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**SEARCHING THE HEFFALUMP: USING TRAITS AND COGNITIVE STYLES TO
PREDICT ENTREPRENEURIAL ORIENTATION**

EVA COOLS

Eva.Cools@vlerick.be

HERMAN VAN DEN BROECK

Herman.VanDenBroeck@vlerick.be

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EVA COOLS

Vlerick Leuven Gent Management School

HERMAN VAN DEN BROECK

Vlerick Leuven Gent Management School

Contact:

Eva Cools

Vlerick Leuven Gent Management School

Tel: +32 09 210 97 78

Fax: +32 09 210 97 00

Email: Eva.Cools@vlerick.be

ABSTRACT

The aim of this study was to get more insight into what typifies Flemish entrepreneurs. We compared entrepreneurs with non-entrepreneurs for five traits (tolerance for ambiguity, self-efficacy, proactive personality, locus of control, need for achievement) and for cognitive styles. Additionally, we used these trait and cognitive characteristics to predict variances in entrepreneurial orientation (EO). Whereas the link between EO and organizational performance has been studied intensively, the examination of possible antecedents of EO remains a white space. We found that entrepreneurs ($N = 177$) score significantly higher on all traits than non-entrepreneurs ($N = 60$). For the cognitive styles (measured with the Cognitive Style Indicator), we found that non-entrepreneurs score higher on the knowing and planning style. No differences were found for the creating style. With regard to the link between the entrepreneur's profile and EO, we found a significant contribution of tolerance for ambiguity and proactive personality to EO.

Keywords: traits; cognitive styles; entrepreneurial orientation; entrepreneurs versus non-entrepreneurs

INTRODUCTION

Given the importance of entrepreneurial activities for economic growth, wealth creation, business expansion, and technological progress, numerous studies on entrepreneurship exist (Wickham, 2004). These studies seek to understand how opportunities are discovered, created, and exploited, *by whom*, and with what consequences (Shane and Venkataraman, 2000). To answer the question ‘Who is an entrepreneur?’, researchers tried to identify the unique characteristics of an entrepreneur by borrowing concepts from the trait psychology domain (Landström, 1999; Shook *et al.*, 2003), but these studies did not yield unequivocal findings (Cromie, 2000). However, as some scholars contend, it remains worthwhile to study the entrepreneurial profile (Hisrich, 2000; Steyaert, 2004) as there is no entrepreneurship without the entrepreneur (Poon *et al.*, 2006; Johnson, 1990). Consequently, the aim of this research project was to get more insight into what typifies Flemish entrepreneurs and what distinguishes them from non-entrepreneurs. However, given the criticism on the trait approach, our study differs from previous studies on the profile of the entrepreneur in two respects.

On the one hand, we added a cognitive perspective in our study, beside the trait approach. The fairly recent adoption of the cognitive perspective in entrepreneurship research seems a promising evolution to continue answering the question ‘who is the entrepreneur?’ (Baron, 2004). The cognitive view of entrepreneurship provides alternative lenses to explore entrepreneurship related phenomena, as it focuses on detecting knowledge structures and mental models that entrepreneurs use to make assessments, judgments, or decisions involving opportunity evaluation, venture creation, and growth (Mitchell *et al.*, 2002). An interesting concept in this regard are cognitive styles, as people’s cognitive styles influence their preferences for different types of knowledge gathering, information processing, and decision making, which are all key actions or tasks an entrepreneur is daily confronted with (Leonard *et al.*, 1999). Although cognitive styles provide an alternative means to conceptualize the characteristics of entrepreneurs, they have not yet received much attention in entrepreneurship literature to date (Sadler-Smith, 2004).

On the other hand, we used the different trait and cognitive characteristics to examine entrepreneurial orientation (EO). EO refers to a firm’s strategic orientation, capturing specific entrepreneurial aspects of decision making styles, methods, and practices (Lumpkin and Dess, 1996).

The failure to identify a set of dispositional characteristics of entrepreneurs has led some scholars to shift their attention to entrepreneurial behavior, conceptualized as the firm's EO (Krauss *et al.*, 2005; Poon *et al.*, 2006). Most studies on EO focus on the possible relationship between EO and organizational performance (*e.g.*, Smart and Conant, 1994; Wiklund, 1999; Zahra and Covin, 1995). Recently, some scholars have defended the usefulness of studying the link between the entrepreneur's trait characteristics and EO, as it is widely recognized that the founders and executives of organizations can exert important influences on the firm's actions (Lumpkin and Erdogan, 2004; Poon *et al.*, 2006). At this moment, few studies have examined EO as a dependent variable, investigating the link between several trait characteristics and EO. The link between entrepreneurs' cognitive styles and entrepreneurial orientation has (as far as we know) not been studied yet.

With this study, we continue the hunt for the Heffalump (*i.e.*, Who is an entrepreneur?) (Bouckennooghe *et al.*, 2005). The Heffalump is a character from Winnie-the-Pooh that has been hunted by many individuals using various ingenious trapping devices, but no one has succeeded in capturing it so far. All who claim to have caught sight of it report it to be enormous, but they disagree on its particularities (Steyaert, 2004; Wickham, 2004). Several elements give our research project a unique dimension in this sense, being: (a) the integration of the trait and the cognitive approach to examine the entrepreneurial profile; (b) the comparison between entrepreneurs and non-entrepreneurs on these cognitive and trait characteristics; and (c) the examination of the impact of the entrepreneur's cognitive and trait characteristics on entrepreneurial orientation.

CONCEPTUAL FRAMEWORK AND HYPOTHESES

To introduce the conceptual framework of the study, we focus shortly on the different concepts that are included in our research design: traits, cognitive styles, and entrepreneurial orientation.

The Trait Approach

As already stated in the introduction, many studies have aimed to identify the particular qualities of entrepreneurs. Consequently, there is considerable literature on those traits that purport to predispose individuals to behave in an entrepreneurial way (Bridge *et al.*, 2003). Many characteristics are attributed to entrepreneurs, like a strong need for achievement, an internal locus of control, risk-taking propensity, or intuitiveness.

However, some recent reviews on trait research give an overview of inconsistent findings with regard to many of these traits. Cromie (2000) and Vecchio (2003), for instance, refer to studies who did not find a difference between entrepreneurs and non-entrepreneurs on locus of control and need for achievement. The inconsistent findings of different trait studies led to increased criticism on this approach, even to the extent that it is questioned whether entrepreneurs do indeed score higher on these characteristics than non-entrepreneurs (*e.g.*, Bridge *et al.*, 2003; Vecchio, 2003). Given the criticism on the trait approach, several authors suggested that identifying a cluster of relevant traits might be more useful to assess the entrepreneurial personality than focusing on a single characteristic (Cromie, 2000; Johnson, 1990). Consequently, we included five widely studied entrepreneurial traits in our research.

Tolerance for Ambiguity When there is insufficient information to structure a situation, an ambiguous situation is said to exist. The way in which people deal with this ambiguous situation reflects their tolerance for ambiguity (Furnham and Ribchester, 1995). People with a high tolerance for ambiguity find ambiguous situations challenging and strive to overcome unstable and unpredictable situations to perform well. Dealing with uncertainty, taking risks, and continuous changes are part of the entrepreneurial job (Markman and Baron, 2003; McMullen and Shepherd, 2006). Research found that entrepreneurs eagerly undertake the unknown and willingly deal with and manage uncertainty (Koh, 1996). Managers with a high tolerance for ambiguity were found to be more entrepreneurial in their actions (Whetten *et al.*, 2000).

Self-efficacy Self-efficacy is a person's belief about his or her chances of successfully accomplishing a specific task (Bandura, 1997). Self-efficacy is a motivational construct that has been shown to influence people's choices of activities, goal levels, persistence, and performance in a variety of contexts (Zhao *et al.*, 2005). There is increased attention for the role of self-efficacy in the study of entrepreneurship, implying research on entrepreneurial career preferences, intentionality, new venture formation, and performance (Chen *et al.*, 1998; Markman *et al.*, 2002). Entrepreneurial research on self-efficacy concludes that it is an important factor to clarify entrepreneurial intentions and behavior, as people need to belief in their capacity to succeed in starting and running a new business before they will do so (Boyd and Vozikis, 1994; Neck *et al.*, 1999). People will avoid careers and environments of which they believe that they exceed their capacities, but they do undertake vocations that they judge themselves capable of handling (Markman *et al.*, 2002).

