford & Gustafson, 1988). Divergent thinking is considered to be a relatively stable construct (Guilford, 1950); for instance, McCrae et al. (1987) provided evidence that

individual differences in divergent thinking are stable over a 6-year period. People's general ability of divergent thinking is assumed to transfer to more specific domains (Chen, Himsel, Kasof, Greenberger, & Dmitrieva, 2006; Clapham, Cowdery, King, & Montang, 2005).

Accordingly, business owners' divergent thinking should transfer to the specific domain of business and facilitate the generation of business ideas.

**Hypothesis 1:** Business owners' divergent thinking has a positive effect on their level of business idea generation.

Business idea generation, in turn, should be related to venture growth because business ideas are precursors of business opportunities and as such, they are ideas for introducing new products or services to the market (Dimov, 2007; Shane & Venkataraman, 2000). Introducing new products or services is an important source for venture growth. Innovations provide firms a competitive advantage. Introducing new products, services, or processes that had not been introduced before differentiates innovative firms from their competitors and puts them in a superior position for profitability and growth in the market (Porter, 1980). Empirical research shows that a firm's innovativeness (i.e., the tendency to introduce new products, services, or processes, (Lumpkin & Dess, 1996)) is related to growth (Roper, 1997; Rosenbusch, Brinckmann, & Bausch, 2011; Thornhill, 2006). It is important to note that business ideas are the starting point, and it takes considerable effort to develop and fully implement the idea (Carter, Gartner, & Reynolds, 1996; Dimov, 2007; Gartner, 1985). Merely generating ideas without executing them should not lead to venture growth. However, business owners/managers who are better able to generate business ideas should have an advantage over their competitors. Their higher abilities to generate business ideas should give them a better grasp of opportunities resulting in a higher degree of venture growth. More specifically, business idea generation should be related to venture growth because business ideas are the basis for new products, services, or processes that can be introduced to the market and that may provide a competitive advantage. Both upper echelon theory (Hambrick & Mason, 1984)

and small business research suggest that characteristics of the business owner/manager are related to the success of the firm (Baum & Locke, 2004; Baum, Locke, & K. G. Smith, 2001; Frese et al., 2007; Hambrick, 2007; MacKey, 2008; Rauch & Frese, 2007). We therefore hypothesize:

**Hypothesis 2:** Business owners' level of business idea generation is positively related to their venture growth.

We further argue that divergent thinking has an indirect effect on venture growth via business idea generation. We note that besides generating business ideas, there may be other mechanisms through which divergent thinking affects venture growth. In general, divergent thinking helps business owners to deal with various entrepreneurial tasks important for achieving venture growth. For example, divergent thinking contributes to generating novel ideas to increase efficiency, achieve higher levels of product quality, and develop better marketing methods (Basadur, Wakabayashi, & Takai, 1992; Kilgour & Koslow, 2009). Divergent thinking also augments the generation of more ideas for solving problems and overcoming barriers which helps business owners to persist in their goal pursuit (Frese & Fay, 2001; Markman, R. A. Baron, & Balkin, 2005; Zaccaro, Mumford, Connelly, Marks, & Gilbert, 2000). Furthermore, divergent thinking is related to leader performance and successfully leading change in firms (Matthew, 2009; Vincent, Decker, & Mumford, 2002); leadership and leading change are two factors considered to be critical for entrepreneurial success (Antonakis & Autio, 2007). Finally, scholars have argued that divergent thinking helps to generate ideas and images for developing and communicating an effective vision (Matthew, 2009; Strange & Mumford, 2005). Business owners' vision and vision communication, in turn, affect subsequent venture growth (Baum, Locke, & Kirkpatrick, 1998). We examine business idea generation as one mechanism through which divergent thinking has an indirect effect on venture growth because of our study's focus on the first step of the entrepreneurial process. Scholars have noted that the entrepreneurial process starts with

business ideas (Dimov, 2007; Locke & Baum, 2007). We have discussed the function of divergent thinking for generating business ideas. Further, we have hypothesized a relationship between business idea generation and venture growth. Business ideas are the starting point for new products, services, or processes. While divergent thinking is a general characteristic, generating business ideas is more closely related to the successful development of a venture. Business idea generation should, therefore, be one mechanism transmitting an indirect effect of divergent thinking on venture growth (cf. Baron, 2007b).

**Hypothesis 3:** Business owners' divergent thinking has an indirect effect on venture growth through business idea generation.

### *3.2. Divergent thinking, diversity of information, and business idea generation*

Theoretical frameworks on creativity emphasized that creative achievements are not the outcome of a unitary psychological capacity but result from an interaction of personal and contextual factors (Amabile, 1983; Shalley, Zhou, & Oldham, 2004; Woodman & Schoenfeldt, 1990). These theoretical frameworks are situated in the broader framework of person-environment fit theory (Kristof, 1996) and propose that certain contextual factors match individual characteristics, and this match leads to the generation of creative ideas. An important contextual factor for the creative process is information provided by the environment. Information triggers and directs the thought process that leads to the accumulation of ideas (Amabile, 1983; Nijstad, Stroebe, & Lodewijkx, 2003). The important role of information is also acknowledged by entrepreneurship researchers. Shane (2003) noted that "some people are more likely than other people to discover opportunities because they have information that the other people lack" (p. 45). Similarly, Fiet and Patel (2008) argued that it is difficult to understand opportunity identification without including information in the theoretical models. We conceptualize information as facts that are external yet accessible to the entrepreneur (Fiet & Patel, 2008; Shane, 2003). In this sense, information is a contextual concept. Previous research has shown that different environments provide different

information (Kim & Cho, 2009) and that entrepreneurs receive different information depending on the environments they are exposed to (Hills & Shrader, 1998).

Information can be characterized according to two dimensions: quantity and diversity of information (Santanen et al., 2004). Entrepreneurship scholars agree that higher quantity increases the likelihood of identifying a business opportunity (R. A. Baron, 2006; Ucbasaran, Westhead, & Wright, 2008). Entrepreneurship scholars have also argued that constrained information (in contrast to diverse information) is more conducive to opportunity identification. Fiet (2002) has suggested that people should constrain the information they receive and only expose themselves to information from domains they know something about. Fiet (2002) calls the information that fits the prior knowledge “consideration sets”. He argues that consideration sets offer the most promising information for identifying business opportunities because a tight linkage of new information to prior knowledge ensures that the incoming information can be meaningfully interpreted. This line of reasoning is supported by Shane (2000) who showed that prior knowledge is a critical factor for opportunity identification and who also argued that people should mainly look for opportunities in domains they know well. Hence, the recommendation is to restrict the information to a small number of domains thus constraining the diversity of information (Fiet, 2002). Fiet provides evidence for the effectiveness of this approach for the identification of business opportunities (Fiet & Patel, 2008; Fiet, Clouse, & Norton, 2004; Fiet, Nixon, Gupta, & Patel, 2006; Fiet, Norton, & Clouse, 2007)

