



the Autonomous Management School of
Ghent University and Katholieke Universiteit Leuven

Vlerick Leuven Gent Working Paper Series 2007/19

CHARACTERIZING THE ELEPHANT:

SOME THOUGHTS ON THE FUTURE OF COGNITIVE STYLE RESEARCH

EVA COOLS

Eva.Cools@vlerick.be

HERMAN VAN DEN BROECK

Herman.VanDenBroeck@vlerick.be

**CHARACTERIZING THE ELEPHANT:
SOME THOUGHTS ON THE FUTURE OF COGNITIVE STYLE RESEARCH**

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

Considerable attention has been devoted to cognitive styles since the beginning of the previous century. Cognitive styles are extensively studied in diverse research domains. This large interest led to a wide diversity of cognitive style theories and studies. The development of the cognitive style field shows some similarity with the story of the ‘blind men and the elephant’, with researchers tending to study only one part of the whole, but none with full understanding. The aim of this article is to build further on previous suggestions for the advancement of the cognitive style field by focusing on six relevant, critical issues in the area of the theory, the measurement, and the practical relevance of cognitive styles: (1) the need for conceptual clarification to situate cognitive styles in the individual differences field, (2) the need for an overarching, contextualized individual differences model, (3) towards longitudinal, contextual research designs to find the origins of cognitive style, (4) the search for the fundamental cognitive style dimensions in the myriad of cognitive style models, (5) an evolution from self-report questionnaires to multi-source, multi-method approaches, and (6) bridging the relevance gap by different approaches of knowledge creation and knowledge dissemination. On the basis of an overview of past and present cognitive style research, we purport to suggest an agenda for future research in the field of cognitive styles. Ideally, cognitive style research evolves towards a ‘pragmatic science’, which combines high theoretical rigour with high practical relevance.

Keywords: cognitive styles, review, future research agenda

INTRODUCTION

A major concern of management and organizational behaviour research is to understand and predict how people behave in organizational settings. To this end, researchers need to consider both person and situation factors and how they interact (Chatman and Flynn 2005; Hatrup and Jackson 1996; House *et al.* 1996). Traditionally, behaviour (B) was conceptualized as the result of the combination of individual elements (Person) and environmental factors (Environment), this is $B = f\{P,E\}$ (Lewin 1951). More recently, this conceptualization was slightly modified as behaviour being the interaction between individual and environmental aspects (Hatrup and Jackson 1996). Many management and organizational behaviour researchers have examined individual differences with respect to their impact on people in various work settings (*e.g.*, Church and Waclawski 1998; Judge and Cable 1997; Michie and West 2004; Nordvik 1996).

One of the person factors studied in this regard are cognitive styles, being individual preferences for perceiving and processing information (*e.g.*, Buttner *et al.* 1999; Church and Waclawski 1995; 1998). Considerable attention has been devoted to cognitive styles since the beginning of the previous century. Cognitive styles are extensively studied in diverse domains, leading to two major streams of research: one focusing on educational implications (Grigorenko and Sternberg 1995; Rayner and Riding 1997) and the other one focusing on organizational behaviour and management aspects (Hayes and Allinson 1994; Hodgkinson and Sadler-Smith 2003; Sadler-Smith and Badger 1998). Cognitive styles are considered to be fundamental determinants of individual and organizational behaviour that manifest themselves in individual workplace actions and in organizational systems, processes, and routines (Sadler-Smith and Badger 1998). Researchers used cognitive styles for studying decision-making behaviour, conflict handling, strategy development, and group processes (Leonard *et al.* 1999). Researchers have found that cognitive style differences influence perception, learning, problem solving, decision making, communication, interpersonal functioning, and creativity in important ways (Hayes and Allinson 1994; Kirton 2003; Sadler-Smith 1998).

The large interest in cognitive styles led to the development of a wide diversity of cognitive style theories. Cognitive styles have been studied from various points of view and different authors developed their own assessment instruments (Coffield *et al.* 2004a; 2004b; Hodgkinson and Sadler-Smith 2003). There is no single universally accepted model of cognitive style (Rayner 2006).

The development of the cognitive style field shows some similarity with the story of the 'blind men and the elephant', with researchers tending to study only one part of the whole, but none with full understanding (Curry 1990; Riding and Cheema 1991).