Proactive Personality Proactive behavior refers to the extent to which people have the tendency to change their environment. Bateman and Crant (1993) defined it as a dispositional construct that identifies differences among people in the extent to which they take action to influence their environment. Research on the entrepreneurial profile concluded that proactive behavior is a characteristic of entrepreneurs (*e.g.*, Becherer and Maurer, 1999; Kickul and Gundry, 2002). According to Drucker (1985), entrepreneurs see change as the norm and as healthy. Entrepreneurs always search for change, respond to it, and exploit it as an opportunity. Research with MBA students found that having a proactive personality to a large extent clarifies someone's entrepreneurial intentions (Crant, 1996).

Locus of Control Locus of control refers to the extent to which people attribute the source of control over events to themselves (internal locus of control) or to external circumstances (external locus of control) (Rotter, 1966). Locus of control is one of the traits that received most attention within the entrepreneurial trait approach (Hansemark, 2003). Generally, it is believed that entrepreneurs prefer to take and hold command instead of leaving things to external factors (Cromie, 2000). Blau (1993) found that an internal locus of control was positively related to the initiative dimension of performance, which means that internals engaged more frequently in innovative and spontaneous performance that goes beyond basic job requirements. Research concludes that many entrepreneurs eventually succeed because their internal locus of control helps them to overcome setbacks and disappointments, leading to higher firm performance (Boone *et al.*, 1996). However, some studies failed to distinguish entrepreneurs and non-entrepreneurs concerning their locus of control (*e.g.*, Chen *et al.*, 1998; Cromie, 2000).

Need for Achievement Need for achievement refers to a desire to accomplish something difficult, to excel, and do better than others to achieve a sense of personal accomplishment (McClelland, 1961). Entrepreneurs must persistently aim at working on their goals, need to continuously enhance their performance, have to take responsibility for the results of their work, and they must cope with challenging tasks (Utsch and Rauch, 2000), which are all characteristics of high achievers. Need for achievement received much attention in entrepreneurship research (Shane *et al.*, 2003). Several studies found a positive effect of a high need for achievement on entrepreneurial behavior and on firm performance (Collins *et al.*, 2004; Johnson, 1990). However, Cromie (2000) summarizes several studies that could not identify differences in the need for achievement of entrepreneurs and of groups like managers or university professors. Based on previous research with these different traits and following the majority of studies that found a higher score for these traits, we propose:

Hypothesis 1: Entrepreneurs will score higher on each of these traits than non-entrepreneurs.

The Cognitive Approach

Recently, a more cognitive oriented approach was introduced in the entrepreneurship domain (Baron, 2004; Mitchell *et al.*, 2004). The cognitive approach tries to answer the question why some people are and others are not able to discover and exploit particular entrepreneurial opportunities. Instead of focusing on stable, dispositional traits that distinguish entrepreneurs from non-entrepreneurs, it includes all aspects of entrepreneurial cognition that can potentially play a role in the entrepreneurial process. The cognitive perspective starts from the idea that some people are better in recognizing opportunities, on the one hand because they possess information that is necessary to identify an opportunity, and on the other hand because they have the cognitive properties necessary to exploit them (Mitchell *et al.*, 2002).

In line with this cognitive approach, we have examined the entrepreneur's cognitive style, being individual preferences in perceiving and processing information. Cognitive styles have been described as the 'missing link' between personality and cognition (Riding and Rayner, 1998). Allinson *et al.* (2000) proposed that cognitive styles are an alternative way of differentiating entrepreneurs from non-entrepreneurs. A cognitive style influences how people prefer to look at their environment for information, how they organize and interpret this information, and how they use these interpretations for guiding their actions (Hayes and Allinson, 1998). Cognitive styles are considered to be fundamental determinants of individual and organizational behavior that manifest themselves in individual workplace actions and in organizational systems, processes, and routines (Sadler-Smith and Badger, 1998). Kickul and Krueger (2004) concluded from their study with entrepreneurs that cognitive styles play an important role in entrepreneurial thinking. According to their view, entrepreneurs with different cognitive styles not necessarily perceive different opportunities (although they may), but it seems in their study that they got there by different cognitive paths.

A large variety of cognitive style dimensions has been identified by researchers over the years (Hodgkinson and Sadler-Smith, 2003; Riding, 1997). Different authors have also developed their own assessment instruments, providing unique labels to the cognitive styles under investigation (Hayes and Allinson, 1994; Grigorenko and Sternberg, 1995; Rayner and Riding, 1997). However, much cognitive style research has been done in educational settings, leading to a lack of instruments for use in organizations (Allinson and Hayes, 1996).

Recently, Cools and Van den Broeck (2006; in press) reported on the development of a reliable, valid, and convenient cognitive style instrument – the Cognitive Style Indicator (CoSI) – for use with managerial and professional groups, that has been tested with three diverse samples ($N = 5,924$; $N = 1,580$; and $N = 635$). Substantial support was found for this instrument’s construct validity. Reliability, item, and factor analyses confirm the internal consistency and homogeneity of three cognitive styles (with Cronbach alpha coefficients ranging from .73 to .85): a knowing, a planning, and a creating style (see Table 1). People with a knowing style search for facts and data. They want to know exactly the way things are, and tend to retain many facts and details. They like to search for rational solutions. People with a planning style are characterized by a need for structure. Planners like to organize and control, and prefer a well structured work environment. They attach importance to preparation and planning to reach their objectives. People with a creating style like experimentation. They see problems as opportunities and challenges. They like uncertainty and freedom. As the CoSI is found to be a valuable model to conceptualize cognitive style differences, we used this model in our research project. Moreover, previous research with this cognitive style model already demonstrated the value of the CoSI model to distinguish entrepreneurs from non-entrepreneurs (Bouckennooghe *et al.*, 2005).

Insert Table 1 About Here

Researchers used cognitive styles as a basis for studying decision-making behavior, conflict handling, strategy development, and group processes (Leonard *et al.*, 1999). A few studies already looked at entrepreneurs’ cognitive styles (*e.g.*, Allinson *et al.*, 2000; Buttner and Gryskiewicz, 1993; Goldsmith and Kerr, 1991; Sadler-Smith, 2004). Goldsmith and Kerr (1991) reported a higher score on an innovative cognitive style [Innovation of Kirton’s (1994) dimension] for students following an entrepreneurship class. Similarly, Buttner and Gryskiewicz (1993) found a more innovative cognitive style for entrepreneurs than for managers in large established organizations. Stewart *et al.* (1998) also found that entrepreneurs had a more innovative cognitive style than were managers of large organizations, who tended to prefer a more adaptive cognitive style [Adaption of Kirton’s (1994) dimension]. Allinson *et al.* (2000) found that entrepreneurs were more intuitive in their cognitive style than the general population of managers.

However, no style differences were found between the entrepreneurs and the senior managers and executives in their samples. Based on the few previous cognitive style studies with entrepreneurs and using the CoSI model, we propose that:

Hypothesis 2: Entrepreneurs will score higher on the creating style than the non-entrepreneurs.

Hypothesis 3: Entrepreneurs will score lower on the knowing and the planning style than the non-entrepreneurs.

Entrepreneurial Orientation

Entrepreneurial orientation (EO) refers to the top management's strategy in relation to innovativeness, proactiveness, and risk taking (*e.g.*, Kreiser *et al.*, 2002; Poon *et al.*, 2006). *Innovativeness* refers to a firm's willingness to engage in and support new ideas, novelty, creative processes and experimentation that may result in new products, services, or technological processes. *Proactiveness* refers to the propensity of a firm to take an opportunity-seeking, forward-looking perspective characterized by the introduction of new products and services ahead of the competition and by acting in anticipation of future demand. *Risk taking* refers to the extent to which a firm is willing to make large and risky resource commitments, and to make decisions and take action without certain knowledge of probable outcomes. Firms with an entrepreneurial orientation are willing to innovate, to be proactive relative to marketplace opportunities, and to take risks (Covin and Slevin, 1991). Accordingly, EO is a firm-level behavioral process of entrepreneurship (Lumpkin and Dess, 1996). However, the behaviors of the firm and that of the entrepreneur are likely to be the same in entrepreneur-led firms (Poon *et al.*, 2006).