It is possible to controversially discuss Fiet’s (2002) approach given basic research on creativity which suggests that constrained information has differential effects depending on the stage of the creative process. Constrained information may have beneficial effects, for example, in stages of idea evaluation, but it also has detrimental effects, particularly at stages of idea generation (Ward, 2004; Wiley, 1998). In stages of idea evaluation, constrained information should be beneficial because this stage requires convergent thinking to scrutinize

the potential of ideas and to decide which idea is useful and feasible (Mumford et al., 1991). Convergent thinking relies on making associations within one domain and, therefore, constrained information should facilitate this process (Brown et al., 1998; Coskun, Paulus, Brown, & Sherwood, 2000). However, at initial stages of the creative process when people seek to produce many original ideas, constrained information should have a negative function and diverse information from many different domains should have a positive function for the generation of multiple and original ideas (Mumford et al., 1996). Mumford's process model of creative capacities (Mumford et al., 1991) suggests that the combination of ideas and concepts that stem from various, unrelated domains leads to the generation of multiple and original ideas. Diverse pieces of information drive associational processes into various directions resulting in the generation of more original ideas (Mumford & Gustafson, 1988; Santanen et al., 2004; Ward et al., 1999). Empirical research supports these theoretical notions. For example, attending to a broad and diverse range of information leads to more insights (Seifert, Meyer, Davidson, Patalano, & Yaniv, 1995; Yaniv, Meyer, & Davidson, 1995). Alissa (1972) found that over-inclusion – the tendency to attend to and use a wide range of information, which may be irrelevant at first sight – is associated with creative achievements. Similarly, Mumford and coworkers showed, in a series of studies (Baughman & Mumford, 1995; Mobley, Doares, & Mumford, 1992; Mumford et al., 1996), that diverse information from multiple domains has a positive impact on the generation of original ideas. Similar findings were obtained by research on innovation and entrepreneurship suggesting that diverse input may foster radical innovations (Majchrzak, Cooper, & Neece, 2004) while a systematic search may result in more imitative products or services (B. R. Smith, Matthews, & Schenkel, 2009).

Our study focuses on the initial stage of the creative process. The line of reasoning described above suggests that, in this stage, diverse information should be beneficial for generating business ideas. However, based on an interactionist theory paradigm (Amabile,

1983; Shalley et al., 2004; Woodman & Schoenfeldt, 1990), we argue that integrating personal and contextual factors into a theoretical model of business idea generation further contributes to our understanding of the effects of constrained versus diverse information in the opportunity identification process. We hypothesize that type of information interacts with business owners' divergent thinking in such a way that divergent thinking has a positive effect on business idea generation when there is diverse information but not when there is constrained information. Business owners with high levels of divergent thinking benefit from diverse information because they are able to perform the mental operations that underlie idea generation. The diverse information activates different domains which business owners with high levels of divergent thinking are able to combine or reorganize to generate new and original ideas. Under conditions of constrained information, divergent thinking should lose its positive effect on business idea generation. Under constrained information divergent thinking should not lead to business idea generation because an incoming flow of information from only one domain should fix the thinking of the business owners to this one domain and thus reduce the number of linkages they would usually be able to make between various domains (Runco & Chand, 1995). Thus, constrained information reduces the effect of divergent thinking on business idea generation. Research demonstrates that even very creative people can be constrained in their thought generation to produce only standard solutions when they are confronted with homogeneous information from one specific domain (Perttula & Sipila, 2007). Therefore, there will be a clear relationship between divergent thinking and business idea generation when diverse information is available. In contrast, there should be a low or zero correlation between divergent thinking and business idea generation when business owners receive constrained information. We therefore hypothesize:

**Hypothesis 4:** Diversity of information moderates the relationship between business owners' divergent thinking and business idea generation. In case of diverse information, divergent thinking has a positive effect on business idea generation. In case of



constrained information, the effect of divergent thinking on business idea generation is weakened.

### *3.3. Methodological approach of the study*

We combine two different methodological approaches in our study to test the hypotheses. First, we conduct a correlational field study to investigate how divergent thinking is related to venture growth via generating business ideas (see Panel A of Figure 1). We conduct an experiment manipulating diversity of information to investigate how diversity of information moderates the effect of divergent thinking on business idea generation (see Panel B of Figure 1). The two approaches examine different aspects of the general question of how divergent thinking is related to important entrepreneurial success measures and how diversity of information affects this relationship. The correlational field study was designed to show that divergent thinking is related to venture growth through business idea generation in an externally valid setting. By investigating a mediating mechanism between divergent thinking and venture growth, we are heeding the calls to provide a more detailed analysis of the role that creativity plays in the entrepreneurial process (Dimov, 2007; Zhou, 2008). Furthermore, the externally valid setting provides the basis for arguing that our experimental manipulation may have implications for real venture growth. The experimental design employed here to investigate the hypothesis that diversity of information moderates the effect of divergent thinking on business idea generation allows us to draw causal conclusions. Experiments, however, always bear the question of external validity (Campbell, 1957). Combining the findings from the correlational field study with the experimental findings offers us a way to infer causal effects and, at the same time, to overcome the potentially limited external validity of our experiment. If divergent thinking has an indirect effect on venture growth through business idea generation (correlational field study design) and if diversity of information moderates the effect of divergent thinking on business idea generation (experimental design), this would indicate that exposure to diverse or constrained information may change the

indirect effect of divergent thinking on venture growth through the business idea generation. In this way, the two studies inform each other via the link of business idea generation. Here we would like to note that our study was designed in such a way that we are able to employ the same sample in both designs.

### *3.4. The context of Uganda: Highly entrepreneurial but less creative?*

Uganda is among the countries with the highest entrepreneurial activity. In 2004, about one third of the Ugandan adult population was trying to start a business or had started a business within the last 3.5 years (Walter et al., 2004, 2005). However, Uganda does not just have a very high rate of start-ups but also a high rate of business closures. In 2004, 30% of Ugandan adults reported that they had shut down a business in the previous 12 months (Walter et al., 2005). One reason for this high rate of business closures is that many firms in Uganda and in Africa in general are not as high in their innovative potential as they ought to be (Buame, 1996; Kiggundu, 2002). There is a striking difference between creativity in culture and creativity in entrepreneurship. African culture and tradition is characterized by a highly artistic and creative expression. However, it seems that creative culture is less pronounced in business. When asked for their business ideas, two thirds of Ugandan entrepreneurs indicated that they just copied or intended to copy an existing business concept (Walter et al., 2005). Instead of imitating existing business concepts or developing only small improvements in existing products or services, business owners should also be oriented towards introducing innovations that are more unique – at least in their local contexts (Ngowi, Iwisi, & Mushi, 2002). Such unique innovations should provide a stronger competitive advantage and, accordingly, contribute more to business success (Ahuja & Lampert, 2001; Kirchoff, 1991). Generating original business ideas may form the basis for coming up with more unique innovations (Shepherd & DeTienne, 2005). Thus, empirical evidence on the generation and functioning of original business ideas is particularly important in this context.