In the farthest reaches of the desert there was a city in which all inhabitants were blind. A king and his army were passing through the region. The king had with him a great elephant. The inhabitants of the city had heard of elephants, but never had the opportunity to know one. Out rushed 6 young blind men, determined to discover what the elephant was like. [1]

In this tale, the blind men touched different parts of an elephant and accordingly gave very different descriptions of an elephant's characteristics. We intertwine this story through this theoretical article, as it offers a valuable metaphor for thinking about the difficulties of integrating diverse views of a complex phenomenon. Riding (2000a) concluded that research on cognitive styles offers some interesting challenges and had reached the stage to focus on some key issues to proceed. This author formulated four interrelated critical issues for the further successful development of the cognitive style concept: (1) reducing the large number of style labels by collapsing them into similar groups to identify the fundamental cognitive style dimensions; (2) developing simple, valid, and direct cognitive style measures that are suitable for worldwide use; (3) clearly situating cognitive style in the context of other individual differences and developing a model on how the various constructs interact in affecting behaviour; and (4) establishing clear relationships between cognitive style measures and objectively observable behaviour to find relevant applications of cognitive styles in practice.

According to Curry (2006), the advancement of the field can be established by three related approaches: (1) conceptual clarification in the bewildering array of definitions and conceptualizations of the style concept; (2) clear demonstration and accumulation of the validity and reliability of measures to indicate that they meet minimum standards for use and interpretation; and (3) continuous attention for the relevance of the field for practice by providing answers to the ‘so what?’ question. The aim of this article is to build further on these key aspects for the advancement of the cognitive style field by focusing on six relevant, critical issues. On the basis of an overview of past and present cognitive style research, we purport to suggest useful avenues for future research in the field of cognitive styles.

The first blind man grasped the elephant’s trunk. The elephant was surprised by this, and snorted loudly. The blind man, startled in turn, exclaimed: “This elephant is like a snake, but it is so huge that its hot breath makes a snorting sound.” He ran back to the city to tell his story.

ISSUE 1: TOWARDS CONCEPTUAL CLARIFICATION TO SITUATE COGNITIVE STYLES

Defining cognitive styles

As stated in the introduction, there is considerable theoretical and empirical interest in cognitive styles. As a consequence, many concepts and terms were introduced in theory and research (Coffield *et al.* 2004b). Different researchers called for clarification in ‘style’ terminology because some scholars talked about learning styles (*e.g.*, Honey and Mumford 1992; Kolb 1984), while others spoke of cognitive styles (*e.g.*, Messick 1984; Riding and Cheema 1991) or thinking styles (*e.g.*, Grigorenko and Sternberg 1995; Leonard and Straus 1997). Regardless of a specific approach or theory, the term style usually refers to a habitual pattern or preferred way of doing something (Grigorenko and Sternberg 1995). We focus on the cognitive style concept in this review.

Cognitive style was defined by Witkin *et al.* (1977) as the individual way a person perceives, thinks, learns, solves problems, and relates to others. Hunt *et al.* (1989) defined cognitive style as the way people process and organize information and arrive at judgments or conclusions on the basis of their observations.

In an early attempt to bring clarity in the cognitive style field, Messick (1984) concluded that the different conceptions all imply that cognitive styles are consistent individual differences in ways of organizing and processing information and experience. In their review of the field, Shipman and Shipman (1985: 229-230) wrote that “cognitive styles are generally considered to be information-processing habits: individually characteristic ways of interpreting and responding to the environment”. Riding and Cheema (1991) described a cognitive style as a person’s typical or habitual mode of thinking, problem solving, perceiving, and remembering. Sadler-Smith and Badger (1998) argued that a cognitive style may be thought of as a qualitatively different way of organizing and processing information. Building further on this stream of conceptualizations, we define a cognitive style as the way people perceive stimuli and how they use this information to guide their behaviour (*i.e.*, thinking, feeling, actions).