Most EO studies focus on the relationship between the degree of entrepreneurial orientation and firm performance. However, these studies have yielded ambiguous results. Several studies found a positive relationship between entrepreneurial orientation and firm performance (*e.g.*, Wiklund, 1999; Zahra and Covin, 1995). Other studies showed that there is no significant relationship between EO and firm performance (*e.g.*, Auger *et al.*, 2003; Smart and Conant, 1994).

Lumpkin and Dess (1996) summarized different possible models on the relationship between EO and performance, suggesting both moderator as well as mediator variables. Only a few studies have examined EO as a dependent variable (*e.g.*, Lumpkin and Erdogan, 2004; Poon *et al.*, 2006).

Traits as Antecedents of EO A review of entrepreneurship literature revealed some theoretical models (*e.g.*, Aloulou and Fayolle, 2005; Lumpkin and Dess, 1996) and empirical works (*e.g.*, Entrialgo *et al.*, 2000; Krauss *et al.*, 2005; Lumpkin and Erdogan, 2004; Poon *et al.*, 2006) that suggest that traits might influence entrepreneurial orientation. However, there is little evidence for and consensus about selecting certain traits (and not others) as antecedents of EO. Therefore, we used the whole cluster of traits that were introduced earlier as antecedents of EO in our model. Previous research found that being innovative, risk taking, and proactive requires a certain level of tolerance for ambiguity (Entrialgo *et al.*, 2000; Lumpkin and Erdogan, 2004). People's level of self-efficacy is assumed to influence their willingness to engage in the challenge to introduce new products, to be proactive towards the environment, and to take risks (Poon *et al.*, 2006). Having a proactive personality is found to result in proactive behavior, meaning a willingness to change the status quo, and a tendency to identify opportunities and improve things (Crant, 2000). With regard to locus of control, more internally oriented entrepreneurs are found to pursue more product-market innovation, undertake greater risks, and lead rather than follow competitors (Entrialgo *et al.*, 2000; Miller *et al.*, 1982). Previous studies found that achievement motivation is positively correlated with a preoccupation with future goals (proactiveness) and with personal innovativeness (Entrialgo *et al.*, 2000; Lumpkin and Erdogan, 2004).

Cognitive Style Differences as Antecedents of EO Given the promise of the cognitive approach as a field of study, linking cognitive styles to differences in EO seems highly valuable. As cognitive styles are individual preferences with regard to information processing and decision making, it can be assumed that these differences lead to variation in the way entrepreneurs see strategy (*e.g.*, Hough and ogilvie, 2005; Manimala, 1992; Sadler-Smith, 2004). Consequently, gaining insight into the entrepreneurial mindset can help us to capture how entrepreneurs think and why they do some things the way they do. In other words, cognitive styles might help explain entrepreneurial orientation.

According to Gallén (1997), research on managerial characteristics and strategy suggested that creative managers can be found in innovative firms, while more bureaucratically oriented managers can be found in stable firms. Analytical types are assumed to adopt a defender strategy (offering a stable set of products and competing mainly based on price, quality, service, and delivery), while more intuitive type are thought to use a prospector firm strategy (having a broad product definition, striving to be first in the market, and focusing on change and innovation) (Gallén, 1997). In an early study on the link between cognitive styles and strategic decision making, Nutt (1990) found that cognitive style differences were a key factor in explaining the likelihood of taking strategic action and the perceived risk seen in this action. We do not know of prior studies that have linked cognitive styles to EO. Given the limited prior research on the antecedents of EO, we formulate a rather general hypothesis, being:

Hypothesis 4: Both trait variables (tolerance for ambiguity, self-efficacy, proactive personality, locus of control, and need for achievement) and cognitive styles will explain a significant amount of variance in entrepreneurial orientation.

METHOD

Samples and Procedure

Data were collected in March 2006, based on a survey instrument sent out through email to 1,797 Flemish entrepreneurs and 422 Flemish healthcare managers. These samples were drawn from the database maintained by a leading Western European business school. There is little consensus among scholars regarding the definition of entrepreneurship (Curran and Blackburn, 2001). Accordingly, for the sample of entrepreneurs, people who indicated in the function categories owner or general manager of the firm were selected from the database. We used two additional sampling criteria, being: (1) the firms had to have a maximum of 500 employees, and (2) we excluded schools (or institutes) and firms within social profit. Our maximum limit of 500 employees is consistent with the definition of 'small business' according to the U.S. Small Business Administration. The exclusion of schools and social profit firms was used to avoid having public sector organizations in this sample. On the other hand, a sample of managers from the healthcare sector (from hospitals as well as nursing homes) was drawn from the same database.

We have used a relatively broad approach and included managers of all ranks and departments. Respondents were given a website link, where they could complete the questionnaire. The survey was pre-tested with academics and entrepreneurs to check whether the questions were clear and understandable. About two weeks after the initial emailing, we sent a 'thank you' mail to people who completed the survey and a reminder email to those who had not. In the end, 177 entrepreneurs (10% response rate) and 60 healthcare managers (14% response rate) have participated in our research. Using the internet or email is a new and promising data collection tool, as it is cheap and efficient. However, the experience is that the response rates are quite low compared to alternatives, as people easily ignore requests for cooperation in such research studies (Spector, 2001).

Mean age of the entrepreneurs in our study was 47.46 ($SD = 9.19$) and about 88% were men. They represented a wide variety of sectors, including industry and production (30%), services (36%), distribution and trade (11%), ICT and new technology (14%), and other (9%) (*e.g.*, building sector). The mean age of the firms was 37.49 years. However, this mean represented a wide variance, ranging from firms younger than 5 years and ones older than 100 years ($SD = 39.01$). Most firms in our study employed between 10 and 50 people (32%), while the other 68% was almost equally spread between firms of less than 10 employees, between 51 and 99 employees, 100 to 199 employees, and 200 to 499 employees. Fifty-eight per cent of the entrepreneurs in our sample was also (one of the) owner(s) of the current firm. Of these owners, 38% was the founder, 21.5% was successor in the family business, and 21.5% bought the firm (management-buy-out or management-buy-in). The other 19% became owner in another way (*e.g.*, climbing the hierarchy, recruitment,...). With regard to seniority, the majority (39%) had worked more than 15 years in their current firm, 19% between 10 and 15 years, 18% between 5 and 10 years, 16.5% between 2 and 5 years, and 7.5% less than 2 years.

Of the healthcare managers in our study, 71% were men and their mean age was 45.82 ($SD = 7.84$), which is comparable to the sample of entrepreneurs. This sample consisted mainly of managers on a higher level, included 52% general directors, 31% directors or senior managers, and 17% middle managers. The majority worked in the general management department (68%), 22% worked within the nursing and care department, and 10% in the financial and administrative department. The firm size of this sample was also diverse: 7% employed 10 to 50 people, 28% 51 to 99 people (the majority), 27% 100 to 199 people, 13% between 200 and 499 people, and 25% more than 500 people.

Measures

To select the measures, we considered the relevance of the instruments for both entrepreneurs as well as non-entrepreneurs. For instance, we found a general locus of control scale and a general self-efficacy scale most appropriate for our research design (instead of a firm-level scale or one focused on specific entrepreneurial activities) to compare entrepreneurs with non-entrepreneurs. To limit the length of the survey, we searched for short scales (*e.g.*, the 5-item Need for Achievement scale of Steers and Braunstein (1976)). If a short measure was not available, we selected a number of items from a larger scale, choosing those items that showed the highest factor loadings as indicated in the original scale development and validation articles (*e.g.*, Bateman and Crant's (1993) Proactive Personality scale or Sherer's *et al.* (1982) General Self-Efficacy scale).

The measures described below were originally developed using various response format. To avoid confusing the respondents, all measures (unless otherwise indicated) used a five-point likert scale format from 1 (*typifies me not at all*) to 5 (*typifies me completely*). Research has suggested that these minor alterations to questionnaire response formats do not affect their validity (Matell and Jacoby, 1971). We created a composite score for each measure by averaging the responses across the items used for the measure. Higher scores on a measure reflect higher levels of the construct.