## **4. Method**

#### *4.1. Sample*

The sample consists of 98 small business owners/managers from Kampala and surrounding suburbs. A power analysis using standard conventions for Type-I ( $\alpha = .05$ ) and Type-II error ( $\beta = .20$ ) (Cohen, 1988) and an effect of size of  $f^2 = .20$  based on previous experimental research in entrepreneurship (Shepherd & DeTienne, 2005) indicated that 80 degrees of freedom should lead to significant results. Therefore, our sample size should be sufficient to avoid Type-II errors (accepting a false null hypothesis) in statistical testing. To meet the definition of a small business owner/manager, the participants had to fulfill the following criteria to be included in the sample: The participants had to run the business for at least one year, they must have started their business themselves, and they had to have between one and 50 employees (Mead & Liedholm, 1998). To recruit participants for our study we contacted the three main organizations for the development of small business in Kampala (the Uganda National Chamber of Commerce, the Uganda Small Scale Industries Association, and the Private Sector Foundation) and were provided with listings of their members. Further contacts were taken from public business directories. From the listings we produced one total list of potential participants who were randomly called to arrange an appointment for an interview. Altogether, we contacted 148 potential participants. The response rate was 66%. Of the total sample, 68% were male. The average age of the participants was 42 years, their average starting capital was 323,000 Uganda Shilling (approximately 180 USD), and they employed 13 people on average. Of our sample, 58% were in the manufacturing sector and the remaining 42% in the service sector.

#### *4.2. Procedure*

All data were collected on the basis of face-to-face interviews. The interviews were conducted by two German graduate students in their final year who had received a thorough interviewer training on interview techniques, note taking, and avoiding typical interviewer errors (e.g., nonverbal communication). During the interview the participants received a task

to generate business ideas. The task is based on a hypothetical scenario stating that the trend of lifelong learning is on the rise in Uganda (see Appendix A). According to the scenario, people are increasingly willing to privately finance their own and their children's continuing education which implies an opportunity for making profit. We administered the scenario using the following two-step approach: First, all participants received the same basic scenario and were asked to generate as many business ideas as possible to profit from the new trend. In this step, the generated business ideas were not affected by any experimental manipulation. We used the business ideas generated before the experimental manipulation to investigate how business idea generation is related to venture growth. Second, when participants stopped generating ideas for new products or services, they received additional pieces of information (see Appendix B). The additional pieces of information constituted the experimental manipulation. Before each interview, participants were randomly assigned to one of two groups. One group received diverse information, the second group constrained information. In sum, all participants received four additional pieces of information. After each piece of information they were again asked whether any idea for a new product or service came to the mind. We used participants' answers in response to the additional pieces of information for our measure of business idea generation after the experimental manipulation. We used this measure to investigate how diversity of information affects the relationship between divergent thinking and business idea generation.

To generate the two different sets of diverse and constrained information we followed the approach suggested by Nijstad and Stroebe (2006) to classify ideas or information as conceptually similar or distinct. We developed a category system for our task by testing the same scenario stated above in a pilot study with 18 business owners and four MBA students. Based on their ideas how they would try to profit from the emerging trend we constructed a two-dimensional category system. The first dimension covers different goals. The second dimension covers different means to achieve the goals. An example for a goal is "educate

older people” and an example for a mean is “learning networks”. In the pilot study we identified six different goals and 11 different means. We crossed the goals and the means, deriving a goal-by-means matrix with 66 different categories. Each idea from the pilot study was assigned to one category. From these ideas we constructed our sets of diverse and constrained information (see Appendix B). An example is “Starting a training center which provides specialized courses for senior citizens”. Diversity is represented by the number of different categories used across different means and goals (Nijstad & Stroebe, 2006). Therefore, for our set of constrained information, we used ideas from categories covering the same goal whereas our set of diverse information contained ideas from four different categories covering different goals and means. Following Nijstad and Stroebe (2006), we presented the additional pieces of information in the form of ideas of other people.

On average, the interview lasted 109 minutes. Open questions were tape-recorded and subsequently transcribed. The transcripts were then used for the ratings of the participants’ answers. The answers were rated by two independent raters. We computed intraclass coefficients (ICC; Shrout & Fleiss, 1979) to assess interrater reliabilities. All coefficients ranged between .78 and .99, indicating good interrater reliabilities.

### 4.3. Measures

*4.3.1. Divergent thinking.* To measure divergent thinking we used the consequences test developed by Christensen, Merrifield, and Guilford (1953). We chose the consequences test because it proved to be valid in an occupational setting (Mumford, Marks, Connelly, Zaccaro, & Johnson, 1998). Participants were asked to list all potential consequences of four different statements. An example statement is “*What would be the results if suddenly no one could use their arms or hands?*”. Together with each statement, four standard answers were also provided as examples for the participants. When the participants stopped generating consequences, they received the next statement. According to the scoring procedure developed by Mumford and colleagues (1998), the answers were rated for fluency (number of

ideas) and flexibility (different topics covered by the participant). Fluency is operationalized as the number of responses that are not identical to other responses or to the four standard answers. Interrater reliabilities (ICCs) for the fluency ratings for the four statements ranged between .98 and .99. The four ratings were aggregated to one fluency score (Cronbach's alpha = .86). Flexibility is operationalized as the number of different topics. Responses that have an underlying core theme belong to one topic. Interrater reliabilities (ICCs) for the flexibility ratings were good, ranging between .84 and .93. The four ratings were aggregated to one flexibility score (Cronbach's alpha = .81). We computed a score for divergent thinking by summing the fluency and flexibility scales, a strategy which was justified by an internal consistency of .91 for the two variables.

*4.3.2. Business idea generation before manipulation.* During the interview we presented a hypothetical scenario which stated that lifelong learning is a new trend in Uganda and people are becoming increasingly willing to privately finance their own and their children's education (see Appendix A). After presenting the scenario, we asked the participants to come up with ideas for new products or services to start a new business or to extend their existing one. We explicitly told the business owners that their ideas may or may not be related to their current businesses. To make sure that the participants generated business ideas, we asked them to list ideas for potential new products or services they could introduce. Whenever a presented idea did not clearly refer to a new product or service, the interviewers used prompts or probed the answer to find out whether the participant had a product or service in mind. Ideas that were too general and not making any statement about a new product or service were not counted. Note that for this measure we used only the set of business ideas that the business owners generated in response to the basic scenario without any experimental manipulation. As this measure is independent of the experimental manipulation, it is also a baseline measure of generating business ideas in response to the basic scenario.

The focus of our study is on divergent thinking which constitutes the part of creativity in which many and original ideas are generated. We, therefore, examine the number and originality of business ideas generated by our participants. We did not include measures of usefulness or feasibility because these measures are outcomes of subsequent selection processes facilitated by operations of convergent thinking. For our measure of number of generated business ideas we counted the number of nonredundant business ideas. Interrater reliability was good (ICC = .89). For our measure of generating original business ideas we used a four-point scale with anchors for each point that was developed by Dean and colleagues (2006). The anchors are (1) common, mundane, or boring business ideas, (2) somewhat interesting business ideas and not obvious on first sight, (3) unusual business ideas that show some imagination, and (4) rare, unusual, ingenious, imaginative, or surprising business ideas. The interrater reliability of the originality rating was good (ICC = .85).

In addition to the number and originality ratings, we rated the diversity of generated business ideas to be able to conduct a manipulation check for our experiment. To rate the diversity of business ideas we used the goals-by-means matrix developed during our pilot study (see above-mentioned description of procedure). The matrix allowed us to rate each business idea into a specific category of the matrix. The number of different categories covered by a participant represents the measure of diversity. This standardized procedure resulted in a good interrater reliability for this measure (ICC = .84).