Situating cognitive styles

Both Riding (2000a) and Curry (2006) identified conceptual clarification of cognitive style in the context of other individual differences as a key issue for the advancement of the cognitive style field. Hodgkinson and Sadler-Smith (2003) asserted that the main contribution of the cognitive style construct lies in its ability to bring notions of information processing and personality together. Cognitive styles represent “a bridge between what might seem to be fairly distinct areas of psychological investigation: cognition and personality” (Sternberg and Grigorenko 1997a: 701). Hence, researchers have investigated cognitive styles in relationship to various concepts, such as ability and intelligence (*e.g.*, Armstrong 2000; Riding and Pearson 1994), personality (*e.g.*, Goldsmith 1994; Riding and Wigley 1997), affect (*e.g.*, Tullett and Davies 1997), and cognitive strategy (*e.g.*, Hayes and Allinson 1994; Sadler-Smith 1998). We subsequently focus on the link between cognitive styles and each of these concepts.

Link between cognitive style and ability. The relation between cognitive styles and abilities has been the subject of continuous debate among cognitive style researchers (Armstrong 2000; Furnham 1995). Riding (2000b) referred to style and ability as the two major characteristics that are studied in the context of individual variation in cognitive processing.

Cognitive styles are considered to be unrelated to ability in general (Mudd 1996; Riding and Rayner 1998; Tullett 1997). Abilities have been characterized as (1) value directional (*i.e.*, having more of an ability is better than having less), (2) enabling (*i.e.*, facilitating task performance in particular areas), and (3) domain specific factors. Cognitive styles have been described as (1) value differentiated (*i.e.*, particular cognitive styles have adaptive value under specified circumstances), and (2) organizing and controlling variables (*i.e.*, contributing to the selection, combination, and sequencing of the content and process, and regulating the direction, duration, intensity, range, and speed of functioning), (3) which cut across domains (Messick 1984; 1994). In other words, both abilities and cognitive styles are expected to influence people's task performance. While ability focuses on the level of performance, cognitive style is more concerned with the manner of performance (Guilford 1980; Witkin *et al.* 1977).

Although cognitive styles and ability are considered to be independent constructs, some studies have found a relation between cognitive styles and ability (Allinson and Hayes 1996; Federico and Landis 1984; Tiedemann 1989).

It might be useful for future research to investigate the possible moderating effect of type of task on the cognitive style–ability relationship. Armstrong (2000) asserted that scholars who found a relation between cognitive styles and ability did not carefully consider the nature of the task that was used to measure ability because some tasks might favour one cognitive style over another. Fuller and Kaplan (2004), for instance, found an interaction effect between cognitive style and task type on auditors' performance, yielding a higher performance for analytical auditors on analytic tasks, and better results for intuitive auditors on intuitive tasks. Fleenor and Taylor (1994) suggested that the manner in which creativity is usually measured might favour creativity by innovation (*i.e.*, the innovator style of Kirton) and not creativity by adaption (*i.e.*, the adaptor style of Kirton, which is related to an analytical way of information processing). Moreover, other aspects, such as motivation, strategies to learning, social work context, dyadic matching, or prior experience, can affect the relationship between cognitive styles and ability (*e.g.*, Armstrong *et al.* 2004; Martinsen and Kaufmann 2000; Spicer 2004; Tierney *et al.* 1999). Hence, building a more complex model to investigate the link between cognitive style and ability can contribute to enhanced knowledge about their interrelation.

Some studies reported the independence of cognitive style and intelligence (*e.g.*, Riding and Agrell 1997; Riding and Pearson 1994). Similar to the possible influence of the task that is used to measure ability, we wonder whether there can be an influence of the kind of intelligence that is assessed. There is currently, for instance, considerable interest in emotional intelligence (Barsade and Gibson 2007; Cools and Van den Broeck 2006a). Côté and Miners (2006) built a model in which they conceptualized emotional intelligence and cognitive intelligence as separate broad sets of abilities. They subsumed them under general intelligence in a hierarchical model. It might be interesting to look at the relation between cognitive styles and emotional intelligence in future research (*e.g.*, Côté and Miners 2006; Higgs 2001). Higgs (2001), for instance, found higher scores on particular aspects of emotional intelligence (*i.e.*, interpersonal sensitivity, influence) among people who scored high on Intuition (MBTI), which suggests a possible link between particular cognitive styles and particular aspects of intelligence.

Link between cognitive style and personality. Personality is another construct that is often studied in relation to cognitive styles. Personality can be defined as “the relatively stable set of psychological attributes that distinguish one person from another” (Moorhead and Griffin 2004: 91). Cognitive styles and personality are considered to be independent, but related constructs that together affect behaviour.