Tolerance for Ambiguity We assessed tolerance for ambiguity using ten items, taken from the willingness-to-change subscale of the Innovativeness scale (Hurt *et al.*, 1977), and the Need for Cognitive Closure scale (Webster and Kruglanski, 1994). Given the criticism on several existing and widely used Tolerance for Ambiguity scales (*e.g.*, Furnham and Ribchester, 1995; Grenier *et al.*, 2005, we chose to measure the construct this way. This scale measures the extent to which people can deal with ambiguity, implying the extent to which they are willing to change and to what extent they have a preference for order and predictability (*e.g.*, 'I don't like situations that are uncertain' (reverse coded)). The alpha reliability of this scale was .73.

Self-efficacy We measured self-efficacy with 6 items taken from the 17-item General Self-Efficacy Scale (GSE) developed by Sherer *et al.* (1982). This scale assesses the extent to which people belief in their own ability to do a task (*e.g.*, 'Failure just makes me try harder').

The alpha reliability of this scale was .61. Sherer's *et al.* (1982) General Self-Efficacy scale has been the most widely used instrument to measure general self-efficacy (Chen *et al.*, 2001).

Proactive Personality We assessed proactive personality with 6 items from Bateman and Crant's (1993) 17-item Proactive Personality scale, which measures people's tendency to effect environmental change, this means the extent to which people take actions to influence their environments (*e.g.*, 'If I see something I don't like, I fix it'). The alpha reliability of this scale was .73.

Locus of Control To measure locus of control, a 7-item locus of control scale was excerpted from Rotter's (1966) Internal-External (I-E) scale (Kreitner *et al.*, 2002). A likert-scale version of this measure is used (Poon *et al.*, 2006), with higher scores reflecting higher internality (*e.g.*, 'There really is no such thing as luck'). The alpha reliability of this scale was .72.

Need for Achievement We assessed achievement motivation with the achievement need subscale of the Manifest Needs Questionnaire (Steers and Braunstein, 1976). This scale measures the extent to which people have the desire to accomplish something difficult and to excel (*e.g.*, 'I do my best work when my job assignments are fairly difficult'). The scale consists of five items, with an alpha reliability in our sample of .56.

Cognitive Styles Cognitive styles are measured with the Cognitive Style Indicator (CoSI) (Cools and Van den Broeck, in press). CoSI is an 18-item questionnaire, measuring individual differences with regard to how people prefer to perceive, process, and structure information, which distinguishes a knowing style (4 items, $\alpha = .76$, *e.g.*, 'I like to analyze problems'), a planning style (7 items, $\alpha = .82$, *e.g.*, 'I prefer clear structures to do my job'), and a creating style (7 items, $\alpha = .78$, *e.g.*, 'I like to extend the boundaries').

Entrepreneurial Orientation To measure the EO of a firm, we used the scales of Covin and Slevin (1989) and Miller and Toulouse (1986). This measure was only completed by the sample of entrepreneurs. The response format of this scale used a 5-point likert scale on which the entrepreneurs had to indicate the extent to which the items represent their firm's strategy.

This scale distinguishes between three subdimensions: innovativeness (3 items, $\alpha = .78$, *e.g.*, ‘Changes in product or service lines have been mostly of a minor nature’ versus ‘... have usually been quite dramatic’), proactiveness (4 items, $\alpha = .88$, *e.g.*, ‘In dealing with its competitors, my firm typically responds to action which competitors initiate’ versus ‘... typically initiates actions which competitors then respond to’), and risk taking (3 items, $\alpha = .77$, *e.g.*, ‘In general, the top managers of my firm have a strong proclivity for low risk projects (with normal and certain rates of return)’ versus ‘... a strong proclivity for high risk projects (with chances of high returns’)). The overall reliability of the EO scale was .90.

Analyses

As the variables used in the analyses came from the answers provided by a single respondent, we checked the possibility that the relationships among the variables could be the result of common method variance by conducting Harman’s (1967) one-factor test (as described by Podsakoff and Organ (1986)). A substantial amount of common method variance would be shown if one factor accounted for the majority of covariance in the variables. However, exploratory factor analysis of the dependent and independent variables (principal components extraction) resulted in 17 factors with Eigenvalues greater than one (accounting for 70 percent of the variance), with the first factor accounting for only 17 percent of the total variance, and the second and third factor each accounting for 10 percent respectively 6 percent of the total variance.

To compare entrepreneurs and non-entrepreneurs on the different cognitive and traits characteristics (hypothesis 1, 2, and 3), independent sample *t* tests were performed, comparing the means of the two groups for each of the variables.

Hierarchical regression was used to analyze the extent to which we can use the trait and cognitive variables in our study to predict entrepreneurial orientation (hypothesis 4), entering the variables in three steps. Model 1 contains only control variables, being age, firm size, and firm age. Model 2 consists of the control variables and the trait characteristics, being tolerance for ambiguity, self-efficacy, proactive personality, locus of control, and need for achievement. Model 3 in its turn adds the cognitive styles to the previous model. As the uniqueness of our research design lies in adding the cognitive approach to the existing trait approach, we chose to enter the variables in this sequence. To exclude potential confounding factors that might influence EO, we used age, firm size, and firm age as control variables in our model (Begley, 1995; Chen *et al.*, 1998; Sadler-Smith, 2004).

RESULTS

Descriptive Statistics

Correlations of the study variables can be seen in Table 2, together with the corresponding means, standard deviations, and alpha reliabilities.

Insert Table 2 About Here

It can be seen from the zero-order correlations in Table 2 that all trait variables (except for locus of control) are significantly correlated among one another, which confirms previous research with these traits (Judge *et al.*, 1999; Poon *et al.*, 2006). Looking at the correlations among the cognitive styles, a strong positive correlation is found between the knowing and planning style ($r = .58, p < .001$). However, item and factor analyses justify the distinction between the two styles. Previous studies with this model also lend support to this three-factor cognitive style model, given the different correlations of the knowing and planning style with several other scales and their different correlation with the creating style (knowing style, $r = .19, p < .01$; planning style, $r = .05, p = .48$) (Cools and Van den Broeck, 2006). It is also remarkable that the creating style shows a strong correlation with different trait variables in the study and with entrepreneurial orientation ($r = .39, p < .001$). Previous research on cognitive styles found that people with an intuitive cognitive style prefer to leave options open, can tolerate ambiguity, like to restructure situations, have a more proactive personality, and are self-confident (*e.g.*, Kickul and Krueger, 2004; Kirton, 1994; Myers *et al.*, 2003; Riding and Wigley, 1997). Moreover, a significant negative correlation is found between a planning style and tolerance for ambiguity ($r = -.30, p < .001$). Stewart *et al.* (1998) already showed that there is considerable variation between entrepreneurs, with different types of entrepreneurs demonstrating different risk preferences. Finally, looking at the correlations with entrepreneurial orientation, the highly significant correlation with tolerance for ambiguity is notable ($r = .47, p < .001$). We also found a significant correlation between EO and need for achievement ($r = .37, p < .001$) and EO and proactive personality ($r = .35, p < .001$).

Comparing Entrepreneurs and Non-entrepreneurs

Table 3 represents the results of the comparison of the entrepreneurs and non-entrepreneurs on the different trait and cognitive characteristics.

Insert Table 3 About Here

Hypothesis 1 was confirmed. Our results are consistent with previous trait studies that found that entrepreneurs had a higher tolerance for ambiguity than non-entrepreneurs (*e.g.*, Koh, 1996), higher levels of self-efficacy (*e.g.*, Chen *et al.*, 1998), a more proactive personality (*e.g.*, Becherer and Maurer, 1999), a more internal locus of control (*e.g.*, Vecchio, 2003), and a stronger need for achievement (*e.g.*, Collins *et al.*, 2004).