*4.3.3. Business idea generation after manipulation.* When participants stopped generating business ideas in response to the basic scenario, they received additional pieces of information (cf. Santanen, Briggs, & De Vreede, 2004). After each piece of new information (see Appendix B), they were again asked whether they could come up with business ideas for new products or services. In total, they received four additional pieces of information (see also description of procedure). Again, only business ideas that referred to a new product or service were used in our further analyses. We rated the business ideas generated after the

manipulation for number, originality, and diversity. We used the same rating procedures as for business idea generation before the manipulation. The interrater reliabilities for the three measures were good (number: ICC = .83; originality: ICC = .82; diversity: ICC = .78).

*4.3.4. Diversity of information.* As described in our procedure, when participants stopped generating ideas for the first time, they received additional pieces of information. Specifically, they either received four pieces of information that were constrained (i.e., only from categories with the same goal as delineated in our goals-by-means matrix developed in the pilot study) or diverse (i.e., from four different categories with different goals and means from our goals-by-means matrix). Thus, we created two experimental groups by manipulating the set of information participants received in each group (constrained vs. diverse). Nijstad and Stroebe (2006) showed that manipulating the set of information that participants receive is a valid approach to cognitively stimulate people to access different domains in an idea generation task. In their study, presenting diverse information increased the accessibility of more different domains, and presenting constrained information resulted in accessing fewer domains (Nijstad & Stroebe, 2006).

*4.3.5. Venture growth.* In the interview, we asked participants for the percentage increase or decrease of profits, sales, and customers during the last three years (2004-2007) (Krauss, Frese, Friedrich, & Unger, 2005). We computed the yearly average of increase or decrease for each indicator. For businesses less than three years old, yearly averages for either one or two years were computed. Subsequently, we summed up the three indicators to one scale of venture growth (Cronbach's alpha = .87). We had to rely on subjective estimates made by the business owners because in small businesses it is generally difficult to ascertain exact objective performance data (Daniels, 1999; Sapienza, K. G. Smith, & Gannon, 1988). This is particularly true in the African context where standard procedures of bookkeeping are not commonly used or do not reflect a valid indicator of the actual performance (McPherson, 1998; Shinder, 1997). Our approach to measure venture growth is in line with other research



in similar contexts (Frese et al., 2007; Krauss et al., 2005; Unger, Keith, Hilling, Gielnik, & Frese, 2009).

*4.3.6. Controls.* The following controls were measured to rule out third variable effects. First, we controlled for cognitive ability because there is a debate that divergent thinking is only a facet of general cognitive ability (cf. Runco, 2004). We measured cognitive ability using the short version of the Raven Advanced Progressive Matrices Test (Arthur & Day, 1994). This test proved to be valid in general and also for the African setting (Rushton, Skuy, & Ann Bons, 2004). We further controlled for business owners' gender, age, education (scale of z-standardized number of years in school and highest degree of formal education), entrepreneurial experience in terms of prior business start-ups, and line of business. Finally, in our analyses regarding venture growth, we additionally controlled for business size, because size and growth might be negatively related due to decreased growth rates of larger companies (Hart & Oulton, 1996). We measured business size by the number of employees.

## **5. Results**

### *5.1. Manipulation check*

To test whether our manipulation was successful, we conducted a t-test between the two experimental groups for the diversity of generated business ideas before and after the participants received the additional information. Before the participants received the additional information there should be no statistical difference in diversity of generated business ideas because the stimulus material was identical in both groups. There should be, however, a statistical difference in the diversity of generated business ideas after the participants received the additional information (constrained vs. diverse) if our manipulation was successful. The statistical analyses revealed this pattern of results. Whereas the diversity of generated business ideas showed no statistical difference between the two groups before the manipulation ( $t = -1.24; p = .22$ ), we found a statistically significant difference between

the diversity of generated business ideas for both groups after the participants received the different information sets ( $t = 2.00$ ;  $p < .05$ ).

### 5.2. Descriptive statistics and intercorrelations of study variables

Table 1 shows the descriptive statistics and zero-order correlations for the variables used in the present study. The descriptive statistics for business idea generation reveal that, on average, the business owners produced only 1.66 ideas, and the originality ratings indicated that, on average, most ideas were common, mundane, or only somewhat interesting ( $M = 1.63$ ). The zero-order correlations between divergent thinking and the measures of business idea generation were all positive and significant indicating a beneficial effect of divergent thinking for generating multiple and original business ideas (number before manipulation:  $r = .28$ ;  $p < .05$ ; originality before manipulation:  $r = .47$ ;  $p < .01$ ; number after manipulation:  $r = .40$ ;  $p < .01$ ; originality after manipulation:  $r = .23$ ;  $p < .05$ ). With respect to the measures of business idea generation, both measures of originality were positively and significantly correlated with venture growth (before manipulation:  $r = .29$ ;  $p < .01$ ; after manipulation:  $r = .27$ ;  $p < .05$ ).

### 5.3. Test of hypotheses

Before we tested our hypotheses, we inspected the variance inflation factor (VIF) for each predictor variable to check for multicollinearity. In all cases, the VIFs were below the value of two indicating that multicollinearity was not an issue (O'Brien, 2007). Hypothesis 1 states that divergent thinking is positively related to business idea generation and it was supported by the present data. Table 2 reports the results of the hierarchical regression analyses. In the first step, we included the controls which explained 8% of the variance in number and 11% of the variance in originality of generated business idea. In the second step, we entered divergent thinking which explained an additional 7% of the variance in number and 16% in originality. In both cases, the betas were positive and significant (number:  $\beta = .27$ ,  $p < .05$ ; originality:  $\beta = .41$ ,  $p < .01$ ).

Hypothesis 2 states that business idea generation is positively related to venture growth and this hypothesis was supported for originality of generated business ideas. Table 3 presents the results. Originality of generated business ideas was positively related to venture growth alone (Model 3:  $\beta = .33, p < .01$ ) and in combination with the number of generated business ideas (Model 4:  $\beta = .38, p < .01$ ). Number of generated business ideas was not related to venture growth. Our findings suggest that only being able to generate a large number of business ideas is not related to venture growth; rather to experience higher growth rates, it is important to be able to generate original business ideas.

To test whether divergent thinking has an indirect effect on venture growth through the business idea generation (Hypothesis 3), we used the bootstrapping method suggested by Preacher and Hayes (2004). This method has several advantages over the causal step approach specified by Baron and Kenny (1986) or Sobel's (1982) test of indirect effects. The bootstrapping approach can be used even when the sample size is small, it is independent of a nonnormal distribution of the indirect effect, and it has a better power to detect real effects (MacKinnon, Lockwood, Hoffman, S. G. West, & Sheets, 2002; Shrout & Bolger, 2002). Regarding the number of generated business ideas as the intervening variable, the bootstrapping result showed that the 95% confidence interval contained zero (indirect effect: .01; lower level: -.046; upper level: .035) indicating that divergent thinking did not have an indirect effect on venture growth through the generation of a high number of business ideas. Regarding originality of generated business ideas as the intervening variable, the bootstrapping result showed that the 95% confidence interval around the indirect effect did not contain zero (indirect effect: .18; lower level: .029; upper level: .407) indicating that divergent thinking had an indirect effect on venture growth through the generation of original business ideas. Thus, Hypothesis 3 was partially supported for the generation of original business ideas as the intervening variable.