Researchers differ in how they see this relationship. Riding and Wigley (1997) argued that behaviour is a combination of the level of a particular personality source, plus or minus the component due to cognitive styles that may either add to or decrease the effect of personality elements. According to Kirton (1994), behaviour that stems from cognitive styles is an expression of stable personality dimensions. Similarly, Riding *et al.* (1995) asserted that how people represent and think about social environments and situations is influenced by their cognitive style and this is in turn related to their personality. Sadler-Smith (1998) described cognitive styles as behavioural manifestations of personality. Early researchers within the cognitive style field referred to a ‘personality space’, a conceptual space in which key bridging components of personality and cognitive style are situated (Kirton and de Ciantis 1986).

This conceptualization implies that not all personality aspects will be related to cognitive styles; only some key elements that constitute the personality space will be. The question remains whether cognitive style affects personality, or personality influences cognitive style (Riding *et al.* 1995). Riding *et al.* (1995: 122) assumed that cognitive style and personality both are “cognitive and social manifestations of the same underlying characteristic and physiological condition”. Further research that clarifies the physiological basis of the underlying mechanisms of the ‘personality space’ is needed.

Link between cognitive style and affect. Another issue to consider when situating cognitive styles in relation to other individual differences is the link between cognitive style and affect. Affect can be described as an umbrella term encompassing the broad range of feelings people experience, covering both emotions and moods (Barsade and Gibson 2007; Cools and Van den Broeck 2006a). According to Tullett and Davies (1997), the interrelationship between cognition and affect is central to our understanding of human behaviour. Cognitive styles are considered to be conceptually different from affect (Kirton 1994; Tullett and Davies 1997). There is not much empirical evidence yet to support this hypothesis. The few available empirical studies, mainly using the Kirton Adaption–Innovation Inventory (KAI), tend to confirm the assumption that cognitive styles are rooted in cognition and not related to affect. For instance, researchers found statistically insignificant correlations between the KAI and affect-related aspects such as neuroticism (*i.e.*, emotionality, worry, depression, maladjustment) and psychoticism (*i.e.*, insensitivity, absence of empathy, isolation) (Kirton 1976), anxiety (Kirton and de Ciantis 1986), and interpersonal needs (*i.e.*, needs for control, inclusion, and affection) (Tullett and Davies 1997).

Moreover, there is currently not a comprehensive model that integrates both the cognitive and non-cognitive processes that are involved in emotion activation, problem solving, and decision making (Izard 1993; Messick 1996). Furnham (1995) asserted that cognitive styles are important in organizing cognitive as well as affective data, but that researchers have focused mainly on the cognitive mechanisms rather than on the affective ones. We believe it is useful to involve affect in cognitive style research and that further research on the link between cognitive style and affect is particularly necessary.

In the past, the role of affect has been understudied in many areas of organizational behaviour and psychology research (Murphy 1996). Barsade and Gibson (2007: 36) wrote about an ‘affective revolution’ that currently takes place because scholars “begun to appreciate how an organizational lens that integrates employee affect provides a perspective missing from earlier views”. On the basis of the empirical evidence we collected, we are wondering about the extent to which cognitive style and affect are completely independent constructs. Hence, is it not possible that there is a kind of ‘affect space’, a conceptual space in which key bridging components of cognitive style and affect are situated? Just like there seem to be some consistent links between particular cognitive styles and particular personality characteristics in various studies (the ‘personality space’) (Allinson and Hayes 1996; Goldsmith 1994; Kirton and de Ciantis 1986; Riding and Wigley 1997), we believe there are similar links between cognitive style and affect. Furnham (1995), for instance, also supposed that cognitive styles have an influence on emotional life (*i.e.*, the kind of feelings people are likely to experience and their intensity, how people cope with emotion, and what factors arouse emotions). Messick (1994) saw cognitive styles as bridging cognitive, affective, and social domains of functioning. Further research on this conceptual ‘affect space’ is particularly relevant. Importantly, it is worthwhile to consider carefully which affect-related constructs to involve in these future studies. Previous studies tended to focus primarily on extreme emotions (*i.e.*, situations in which emotions dominate the normal functioning of people), even situated more in the psychotherapeutic sphere (*e.g.*, psychoticism, neuroticism, anxiety). We believe that future research should broaden this focus to make valuable and relevant contributions on the relation between cognitive styles and affect. Examples with relevance for organizations are looking at the earlier mentioned interpersonal emotional behaviour (*i.e.*, emotional intelligence), emotional regulation, optimism versus pessimism, or intuition (Barsade and Gibson 2007; Dane and Pratt 2007; Higgs 2001; Woolhouse and Bayne 2000).