When comparing the entrepreneurs and non-entrepreneurs on their cognitive styles, we see that Hypothesis 3 was confirmed, but Hypothesis 2 was not. Comparison of the cognitive style profiles of the two samples in our study revealed that healthcare managers score significantly higher on the knowing and the planning style than entrepreneurs. Interestingly, no significant difference was found for the creating style ($t(233) = 1.52, p = 0.13$). Although previous research found a higher score on an innovative, intuitive cognitive style for entrepreneurs than for non-entrepreneurs (*e.g.*, Buttner and Gyskiewicz, 1993; Goldsmith and Kerr, 1991), this was not confirmed in our study. However, this finding is consistent with a study of Allinson *et al.* (2000) that found no differences between entrepreneurs and senior managers in their samples for an intuitive cognitive style (Allinson *et al.*, 2000). Managers on higher levels, like entrepreneurs, also face uncertainty, time pressure, ambiguity, incomplete information, which needs an intuitive problem solving approach. These findings suggest that it is not necessarily a creating style that typifies entrepreneurs. In contrast, it seems that higher levels of knowing and planning styles, indicating a larger focus on rationality and procedures, hamper entrepreneurship. The knowing style is characterized by a focus on facts and figures, a high level of rationality, and avoidance of risks. The planning style is characterized by an urge for control, a focus on structures, procedures, and planning, and a need for certainty. These characteristics might implicate that people with these styles see more risk in entrepreneurship and experience higher levels of uncertainty, which curbs their enthusiasm to become an entrepreneur.

Additional independent sample t tests revealed that within the sample of entrepreneurs no differences can be found for any of the trait and cognitive characteristics between founders ($n = 47$) and non-founders ($n = 78$), nor between owners ($n = 101$) and non-owners ($n = 74$). Moreover, when comparing healthcare managers and entrepreneurs from the service sector ($n = 64$), all differences between the two samples remained significant, except for the knowing style ($t(121) = -1.69, p = .09$) and tolerance for ambiguity ($t(120) = 1.72, p = .09$). These additional analyses suggest that the findings in Table 3 are probably more due to being entrepreneur or not than to the sector of employment.

Trait and Cognitive Variables as Predictors of Entrepreneurial Orientation

To study the effect of the cognitive and trait variables on entrepreneurial orientation, we performed hierarchical regression analysis (see Table 4).

Insert Table 4 About Here

Exploration of Table 4 reveals that Model 2 (control and trait variables) was a better predictor of EO than Model 1 (control variables) ($\Delta R^2 = .27; F(5,140) = 10.57, p < .001$). Model 3 (adding cognitive styles), in its turn, was a better predictor than the default zero model ($R^2 = .29; F(11,137) = 5.09, p < .001$), but it was no significant improvement compared to Model 2 ($\Delta R^2 = .01; F(3,137) = .65, p = .58$). These findings suggest that Model 2 is the best fitting model. Consequently, hypothesis 4 was only partly confirmed. Two of the trait variables are found to be significant contributors of entrepreneurial orientation. Specifically, people with higher tolerance for ambiguity showed higher entrepreneurial orientation ($\beta = .33, p < .001$), as well as more proactive people ($\beta = .22, p < .05$). In the same regard, previous research identified tolerance for ambiguity as one of the most important variables in explaining managerial coping with organizational change (Judge *et al.*, 1999). Entrepreneurs with a higher tolerance for ambiguity are found to own the most innovative and entrepreneurial firms (Entrialgo *et al.*, 2000; Rigotti *et al.*, 2003). Similarly, proactive behavior is considered to be an important variable in the context of organizational success, implying actions like challenging the status quo or identifying opportunities for improvement (Crant, 2000). According to Kickul and Gundry (2002), entrepreneurs with a proactive personality choose a strategic orientation for their firms that permits flexibility and change in response to surrounding business conditions.

Need for achievement showed a positive relationship with EO, but only at the $p < .10$ level of significance ($\beta = .20, p = .052$). Although previous research identified self-efficacy as an important antecedent of EO (Poon *et al.*, 2006), we found a negative relationship with EO, although it was only significant at the $p < .10$ level of significance ($\beta = -.19, p = .052$). However, the findings with regard to need for achievement and self-efficacy should be treated with caution, given the low internal consistencies observed for the used scales (Cronbach alpha $< .70$). Contrary to expectations, locus of control did not contribute significantly to EO ($\beta = -.09, p = .23$).

DISCUSSION AND CONCLUSION

Discussion of Findings

The aim of this study was to contribute to further insight into whom the entrepreneur is. Our findings demonstrate that Flemish entrepreneurs score higher on tolerance for ambiguity, self-efficacy, proactive personality, an internal locus of control, and need for achievement than the non-entrepreneurs in our study. These results are consistent with previous research that found higher scores on several traits for entrepreneurs than non-entrepreneurs (*e.g.*, Koh, 1996; Stewart *et al.*, 1998). With regard to cognitive style differences, we found a higher score for the knowing and the planning style for non-entrepreneurs than for entrepreneurs, indicating a larger focus on rationality and procedures from managers of the healthcare sector than from entrepreneurs. In contrary to previous studies that found a higher score for entrepreneurs on a more innovative cognitive style (*e.g.*, Buttner and Gyskiewicz, 1993; Goldsmith and Kerr, 1991), we found no differences for the creating style in our study. However, this is consistent with previous research of Allinson *et al.* (2000) who found no differences for an intuitive cognitive style between entrepreneurs and senior managers. With regard to the link between the entrepreneur's profile and EO, we found a significant contribution of tolerance for ambiguity and proactive personality to EO. In contrary to other studies, we found no significant contribution of need for achievement and locus of control to EO and a negative contribution of self-efficacy (Entrialgo *et al.*, 2000; Poon *et al.*, 2006).

Research and Managerial Implications

Our research fits well within the call of Landström (1999) to integrate a variety of perspectives in one study to further advance research on entrepreneurship. Three aspects gave our research a unique character compared to other studies on the entrepreneurial profile. First, we integrated the trait and the cognitive approach in our study, given the promise of the cognitive perspective to enhance our understanding of the entrepreneurial profile (Baron, 2004). Moreover, studying a cluster of traits instead of one single characteristic is suggested to be a useful approach to assess the entrepreneurial personality (Cromie, 2000). Several authors recognized the relevance of studying cognitive style differences of entrepreneurs (Allinson *et al.*, 2000; Sadler-Smith, 2004). Secondly, we compared entrepreneurs and non-entrepreneurs on these traits and cognitive styles, which contributed to further clarification of differences between entrepreneurs and non-entrepreneurs. Given the ambiguous findings of previous trait studies and the subsequent criticism on the relevance of studying the distinguishing characteristics of entrepreneurs (Bridge *et al.*, 2003; Vecchio, 2003), this study was a unique opportunity to check whether the criticism on the trait approach is warranted. Thirdly, we used these trait and cognitive variables as antecedents to clarify entrepreneurial orientation. Most studies on EO look at the link with organizational performance, whereas research on EO as a dependent variable is currently scarce (Lumpkin and Erdogan, 2004; Poon *et al.*, 2006). Through the exploration of a cluster of traits and the cognitive style profiles of entrepreneurs and the comparison with non-entrepreneurs on the one hand, and the link with entrepreneurial orientation on the other hand, we are convinced that we have contributed to the advancement of entrepreneurship research.

However, some limitations of the study should also be indicated. Due to the data collection method, we cannot totally assure whether our samples are representative for their populations. Whereas this coverage problem is inherent to online surveying, several researchers from their part welcome the internet as a convenient means of accessing large sample populations (Pettit, 1999; Schmidt, 1997).

Moreover, due to availability and access problems, we have compared entrepreneurs only with healthcare managers, not with managers from other sectors. To examine the consistency of our findings, further research should also look at the comparison with other types of managers for two major reasons.

First, as trait studies within entrepreneurship did not succeed in identifying those factors that are unique to entrepreneurs, a major criticism on studies that compare entrepreneurs with non-entrepreneurs is that these traits are common to successful people, including managers (Boyd and Vozikis, 1994). Our study could not fully address this criticism as we only included healthcare managers. Secondly, although previous studies on entrepreneurs' cognitive styles did not find differences between entrepreneurs and senior managers in their samples with regard to the intuitive cognitive style (Allinson *et al.*, 2000), they did find differences for lower-level managers. Due to the sample size of the non-entrepreneurs in our study and the limited number of lower-level managers within this sample ($n = 10$), we could not examine this further.

As there is little prior research on EO as a dependent variable, there was not much theoretical and empirical basis to identify relevant models for hierarchical regression analyses. Further research is needed to stimulate our understanding of variances in entrepreneurial orientation. In this regard, it is also important to carefully select the right measures to assess the variables, as the low internal consistencies of the self-efficacy and need for achievement scales in our study imply that our results should be treated with caution. As we selected for several trait concepts items from larger scales and also applied these scales in different settings from those for which they were originally developed, questions about their validity can be raised (Begley, 1995).