Hypothesis 4 states that diversity of information moderates the relationship between divergent thinking and business idea generation. The hypothesis was supported by the data. We calculated hierarchical regression analyses using number and originality of generated business ideas after the manipulation as dependent variables. To have a baseline for generated business ideas before the manipulation we included the respective measures in the model. Table 4 shows that business idea generation before the manipulation predicted significantly business idea generation after the manipulation (number:  $\beta = .52, p < .01$ ; originality:  $\beta = .39, p < .01$ ). Entering divergent thinking and diversity of information into the model (Model 2) explained an additional 7% of the variance in number and an additional 1% of the variance in originality of generated business ideas after the manipulation. Only divergent thinking with regard to number of generated business ideas was significant ( $\beta = .21, p < .05$ ). In the final model (Model 3), we included the interaction term which we computed by multiplying the mean centered variables of divergent thinking and diversity of information (Aiken & S. G. West, 1991). The interaction term was negative and significant for both measures of business idea generation (number:  $\beta = -.19, p < .05$ ; originality:  $\beta = -.29, p < .01$ ). We followed Aiken and West (1991) to display the nature of the interactions (see Figure 2 and Figure 3). There was a strong relationship between divergent thinking and number of generated business ideas for diverse information. For constrained information the relationship between the two variables was weaker. Simple slope analyses (Jaccard, Wan, & Turrisi, 1990) revealed that the slope for diverse information was significant ( $t = 3.32, p < .01$ ) whereas the slope for constrained information was not ( $t = 0.61, ns.$ ). We found a similar pattern for originality of generated business ideas. There was a strong relationship between divergent thinking and originality of generated business ideas in case of diverse information while the relationship was weaker (and slightly negative) for constrained information. Simple slope analyses showed that in case of diverse information the slope was significant ( $t = 2.15, p < .05$ ) while the slope for constrained information was not ( $t = -1.49, ns.$ ).

#### 5.4. *Additional analyses to control for common method variance*

The design of our study might be susceptible to biases due to common method variance. We used a single source to obtain data on divergent thinking, business idea generation, and venture growth. To control for common method variance, we followed recommendations by Podsakoff et al. (2003). We used structural equation modeling to test whether the relationships between divergent thinking, originality of generated business ideas, and venture growth remained significant when we included an unmeasured latent method factor loading on the indicators of the three construct. We also included the control variables in the model. The model showed a good model fit ( $\text{Chi}^2(68) = 79.96$ ,  $\text{RMSEA} = .06$ ,  $\text{CFI} = .95$ ,  $\text{SRMR} = .09$ ). The model with the unmeasured latent method factor had a significantly better model fit than the model without the unmeasured latent method factor ( $\text{Chi}^2$  difference (7) = 17.72,  $p < .05$ ). However, in the model with the unmeasured latent method factor, the path coefficients of the relationships between divergent thinking and originality of generated business ideas ( $\beta = .53$ ,  $p < .01$ ) and between originality of generated business ideas and venture growth ( $\beta = .27$ ,  $p < .05$ ) remained significant, indicating that common method variance does not fully explain our findings.

## 6. Discussion

### 6.1. *Interpretation of the link between divergent thinking, business idea generation, and venture growth*

We found that divergent thinking had a positive indirect effect on venture growth through the generation of original business. So far, the entrepreneurship literature identified several factors such as cognitive mechanisms (R. A. Baron, 1998; Mitchell et al., 2007), human and social capital (Davidsson & Honig, 2003; Unger, Rauch, Frese, & Rosenbusch, in press), or personality characteristics (Rauch & Frese, 2007; Zhao & Seibert, 2006) that influence success in the different phases of the entrepreneurial process. Surprisingly, little research has been conducted on the role of creativity and divergent thinking in the

entrepreneurial process, and the existing empirical results are mixed (Dimov, 2007; Zhou, 2008). The lack of explicit and focused research might be due to a general consensus that creativity and divergent thinking are conducive to entrepreneurship. Our findings suggest that divergent thinking is indeed related to entrepreneurial success, but a more fine-grained perspective is necessary to understand how and when divergent thinking exerts an influence on different measures of entrepreneurial success. We found that divergent thinking had a direct effect on the generation of many and original business ideas but it was not directly related to venture growth. The effect of divergent thinking on venture growth was indirect through the generation of original business ideas. The finding that the direct effect on venture growth is nonsignificant is in line with other research (e.g., Heunks, 1998). The results suggest that divergent thinking has direct effects in the beginning of the entrepreneurial process when key tasks include generating many and original business ideas. The effect of divergent thinking is indirect and transmitted by the generation of original business ideas in the phase of operating the venture. The findings support theoretical notions that entrepreneurs' cognitions contribute to explaining entrepreneurial success insofar as the cognitions are closely related to the key tasks of the entrepreneurial process (R. A. Baron, 2007b; Rauch & Frese, 2007). In our study, the significant indirect effect shows that the high levels in divergent thinking are not generally related to higher venture growth; business owners with higher levels of divergent thinking may achieve higher venture growth only if they use their divergent thinking to generate original business ideas.

The positive relationship between the generation of original business ideas and venture growth is in line with research suggesting that the originality of business ideas is an important indicator for the financial potential of business ideas (Fiet, 2002; Shepherd & DeTienne, 2005; Ucbasaran et al., 2008). More original ideas might result in more unique innovations which are an important factor for sustained venture growth (Ahuja & Lampert, 2001; Kirchoff, 1991). However, applying an interactionist perspective in this context may also

provide a more thorough understanding of the function of original business ideas for venture performance. For example, research showed that business concepts based on more radical ideas were not generally beneficial for success in firms; the positive effect was contingent on the level of competition and dynamism in the economic environment (Nerkar & Shane, 2003; Zahra & Bogner, 2000). Thus, the relationship between the generation of original business ideas and venture growth is likely to depend on further contextual factors.

We did not find that the number of generated business ideas was related to venture growth. This finding suggests that simply generating a lot of business ideas is not beneficial for venture growth. Although research showed that generating a large amount of ideas increases the likelihood of generating original ideas (Simonton, 1989), generating a large number of business ideas might lead to overextension, with business owners/managers working on too many business opportunities at the same time. Business owners/managers might direct their efforts towards too many opportunities and thus fail to fully exploit any one opportunity. Furthermore, the wasted resources might even lead to lower levels of venture performance. In conclusion, there may be positive as well as negative effects of generating a large number of business ideas which leads, overall, to a weak relationship with venture growth. An alternative explanation would be that the relationship between generating a large number of business ideas and venture growth is also contingent on contextual factors. In some industries the number of new ideas and innovations may be beneficial while in other industries it may be detrimental for performance. For example, in more artistic industries the relationship may be positive (Simonton, 1997) while in more conservative contexts the relationship may be negative (McKee, Varadarajan, & Pride, 1989).

## *6.2. Interpretation of the interplay between divergent thinking and diversity of information*

We investigated the combined effects of the personal factor of divergent thinking and the contextual factor of diversity of information on business idea generation. We found that the positive impact of divergent thinking on business idea generation was contingent on the

diversity of information. When provided with diverse information, we found a strong positive relationship between divergent thinking and business idea generation. Providing business owners with constrained information led to a weaker relationship between divergent thinking and business idea generation. These findings contribute to an emerging stream of research that emphasizes the importance of taking into account joint effects of personal and contextual factors to further enhance the predictive validity of our theoretical models (Brigham & De Castro, 2003; Brigham et al., 2007; Hmieleski & R. A. Baron, 2009; Markman & R. A. Baron, 2003). Specifically, our findings suggest that diversity of information is a factor that enhances the positive effect of divergent thinking in the opportunity identification process. So far, research dealing with the factor information mostly concentrated on a main effect of amount of information on opportunity identification (Busenitz, 1996; Kaish & Gilad, 1991; Ucbasaran et al., 2008; Westhead, Ucbasaran, & Wright, 2009). We add to this approach by offering new insights that go beyond simple main effects and by investigating the characteristic of diversity of information as an important factor that influences the extent to which business owners/managers can make use of their divergent thinking to generate business ideas.