Link between cognitive style and cognitive strategy. Finally, scholars made a distinction between cognitive style and cognitive strategy. Cognitive styles are considered to be fairly fixed, relatively in-built features of people.

Test-retest studies on the stability of cognitive style scores and comparisons between cognitive style scores before and after training sessions confirmed the stability of cognitive styles (e.g., Allinson and Hayes 1996; Clapp 1993; Murdock *et al.* 1993; Taylor 1994). Cognitive strategies are considered to be specific behaviours people use to cope with particular situations and tasks outside their natural preferences. People have a preferred or dominant cognitive style, but their actual behaviour and performance seem also influenced by the demands of the situation (Armstrong 2000; Grigorenko and Sternberg 1997; Spicer 2004). This distinction between cognitive style and cognitive strategy derived from the apparent contradicting views concerning the stability versus malleability of cognitive styles (Coffield *et al.* 2004a; 2004b; Riding and Cheema 1991). Most theorists claim that cognitive styles are stable, pervasive, and consistent across different areas of cognitive functioning (Sadler-Smith 1998). People tend to retain their dominant preferences throughout various work and social situations. On the other hand, researchers found that it is possible for individuals to process information and behave in ways that are not consistent with their habitual approach (Hayes and Allinson 1994; Streufert and Nogami 1989). In other words: “While styles may produce consistent behaviour across a variety of situations over the short and medium term, strategies are much more specific and essentially represent the result of the conscious decisions an individual makes to cope with immediate cognitive tasks” (Hayes and Allinson 1998: 853). Kirton (1994) referred to coping behaviour in the context of cognitive strategies. Coping behaviour implies using strategies and tactics in such a way that they sufficiently influence one’s overt behaviour to meet the objectives in a particular situation. Coping behaviour intervenes between one’s stable, preferred cognitive style and actual, needed behaviour (Hayes and Allinson 1994). The question remains unanswered where cognitive strategies come from and how and when they arise (see further issue 3).

Proposition 1: Many assertions are made on the relationship between cognitive style and ability, intelligence, personality, affect, and cognitive strategy respectively, but for conceptual clarification further research is needed on each of these links.

The second blind man heard and felt the air as it was pushed by the elephant's flapping ear, then grasped the ear itself and felt its thin roughness. He laughed with delight. "This wonderful elephant is like a living fan." He dropped the ear and ran back to the city.

ISSUE 2: TOWARDS AN OVERARCHING INDIVIDUAL DIFFERENCES MODEL

An integrated model

The discussion of the previous issue illustrates that it is not straightforward to situate cognitive styles in the individual differences domain. Scholars agree that various individual characteristics affect how people behave and perform, but how these characteristics interact in this regard is less obvious. Several researchers attempted to develop some kind of overarching model that situates different concepts towards one another (*e.g.*, Curry 1983; Furnham 1995; Riding 1997; Riding and Rayner 1998; Sadler-Smith 1998; Wardell and Royce 1978). There is currently no agreed upon model that integrates all individual differences (Armstrong and Rayner 2002; Rayner 2006). This is no big surprise because the broad fields of personality and intelligence – to which cognitive style both has inherent relationships – after more than eighty years did not achieve universal acceptance of a superordinate unifying model (Furnham 1995; Messick 1996). Although researchers found a number of interesting linkages between cognitive styles and other psychological constructs, the wide range of results still did not come together to form a single, comprehensive picture.

Grigorenko and Sternberg (1995) already called for more systematic research on the link between cognitive styles, abilities, and personality traits to clarify the overlap and distinction between these concepts. Riding (2000a) also identified the need for developing a model on how the various constructs interact in affecting behaviour.