Furthermore, it can be of interest to take a longitudinal perspective instead of a cross-sectional one, linking traits variables to entrepreneurial intentions, and later on to entrepreneurial orientation to learn more about the entrepreneurial profile. For instance, locus of control and self-efficacy are considered to be learned characteristics, that can change over time (Hansemark, 2003). A longitudinal study, in which dependent and independent variables are kept apart can contribute to further examining the predictive power of various traits. Moreover, comparing potential entrepreneurs with actual entrepreneurs, preferably in a longitudinal setting, can stimulate the advancement of understanding who the entrepreneur is or will be.

Finally, we used self-reporting questionnaires, using a single data source, which implies that respondents can unduly influence the result. Certainly with regard to the measurement of entrepreneurial orientation, it might be useful for further research to include responses from more than one data source. According to Curran and Blackburn (2001), a high proportion of small firms have two or more owner-managers, partners, or directors, which suggests that it might be better to aggregate responses of several entrepreneurs from one company to measure EO.

The main practical implication of our study is that the findings are useful in the light of the selection and coaching of potential entrepreneurs and entrepreneurial potential as they contribute to the existing knowledge about what characterizes an entrepreneur. Increased awareness of the entrepreneurial profile might stimulate screening the entrepreneurs with the potential to create high-performing firms. Starting a new business is a complex and expensive endeavor, which still has a low success rate at this moment. Many new firms fail in the short term. Identifying and investing in the right people might lead to an increased success rate. Moreover, by identifying the factors (*i.e.*, trait and cognitive characteristics) that are associated with entrepreneurial orientation of firms, programs can be designed (by governments or other institutions) to develop and enhance these factors in order to stimulate entrepreneurship. Furthermore, the findings can be used as a career guidance tool for students or as a selection device for entrants of entrepreneurship programs.

REFERENCES

- Allinson, C. W., Chell, E. and Hayes, J. (2000) 'Intuition and Entrepreneurial Behaviour', *European Journal of Work and Organizational Psychology* 9(1): 31–43.
- Allinson, C. W. and Hayes, J. (1996) 'The Cognitive Style Index: A Measure of Intuition-Analysis for Organizational Research', *Journal of Management Studies* 33(1): 119–35.
- Aloulou, W. and Fayolle, A. (2005) 'A Conceptual Approach of Entrepreneurial Orientation within Small Business Context', *Journal of Enterprising Culture* 13(1): 21–45.
- Auger, P., Barnir, A. and Gallagher, J. M. (2003) 'Strategic Orientation, Competition, and Internet-based Economic Commerce', *Information Technology and Management* 4(2): 139–64.
- Bandura, A. (1997) *Self-efficacy: The Exercise of Control*. New York: Freeman.
- Baron, R. A. (2004) 'The Cognitive Perspective: A Valuable Tool Answering Entrepreneurship's Basic "Why" Questions', *Journal of Business Venturing* 19(2): 221–39.
- Bateman, T. S. and Crant, J. M. (1993) 'The Proactive Component of Organizational Behavior: A Measure and Correlates', *Journal of Organizational Behavior* 14(2): 103–18.
- Becherer, R. C. and Maurer, J. G. (1999) 'The Proactive Personality Disposition and Entrepreneurial Behavior among Small Company Presidents', *Journal of Small Business Management* 37(1): 28–36.
- Begley, T.M. (1995) 'Using Founder Status, Age of Firm, and Company Growth Rate as the Basis for Distinguishing Entrepreneurs from Managers of Smaller Businesses', *Journal of Business Venturing* 10(3): 249–63.
- Blau, G. J. (1993) 'Testing the Relationship of Locus of Control to Different Performance Dimensions', *Journal of Occupational and Organizational Psychology* 66(2): 125–38.
- Boone, C., De Brabander, B. and Van Witteloostuijn, A. (1996) 'CEO Locus of Control and Small Firm Performance: An Integrative Framework and Empirical Test', *Journal of Management Studies* 33(5): 667–99.

- Bouckenoghe, D., Cools, E., Vanderheyden, K. and Van den Broeck, H. (2005) 'In Search for the Heffalump: An Exploration of Cognitive Style Profiles Among Flemish Entrepreneurs', *Journal of Applied Management and Entrepreneurship* 10(4): 58–75.
- Boyd, N. G. and Vozikis, G. S. (1994) 'The Influence of Self-efficacy in the Development of Entrepreneurial Intentions and Actions', *Entrepreneurship Theory and Practice* 18(4): 63–90.
- Bridge, S., O'Neill, K. and Cromie, S. (2003). *Understanding Enterprise: Entrepreneurship and Small Business (second edition)*. New York: Palgrave Macmillan.
- Buttner, E. H. and Gyskiewicz, N. (1993) 'Entrepreneurs' Problem-Solving Styles: An Empirical Study Using the Kirton Adaption/Innovation Theory', *Journal of Small Business Management* 31(1): 22–31.
- Chen, C. C., Greene, P. G. and Crick, A. (1998) 'Does Entrepreneurial Self-efficacy Distinguish Entrepreneurs from Managers?', *Journal of Business Venturing* 13(4): 295–316.
- Chen, G., Gully, S.M. and Eden, D. (2001) 'Validation of a New General Self-Efficacy Scale', *Organizational Research Methods* 4(1): 62–83.
- Collins, C. J., Hanges, P. and Locke, E. A. (2004) 'The Relationship of Need for Achievement to Entrepreneurship: A Meta-Analysis', *Human Performance* 17(1): 95–117.
- Cools, E., and Van den Broeck, H. (2006). *The Cognitive Style Indicator: Development and validation of a new measurement tool*. In L. Lassen, L. Bostrom and C. Evans (Eds.), *Enabling Lifelong Learning in Education, Training and Development*, Eleventh Annual Conference of the European Learning Styles Information Network (CD-rom). Oslo: University of Oslo, Norway.
- Cools, E. and Van den Broeck, H. (2007). Development and validation of the Cognitive Style Indicator. *The Journal of Psychology* (in press).
- Covin, J. G. and Slevin, D. P. (1989) 'Strategic Management of Small Firms in Hostile and Benign Environments', *Strategic Management Journal* 10(1): 75–87.
- Covin, J. G. and Slevin, D. P. (1991) 'A Conceptual Model of Entrepreneurship as Firm Behaviour', *Entrepreneurship Theory and Practice* 16(1): 7–25.

- Crant, J. M. (1996) 'The Proactive Personality Scale as a Predictor of Entrepreneurial Intentions', *Journal of Small Business Management* 34(3): 42–49.
- Crant, J. M. (2000) 'Proactive Behaviour in Organizations', *Journal of Management* 26 (3): 435–62.
- Cromie, S. (2000) 'Assessing Entrepreneurial Inclinations: Some Approaches and Empirical Evidence', *European Journal of Work and Organizational Psychology* 9(1): 7–30.
- Curran, J. and Blackburn, R. A. (2001) *Researching the Small Enterprise*. London: Sage.
- Drucker, P. F. (1985) *Innovation and Entrepreneurship: Practice and Principles*. New York: Harper & Row.
- Entrialgo, M., Fernández, E. and Vázquez, C. J. (2000) 'Characteristics of Managers as Determinants of Entrepreneurial Orientation: Some Spanish Evidence', *Enterprise & Innovation Management Studies* 1(2): 187–205.
- Furnham, A. and Ribchester, T. (1995) 'Tolerance of Ambiguity', *Current Psychology* 14(3): 179–200.
- Gallen, T. (1997) 'The Cognitive Style and Strategic Decisions of Managers', *Management Decision* 35(7/8): 541–51.
- Goldsmith, R. E. and Kerr, J. R. (1991) 'Entrepreneurship and Adaption-Innovation Theory', *Technovation* 11(6): 373–82.
- Grenier, S., Barrette, A.-M. and Ladouceur, R. (2005) 'Intolerance of Uncertainty and Intolerance of Ambiguity: Similarities and Differences', *Personality and Individual Differences* 39(3): 593–600.
- Grigorenko, E. L. and Sternberg, R. J. (1995) 'Thinking styles', in D. H. Saklofske and M. Zeidner (Eds) *International Handbook of Personality and Intelligence*, pp. 205–29. New York: Plenum Press.
- Hansemark, O. C. (2003) 'Need for Achievement, Locus of Control and the Prediction of Business Start-ups: A Longitudinal Study', *Journal of Economic Psychology* 24(3): 301–19.