The interactionist perspective, with the focus on diversity of information, also aimed to inform the entrepreneurship literature about the type of information that is beneficial for opportunity identification. Existing theoretical frameworks in the entrepreneurship literature recommend acquiring constrained information (Fiet, 2002, 2007). Our results show that constraining information weakens the positive effect of divergent thinking on the generation of multiple and original business ideas. This finding supports theoretical models from basic research on creativity that diverse information promotes generating many and original ideas (Mumford et al., 1991; Ward, 2004). However, constraining information may not be detrimental in general. From the creativity literature it follows that constrained information may have beneficial effects at evaluation stages of the creative process. At evaluation stages,



ideas are selected with respect to their usefulness and feasibility. The proper evaluation of ideas is enhanced by an in-depth understanding of relevant restrictions and principles of the context to which the idea will be applied (Lonergan, Scott, & Mumford, 2004). Constraining information and focusing on information about the specific context should help in developing an in-depth understanding to properly evaluate generated ideas. Furthermore, convergent thinking to evaluate an idea relies on making associations within one domain to identify a correct and applicable idea or solution (Brown et al., 1998; Coskun et al., 2000). Constraining information to the relevant domain should thus support idea evaluation because constrained information helps people to make associations within only one domain or in directly adjacent domains thus sticking to a narrow range of relevant information (Cropley, 2006).

In line with Dimov (2007) and several other scholars in the entrepreneurship domain (R. A. Baron, 2007a; Singh, Hills, & Lumpkin, 1999), we think that entrepreneurship literature would benefit from regarding opportunity identification as a process that starts with the generation of business ideas and continues with the development of these ideas into business opportunities. Creativity should play an important role in this process (Ward, 2004). We focused on divergent thinking as one part of creativity. Another important part of creativity is the refinement and development of these ideas which is facilitated by processes of convergent thinking. Future research could investigate the role of divergent and convergent thinking as well as of constrained and diverse information in an integrative fashion. Recent theoretical frameworks suggested that people have to deal with conflicting demands, such as divergent and convergent thinking, to successfully generate and implement new ideas (Bledow, Frese, Anderson, Erez, & Farr, 2009). Research showed that people's ability to deliberately switch between divergent and convergent thinking predicted success of self-employed inventors (Wolf & Mieg, 2010). Similarly, switching between seeking diverse and constrained information at different stages of the opportunity identification process may further contribute to generating a large pool of original ideas and retaining those ideas that are useful (Bledow et

al., 2009). By splitting the opportunity identification process into several parts and examining in detail the idea generation part, we were able to build upon existing theories from the creativity literature. We were thus able to gain a better understanding of the effect that divergent thinking exerts in the opportunity identification process and why diverse or constrained information might enhance or restrict this effect. Similar studies examining in more detail the opportunity identification process would enhance our understanding of the conditions and the stages in which different types of thinking and information exert beneficial or detrimental effects.

### *6.3. Strengths and limitations*

The design of our correlational field study on the relationship between divergent thinking, business idea generation, and venture growth has some limitations. We used a cross-sectional design to study the relationship between business idea generation and venture growth. We argued that business idea generation leads to higher venture growth. A reverse causal direction of the relationship may also be possible. We cannot rule out this interpretation of our results. However, our interpretation of an effect of business idea generation on venture growth is in accordance with current theories in the entrepreneurship literature (R. A. Baron, 2007a; Ward, 2004). Additionally, individual differences in divergent thinking are relatively stable over time (McCrae et al., 1987). Therefore, we think that our hypothesized direction is in line with real-world phenomena.

Furthermore, our measure of venture growth was based on business owners' subjective estimates about their growth rates. The alternative would be to obtain more objective data, for example, accountancy-based measures. Yet it is important to note that accountancy-based measures also include subjective assumptions, for example, about the cost of stock (T. Smith, 1996). Similarly, performance measures (e.g., profit) might be deliberately manipulated for tax reasons (Sapienza et al., 1988). Particularly in the African context, business owners include personal expenses in their financial records to reduce business income tax (Bradford,

2007). Additionally, many smaller enterprises in Africa, but also elsewhere, do not keep appropriate and continuous financial records (Shinder, 1997; Wall et al., 2004). We, therefore, relied on estimates by the business owners who have, in general, a comprehensive overview of the performance of their businesses. Our approach is justified by research that showed that managers' and chief executives' estimates about the performance of their companies have convergent and construct validity and that the use of subjective measures of performance does not lead to erroneous conclusions (Wall et al., 2004). Using subjective measures of performance might also lead to common method biases. To test whether common method biases affected our relationships, we computed a model with an unmeasured latent method factor. The model with the unmeasured latent method factor yielded a significantly better model fit than a model without this factor indicating that there was a common factor underlying our measures of divergent thinking, business idea generation, and venture growth. However, and more importantly, the hypothesized relationships remained significant when we included the unmeasured latent method factor in our model suggesting that common method variance did not fully account for our significant findings.

We investigated the interaction between divergent thinking and diversity of information using an experimental design which questions the external validity of our findings. Future studies have to replicate these findings in a more natural setting to provide evidence for the external validity and generalizability of our findings. Yet despite the potential disadvantages of experiments regarding the external validity, we consider the experimental design to be a strength of our study. Our manipulation heightens the internal validity of the study and our experiment allowed us to draw causal conclusions. We also note that our measures of business idea generation focused only on number and originality of business ideas leaving out aspects of usefulness which are a defining characteristic of creative ideas (Hennessey & Amabile, 2010). Furthermore, our measures of business idea generation were based on only one scenario. Using more scenarios that deal with different topics would have reduced the

influence of domain specific knowledge. However, our participants were randomly assigned to the two groups. This means that we can assume that the domain specific knowledge was similar in both groups. Therefore, our experimental findings should not be affected by the fact that we used only one scenario. Furthermore, it is important to note that our scenario was not designed to be specific to the area of expertise of our participants. We were interested in the interaction between diversity of information and business owners' levels of divergent thinking. However, information constrained to the specific domains of expertise might have beneficial effects for individuals with deep knowledge in these domains while diverse information might be more beneficial for people with broader and more general knowledge. A deep knowledge base may provide the basis for deep exploration triggered by constrained information which could then also lead to the generation of original ideas (Stroebe, Nijstad, & Rietzschel, 2010). Future studies could investigate the interplay between divergent thinking, depth of domain knowledge, and type of information to shed further light on the question of what type of information may be particularly helpful under which conditions to promote opportunity identification.

A limitation might be the sample in our study. We acknowledge that the results can strictly be generalized only to the population of Ugandan business owners/managers located in the wider area of Kampala. Additionally, our results can only be generalized to surviving small businesses. Our focus on existing business owners/managers allowed us to investigate the relationship between business idea generation and venture growth; however, this also means that our sample might suffer from survivor bias because we only included business owners/managers in our sample who managed businesses that survived. Nonetheless, this might be less of a problem in the setting of Uganda because 57% of the business owners who close down a business intend to open up a new business, and 37.5% actually start a new one within a 12-month period (Walter et al., 2005). Thus, it is difficult to draw a clear distinction

between survivors and business owners who failed in Uganda, and it is likely that our sample did not include only those particularly successful business owners.

One might argue that business owners took part in the study because of motives other than supporting the research project leading to response biases, such as social desirability or acquiescence. However, we think that our results are not affected by such response biases. We measured divergent thinking and business idea generation by asking the business owners to generate as many and original consequences and ideas as they could. The responses were subsequently rated by two independent raters. This approach makes it difficult for the respondents to fake and to present themselves in a better light. Additionally, we used a measure of venture growth that correlated significantly with objective measures of performance in similar settings indicating that this measure is not substantially biased (Frese et al., 2007).

#### *6.4. Practical implications and conclusions*

Combining the findings from our correlational field study with the experimental findings offers some practical implications for current and future business owners/managers. Business owners/managers who generate more original ideas are more successful in terms of venture growth. At the same time, we were able to change their levels of business idea generation by giving them constrained or diverse information. This leads to the conclusion that business owners/managers high in divergent thinking may enhance their venture growth through the generation of original business ideas by exposing themselves to diverse information. In contrast, if they expose themselves only to constrained information, they should generate less original business ideas which may eventually lead to lower growth rates. People's individual levels of divergent thinking are relatively stable (Guilford, 1950; McCrae et al., 1987). Thus, it is possible to assess and inform business owners about their levels of divergent thinking to avoid potential mismatches between their levels of divergent thinking and the type of information they seek to generate business ideas. Our study shows that it is

important to consider between-person differences among current and future business owners/managers when giving recommendations regarding the type of information that optimizes the chances of identifying business opportunities. A constrained search may have some advantages (cf. Fiet, 2002), but it may also restrict the positive effects of divergent thinking on generating multiple and original business ideas. Current and future business owners/managers could expand their considerations sets depending on their individual levels of divergent thinking. Business owners/managers high on divergent thinking could actively seek out environments that provide more diverse information. Actively seeking environments or sources that provide diverse information should avoid mismatches between high levels of divergent thinking and constrained information. Business owners high in divergent thinking could be made aware of the different sources of information that provide diverse information useful for opportunity identification (cf. Hills & Shrader, 1998; Kaish & Gilad, 1991; Ucbasaran, Westhead, & Wright, 2008).

Furthermore, business owners/managers have to come up with original business ideas to stimulate venture growth. Our results suggest that ordinary ideas, for example, by copying or imitating ideas from competitors, are not sustainable sources for venture growth. Particularly in Uganda, where most of the entrepreneurs indicate that their business ideas are based on existing products or services (Walter et al., 2005), current and future business owners/managers should be educated to strive for nonstandard, novel, and extraordinary business ideas.

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## **Appendix A**

Hypothetical scenario on new lifelong learning trend in Uganda

### **Lifelong learning in Uganda**

You are watching the news on TV and you hear that nowadays skills and competencies become more important. There is still room for improvement in the education system in Uganda. Although it rather seems to be a governmental or political issue, the news say that this is a huge new market with a big profit potential because people are more and more willing to pay privately for their own and their children's education. Lifelong learning is the new trend.

What business ideas come to your mind? Please list as many business ideas for new products or services as possible. The ideas may or may not be related to your current business.

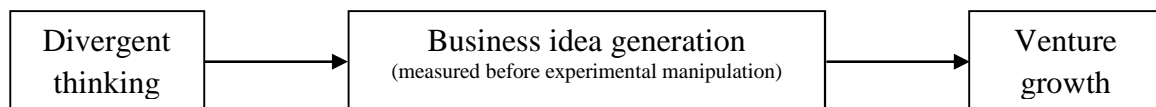
## Appendix B

Constrained and diverse information used in the study

<b>Constrained information</b>	<b>Diverse information</b>
1. Founding mechanical schools.	1. Offering after-work refresher courses.
2. Developing a program that combines university with the job.	2. Developing learning board games for kids.
3. Starting a training center which provides on-the-job training.	3. Starting a training center which provides specialized courses for senior citizens.
4. Founding an internship agency to foster job skills.	4. Establishing an Internet platform where people can exchange knowledge.

Fig. 1. The hypothesized indirect effect of divergent thinking on venture growth through business idea generation (Panel A) as well as the interaction effect of divergent thinking and diversity of information on business idea generation (Panel B).

Panel A (Correlational field study)



Panel B (Experimental design)

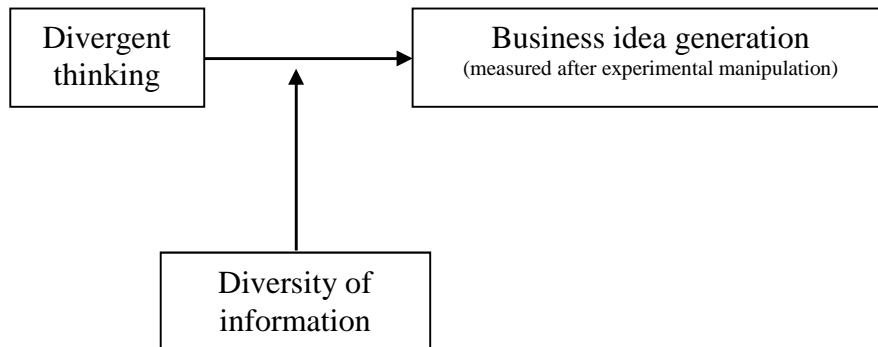


Fig. 2. Relationship between divergent thinking and number of generated business ideas moderated by diversity of information.

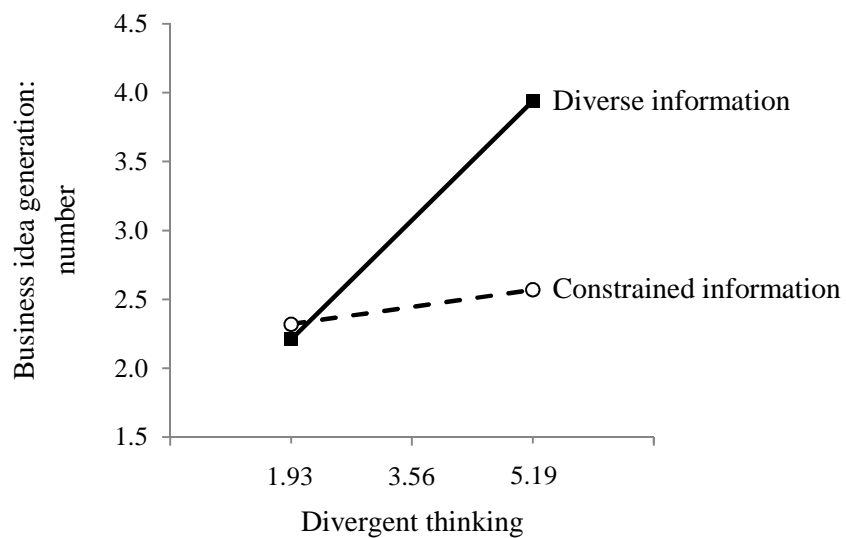


Fig. 3. Relationship between divergent thinking and originality of generated business ideas moderated by diversity of information.