- Harman, H. H. (1967) *Modern Factor Analysis (second edition)*. Chicago: University of Chicago Press.
- Hayes, J. and Allinson, C. W. (1994) 'Cognitive Style and Its Relevance for Management Practice', *British Journal of Management* 5(1): 53–71.
- Hayes, J. and Allinson, C. W. (1998) 'Cognitive Style and the Theory and Practice of Individual and Collective Learning in Organizations', *Human Relations* 51(7): 847–71.
- Hisrich, R. D. (2000) 'Can Psychological Approaches Be Used Effectively: An Overview', *European Journal of Work and Organizational Psychology* 9(1): 93–96.
- Hodgkinson, G. P. and Sadler-Smith, E. (2003) 'Complex or Unitary? A Critique and Empirical Re-assessment of the Allinson-Hayes Cognitive Style Index', *Journal of Occupational and Organizational Psychology* 76(2): 243–68.
- Hough, J. R. and ogilvie, dt (2005) 'An Empirical Test of Cognitive Style and Strategic Decision Outcomes', *Journal of Management Studies* 42(2): 417–48.
- Hurt, H. T., Joseph, K. and Cook, C. D. (1977) 'Scales for the Measurement of Innovativeness', *Human Communication Research* 4(1): 58–65.
- Johnson, B. R. (1990) 'Towards a Multidimensional Model of Entrepreneurship: The Case of Achievement Motivation and the Entrepreneur', *Entrepreneurship Theory and Practice* 14(3): 39–54.
- Judge, T. A., Thoresen, C. J., Pucik, V. and Welbourne, T. M. (1999) 'Managerial Coping with Organizational Change: A Dispositional Perspective', *Journal of Applied Psychology* 84 (1): 107–22.
- Kickul, J. and Gundry, L.K. (2002) 'Prospecting for Strategic Advantage: The Proactive Entrepreneurial Personality and Small Firm Innovation', *Journal of Small Business Management* 40(2): 85–97.
- Kickul, J. and Krueger, N. (2004) 'A Cognitive Processing Model of Entrepreneurial Self-Efficacy and Intentionality', in S. A. Zahra *et al.* (Eds) *Frontiers of Entrepreneurship Research*, pp. 607–19. Wellesley, MA: Babson College, Center for Entrepreneurial Studies.

- Kirton, M. J. (Ed.) (1994) *Adaptors and Innovators: Styles of Creativity and Problem Solving*. New York: Routledge.
- Koh, H. C. (1996) 'Testing Hypotheses of Entrepreneurial Characteristics: A Study of Hong Kong MBA Students', *Journal of Managerial Psychology* 11(3): 12–25.
- Kraus, S. I., Frese, M., Friedrich, C. and Unger, J. M. (2005) 'Entrepreneurial Orientation: A Psychological Model of Success among Southern African Small Business Owners', *European Journal of Work and Organizational Psychology* 14(3): 315–44.
- Kreiser, P. M., Marino, L. D. and Weaver, K. M. (2002) 'Assessing the Psychometric Properties of the Entrepreneurial Orientation Scale: A Multi-country Analysis', *Entrepreneurship Theory and Practice* 26(4): 71–94.
- Kreitner, R., Kinicki, A. and Buelens, M. (2002) *Organizational Behaviour (second European edition)*. London: McGrawHill.
- Landström, H. (1999) 'The Roots of Entrepreneurship Research', *New England Journal of Entrepreneurship* 2(2): 9–20.
- Leonard, N. H., Scholl, R. W. and Kowalski, K. B. (1999) 'Information Processing Style and Decision Making' *Journal of Organizational Behavior* 20(3): 407–20.
- Lumpkin, G. T. and Dess, G. G. (1996) 'Clarifying the Entrepreneurial Orientation Construct and Linking It to Performance', *Academy of Management Review* 21(1): 135–72.
- Lumpkin, G. T. and Erdogan, B. (2004) 'If Not Entrepreneurship, Can Psychological Characteristics Predict Entrepreneurial Orientation? – A Pilot Study', *The ICFAI Journal of Entrepreneurship Development* 1(1): 21–33.
- Manimala, M. J. (1992) 'Entrepreneurial Heuristics: A Comparison between High PI (Pioneering-Innovative) and Low PI Ventures', *Journal of Business Venturing* 7(6): 477–504.
- Markman, G. D., Balkin, D. B. and Baron, R. A. (2002) 'Inventors and New Venture Formation: The Effects of General Self-Efficacy and Regretful Thinking', *Entrepreneurship Theory and Practice* 27(2): 149–65.

- Markman, G. D. and Baron, R. A. (2003) 'Person-Entrepreneurship Fit: Why Some People Are More Successful as Entrepreneurs than Others', *Human Resource Management Review* 13(2): 281–301.
- Matell, M.S. and Jacoby, J. (1971). 'Is there an optimal number of alternatives for Likert scale items?', *Educational and Psychological Measurement* 31(3): 657–74.
- McClelland, D. C. (1961) *The Achieving Society*. New York: Van Nostrand.
- McMullen, J. S. and Shepherd, D. A. (2006) 'Entrepreneurial Action and the Role of Uncertainty in the Theory of the Entrepreneur', *Academy of Management Review* 31(1): 132–52.
- Miller, D., Kets De Vries, M. F. R. and Toulouse, J. (1982) 'Top Executive Locus of Control and Its Relationship to Strategy-Making, Structure, and the Environment', *Academy of Management Journal* 25(2): 237–53.
- Miller, D. and Toulouse, J. M. (1986) 'Strategy, Structure, CEO Personality and Performance in Small Firms', *American Journal of Small Business* 10(3): 47–62.
- Mitchell, R. K., Busenitz, L., Lant, T., McDougall, P. P., Morse, E. A. and Smith, H. 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., Busenitz, L., Lant, T., McDougall, P. P., Morse, E. A. and Smith, H. B. (2004) 'The Distinctive and Inclusive Domain of Entrepreneurial Cognition Research', *Entrepreneurship Theory and Practice* 28(6): 505–18.
- Myers, I. B., McCaulley, M. H., Quenk, N. L. and Hammer, A. L. (2003) *MBTI Manual: A Guide to the Development and Use of the Myers-Briggs Type Indicator*. Palo Alto: Consulting Psychologists Press.
- Neck, C. P., Neck, H. M., Manz, C. C. and Godwin, J. (1999) "'I Think I Can; I Think I Can": A Self-Leadership Perspective toward Enhancing Entrepreneur Thought Patterns, Self-Efficacy, and Performance' *Journal of Managerial Psychology* 14(6): 477–501.
- Nutt, P. C. (1990) 'Strategic Decisions Made by Top Executives and Middle Managers with Data and Process Dominant Styles', *Journal of Management Studies* 27(2): 173–94.

- Pettit, F. A. (1999) 'Exploring the Use of the World Wide Web as a Psychology Data Collection Tool', *Computers in Human Behavior* 15(1): 67–71.
- Podsakoff, P. M. and Organ, D. W. (1986) 'Self Reports in Organizational Reports: Problems and Prospects', *Journal of Management* 12(4): 531–44.
- Poon, J. M. L., Ainuddin, R. A. and Junit, S. H. (2006) 'Effects of Self-Concept Traits and Entrepreneurial Orientation on Firm Performance', *International Small Business Journal* 24(1): 61–82.
- Rayner, S. and Riding, R. J. (1997) 'Towards a Categorization of Cognitive Styles and Learning Styles', *Educational Psychology* 17(1/2): 5–27.
- Riding, R. J. (1997) 'On the Nature of Cognitive Style', *Educational Psychology* 17(1/2): 29–49.
- Riding, R. and Rayner, S. (1998) *Cognitive Styles and Learning Strategies: Understanding Style Differences in Learning and Behaviour*. London: David Fulton Publishers.
- Riding, R. J. and Wigley, S. (1997) 'The Relationship between Cognitive Style and Personality in Further Education Students', *Personality and Individual Differences* 23(3): 379–89.
- Rigotti, L., Ryan, M. and Vaithianathan, R. (2003) 'Tolerance of Ambiguity and Entrepreneurial Innovation', *Working Papers Duke Fuqua School of Business*, 1/1/2003, 39p.
- Rotter, J. B. (1966) 'Generalized Expectancies for Internal and External Control of Reinforcement', *Psychological Monographs: General and Applied* 80(1): 1–28.
- Sadler-Smith, E. (2004) 'Cognitive Style and the Management of Small and Medium-sized Enterprises', *Organization Studies* 25(2): 155–81.
- Sadler-Smith, E. and Badger, B. (1998) 'Cognitive Style, Learning and Innovation', *Technology Analysis and Strategic Management* 10(2): 247–65.
- Schmidt, W. C. (1997) 'World Wide Web Survey Research: Benefits, Potential Problems and Solutions', *Behavior Research Methods, Instruments and Computers* 29(2): 274–9.