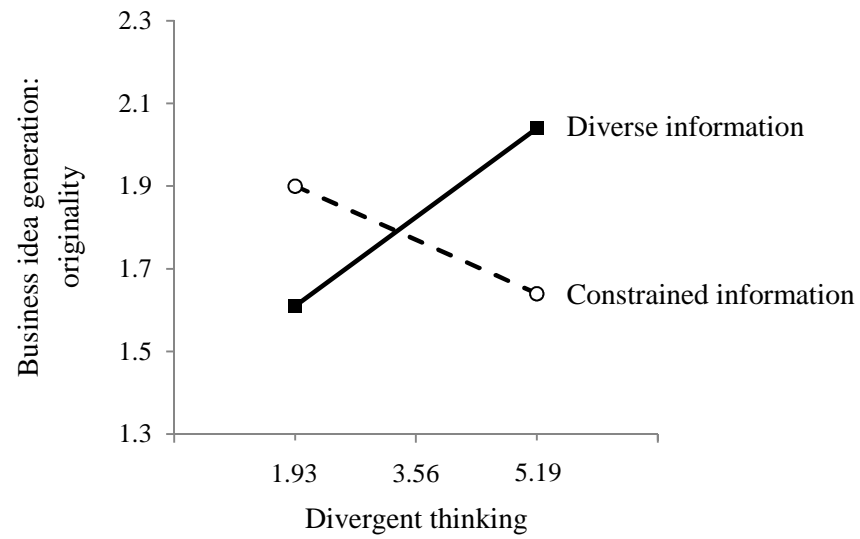


Table 1. Descriptive statistics and zero-order correlations.

Variables and Scales	Mean	s.d.	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Divergent thinking	3.56	1.63	(.91)												
2. Diversity of information <sup>a</sup>	0.47	0.50	-.06	-											
3. Business idea generation before manipulation: number	1.66	1.94	.28*	.21*	(.89)										
4. Business idea generation before manipulation: originality	1.63	0.78	.47**	.02	.37**	(.85)									
5. Business idea generation after manipulation: number	2.78	1.87	.40**	-.10	.54**	.27*	(.83)								
6. Business idea generation after manipulation: originality	1.83	0.60	.23*	-.09	.26**	.44**	.52**	(.82)							
7. Venture growth	23.29	27.46	.00	-.17	.04	.29**	.06	.27*	(.87)						
8. Cognitive ability	0.36	0.21	.21*	-.14	-.09	.21*	.07	.27*	.17	(.68)					
9. Business owners' age	41.56	11.72	-.10	.10	-.20*	-.02	-.22*	-.14	-.09	.03	-				
10. Gender <sup>b</sup>	0.32	0.47	.05	.02	.02	-.02	.08	.01	-.05	-.12	.08	-			
11. Education	0.00	0.91	.18	-.07	.24*	.30**	.31**	.31**	.12	.19	-.34**	-.25*	(.80)		
12. Entrepreneurial experience	0.70	1.06	-.06	.03	-.02	-.09	.11	.08	.14	.11	.03	-.19	.06	-	
13. Business size	10.57	11.76	-.09	.11	.01	.03	-.04	.06	.15	.06	.10	-.22*	.07	-.08	-
14. Line of business <sup>c</sup>	0.58	0.50	-.19	-.07	-.03	-.19	-.15	-.21*	-.04	-.30**	.14	.04	-.35**	-.10	.04

Note: In parentheses: reliability of the measure (ICC or Cronbach's alpha); <sup>a</sup> 0 = diverse, 1 = constrained; <sup>b</sup> 0 = male, 1 = female; <sup>c</sup> 0 = service, 1 =

manufacturing); \*  $p < .05$ , \*\*  $p < .01$ .

Table 2. Business idea generation regressed on divergent thinking.

	<b>Business idea generation before manipulation</b>			
	<b>Number</b>		<b>Originality</b>	
	Model 1	Model 2	Model 1	Model 2
Line of business <sup>a</sup>	.04	.06	-.06	-.02
Business owners' age	-.13	-.11	.08	.11
Gender <sup>b</sup>	.12	.08	.05	.00
Cognitive ability	-.10	-.16	.18	.10
Education	.21	.19	.20	.17
Entrepreneurial experience	.02	.04	-.16	-.12
Divergent thinking		.27*		.41**
<b>Model</b>				
R <sup>2</sup>	.08	.15	.11	.27**
Change in R <sup>2</sup>	.08	.07*	.11	.16**

Note: Standardized coefficients are shown; <sup>a</sup> 0 = manufacturing, 1 = service; <sup>b</sup> 0 = male, 1 =

female; \*  $p < .05$ , \*\*  $p < .01$ .



Table 3. Venture growth regressed on business idea generation.

	<b>Venture Growth</b>			
	Model 1	Model 2	Model 3	Model 4
Business Size	.15	.16	.17	.16
Line of business <sup>a</sup>	.05	.05	.08	.07
Business owners' age	-.09	-.09	-.13	-.14
Gender <sup>b</sup>	.06	.06	.06	.05
Cognitive ability	.14	.14	.07	.07
Education	.07	.07	.02	.01
Entrepreneurial experience	.16	.16	.22*	.21
Business idea generation before manipulation: number		.04		-.11
Business idea generation before manipulation: originality			.33**	.38**
<b>Model</b>				
R <sup>2</sup>	.08	.08	.17*	.18
Change in R <sup>2</sup>	.08	.08	.09**	.01

Note: Standardized coefficients are shown; <sup>a</sup> 0 = manufacturing, 1 = service; <sup>b</sup> 0 = male, 1 =

female; \* p < .05, \*\* p < .01.

Table 4. Business idea generation after manipulation regressed on divergent thinking, diversity of information, and the interaction term between divergent thinking and diversity of information.

	<b>Business idea generation after manipulation</b>					
	<b>Number</b>			<b>Originality</b>		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Line of business <sup>a</sup>	-.01	-.02	-.04	-.03	-.04	-.07
Business owners' age	-.07	-.04	-.04	-.11	-.11	-.11
Gender <sup>b</sup>	.17	.14	.15	.08	.08	.10
Cognitive ability	.09	.01	-.01	.14	.13	.09
Education	.20*	.17	.15	.16	.16	.13
Entrepreneurial experience	.12	.14	.17	.13	.13	.18
Business idea generation before manipulation: number	.52**	.50**	.51**			
Business idea generation before manipulation: originality				.39**	.39**	.39**
Divergent thinking		.21*	.26**		.00	.07
Diversity of information <sup>c</sup>		-.17	-.17		-.05	-.05
Divergent thinking x diversity of information			-.19*			-.29**
<b>Model</b>						
R <sup>2</sup>	.41**	.48**	.51**	.29**	.30**	.37**
Change in R <sup>2</sup>	.41**	.07**	.03*	.29**	.01	.07**

Note: Standardized coefficients are shown; <sup>a</sup> 0 = manufacturing, 1 = service; <sup>b</sup> 0 = male, 1 = female; <sup>c</sup> 0 = diverse, 1 = constrained; \* p < .05, \*\* p < .01.