Shane, S., Locke, E. A. and Collins, C. J. (2003) 'Entrepreneurial Motivation', *Human Resource Management Review* 13(2): 257–79.

Shane, S. and Venkataraman, S. (2000) 'The Promise of Entrepreneurship as a Field of Research', *Academy of Management Review* 25(1): 217–26.

Sherer, M., Maddux, J. E., Mercandante, B., Prentice-Dunn, S., Jacobs, B. and Rogers, R. W. (1982) 'The Self-Efficacy Scale: Construction and Validation', *Psychological Reports* 51(2): 663–71.

Shook, C. L., Priem, R. L. and McGee, J. E. (2003) 'Venture Creation and the Enterprising Individual: A Review and Synthesis', *Journal of Management* 29(3): 379–99.

Smart, D. T. and Conant, J. S. (1994) 'Entrepreneurial Orientation, Distinctive Marketing Competencies and Organizational Performance', *Journal of Applied Business Research* 10(3): 28–38

Spector, P. E. (2001) 'Research Methods in Industrial and Organizational Psychology: Data Collection and Data Analysis with Special Consideration to International Issues', in N. Anderson, D. S. Ones, H. G. Sinangil and C. Viswervaran (Eds.) *Handbook of Industrial, Work, and Organizational Psychology. Volume 1: Personnel Psychology*, pp. 10–26. London: Sage.

Steers, R. M. and Braunstein, D. N. (1976) 'A Behaviorally-Based Measure of Manifest Needs in Work Settings', *Journal of Vocational Behavior* 9(2): 251–66.

Stewart, W. H., Jr., Watson, W. E., Carland, J. C. and Carland, J. W. (1998) 'A Proclivity for Entrepreneurship: A Comparison of Entrepreneurs, Small Business Owners, and Corporate Managers', *Journal of Business Venturing* 14(2): 189–214.

Steyaert, C. (2004) 'Entrepreneurship without Entrepreneurs? Reclaiming a(n other) Psychology of Entrepreneurship Studies', *Paper presented at the RENT XVIII Conference, Copenhagen, November.*

Utsch, A. and Rauch, A. (2000) 'Innovativeness and Initiative as Mediators between Achievement Orientation and Venture Performance', *European Journal of Work and Organizational Psychology* 9(1): 45–62.

- Vecchio, R. P. (2003) 'Entrepreneurship and Leadership: Common Trends and Common Threads', *Human Resource Management Review* 13(2): 303–27.
- Webster, D. M. and Kruglanski, A. W. (1994) 'Individual Differences in Need for Cognitive Closure', *Journal of Personality and Social Psychology* 67(6): 1049–62.
- Whetten, D., Cameron, K. and Woods, M. (2000) *Developing Management Skills for Europe (second edition)*. Harlow: Pearson Education.
- Wickham, P. A. (2004) *Strategic Entrepreneurship (third edition)*. Harlow: Pearson Education Limited.
- Wiklund, J. (1999) 'The Sustainability of the Entrepreneurial Orientation-Performance Relationship', *Entrepreneurship Theory and Practice* 24(1): 37–48.
- Zahra, S. and Covin, J. (1995) 'Contextual Influence on the Corporate Entrepreneurship-Performance Relationship: A Longitudinal Analysis', *Journal of Business Venturing* 10(1): 43–58.
- Zhao, H., Seibert, S. E. and Hills, G. E. (2005) 'The Mediating Role of Self-efficacy in the Development of Entrepreneurial Intentions', *Journal of Applied Psychology*, 90(6): 1265–72.

TABLE 1**Description of the CoSI Model**

Knowing style	Planning style	Creating style
Facts, details	Sequential, structured	Possibilities,
Logical, reflective	Conventional,	meanings, ideas
Objective,	conformity	Impulsive, flexible,
impersonal, rational	Planned, organized,	open-ended
Precision,	systematic	Novelty
methodicalness	Routine	Subjective
		Inventive, creative

Note. Based on Table 1 in Cools and Van den Broeck (in press).

TABLE 2

Descriptive Statistics, Scale Reliabilities, and Correlations of Study Variables

<i>Variable</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>
1. Knowing style	(.76)								
2. Planning style		(.82)							
		.58***							
3. Creating style	.19**	.05	(.78)						
4. Tolerance for ambiguity	-.08	-.30***	.58***	(.73)					
5. Self-efficacy	.28***	.15*	.36***	.38***	(.61)				
6. Proactive personality	.22**	.05	.53***	.50***	.61***	(.73)			
7. Locus of control	.17*	.14*	.17*	.07	.27***	.38***	(.72)		
8. Need for achievement	.27***	.11	.50***	.53***	.57***	.62***	.32***	(.56)	
9. Entrepreneurial orientation [†]	-.06	-.12	.39***	.47***	.18*	.35***	.01	.37***	(.90)
Mean	3.69	3.70	4.02	3.29	3.70	3.71	3.18	4.10	3.44
Standard deviation	.65	.60	.50	.51	.63	.52	.58	.50	.74

Notes. Alpha reliabilities are shown in parentheses on the diagonal; [†] This measure was only completed by the entrepreneurs; * $p < .05$, ** $p < .01$, *** $p < .001$.

TABLE 3**Comparison Entrepreneurs (*N* = 177) and Non-entrepreneurs (*N* = 60)**

<i>Variable</i>	<i>Entrepreneurs</i>		<i>Managers</i>		<i>Comparison</i>	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>t</i>	<i>df</i>
Knowing style	3.64	0.66	3.86	0.60	−2.21*	(232)
Planning style	3.64	0.58	3.86	0.63	−2.48*	(231)
Creating style	4.05	0.49	3.94	0.51	1.52	(233)
Tolerance for ambiguity	3.34	0.51	3.16	0.50	2.39*	(227)
Self-efficacy	3.79	0.61	3.42	0.61	3.99***	(229)
Proactive personality	3.80	0.51	3.44	0.47	4.79***	(228)
Locus of control	3.27	0.53	2.95	0.65	3.79***	(228)
Need for achievement	4.18	0.45	3.87	0.57	3.76***	(227)

Note. * $p < .05$, ** $p < .01$, *** $p < .001$.

TABLE 4

Hierarchical Regression of Trait and Cognitive Characteristics on Entrepreneurial Orientation ($N = 177$)

<i>Variables</i>	<i>Model 1</i>		<i>Model 2</i>		<i>Model 3</i>	
	β	t	β	t	β	t
Constant		10.23***		.63		.54
Age	.04	.50	.08	.998	.07	.91
Firm size	.02	.20	-.05	-.60	-.06	-.78
Firm age	-.09	-1.04	.01	.06	.002	.03
Tolerance for ambiguity			.33	3.72***	.31	2.68**
Self-efficacy			-.19	-1.96 [†]	-.18	-1.73 [†]
Proactive personality			.22	2.16*	.22	2.09*
Locus of control			-.09	-1.20	-.09	-1.17
Need for achievement			.20	1.96 [†]	.21	1.95 [†]
Knowing style					-.12	-1.34
Planning style					.07	.70
Creating style					.03	.31
<i>Summary statistics</i>						
R^2		.01		.28***		.29***
ΔR^2				.27***		.01

Note. [†] $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$.