Similar to studies that attempted to empirically test the interrelations between the layers (*i.e.*, instructional preference, information-processing style, cognitive personality style) in Curry's (1983) onion model (*e.g.*, Sadler-Smith 1997; 1999a; 1999b), we believe a useful first step is to bring several of these concepts (*e.g.*, cognitive style, ability, personality, affect) together in one research design and see how each of the concepts in interaction with the other ones contributes to clarifying people's behaviour and performance. This way, it will, for instance, be possible to gain further insight on the precise relation between cognitive styles and personality or on the interaction between cognitive styles and cognitive strategies.

The importance of the wider context

Importantly, we think it is highly valuable that researchers in the development and empirical testing of an overarching model take the wider context into account because the particular context plays a crucial role in clarifying the interrelations between the various constructs. How people behave in their job and organization does not only depend on their cognitive style, but also on environmental factors and the interaction between their style and environmental conditions. Hence, many empirical studies in cognitive style research were concerned with investigating fit or congruence in particular situations (*e.g.*, Allinson *et al.* 2001; Aritzeta *et al.* 2005; Armstrong *et al.* 1997; 2002; 2004; Armstrong and Priola 2001; Hayes and Allinson 1996; Priola *et al.* 2004; Sadler-Smith 1999a; 1999b; Volkema and Gorman 1998). These studies, for instance, examined the impact of style (dis)similarity within interpersonal relationships, the effects of homogeneous versus heterogeneous cognitive-based teams, the consequences of cognitive fit or misfit in terms of functional differences and work demands, or the influence of matching or mismatching people in training and education situations. It is not possible to draw general, straightforward conclusions about whether fit or misfit is the best option in each of these congruence studies as the particular context played an important role to clarify the findings.

Recently, much attention has been devoted to the importance of the organizational context in organizational studies (Chatman and Flynn 2005; Johns 2006; Rousseau and Fried 2001). Johns (2006) called for taking context into account when studying organizational behaviour because context elements can have subtle and powerful effects on research results.

Rousseau and Fried (2001) addressed the need for a better contextualization in organizational behaviour research. Hence, it is important to integrate the organizational context in the research design, measurement, and analyses of future cognitive style studies (Johns 2006). Importantly, in the light of ‘bridging the relevance gap’ (see issue 6), this also implies specifying in what context the findings apply and how the results can be used in practice in the resulting research reports or articles.

Proposition 2: To advance the cognitive style field, future research should continue the development and empirical testing of an integrated individual differences model that takes the wider context into account.

The third blind man ran straight into the side of the elephant. He felt the animal's broad, smooth side. He sniffed the air, and thought: "This is an animal, my nose leaves no doubt of that, but this animal is like a wall." He turned and ran back to the city to tell of his discovery.

ISSUE 3: TOWARDS CONTEXTUAL, LONGITUDINAL RESEARCH MODELS TO FIND THE ORIGINS OF COGNITIVE STYLE

Another issue that remains unresolved within the cognitive style field refers to the origins of cognitive styles. Are cognitive styles biologically based, the result of early learning, neither, or both (Furnham 1995)? Are we born with a particular cognitive profile (nature)? Are there style genes? Or is it rather a matter of socialization or education (nurture)? In other words, to what extent can cognitive styles be influenced by external factors (*e.g.*, culture, education, social environment)? Two types of studies tried to find an answer to this dilemma: studies that focused on the biological or physiological basis of cognitive styles (nature) on the one hand and studies that looked at the influence of external factors, such as the national culture, on cognitive style (nurture) on the other hand.

Nature

At this moment, there is no strong evidence yet about the heredity of cognitive styles. According to Coffield *et al.* (2004b: 12), “all arguments for the genetic determination of learning [cognitive] styles are necessarily based on analogy, since no studies of learning [cognitive] styles in identical and non-identical twins have been carried out, and there are no DNA studies in which learning [cognitive] style genes have been identified”. Some scholars suggested that cognitive styles may have an underlying neurological basis and that cognitive style differences are due to differences in specialization of functioning in certain areas of the brain (*e.g.*, Iaccino 1993; Prevedi and Carli 1987; Riding *et al.* 1997; Taggart and Robey 1981). In a way, studies on the link between cognitive styles and brain activity can be interpreted as an inquiry on the physiological or biological basis of cognitive styles.

The development of advanced techniques to measure brain activity may stimulate our knowledge about the potentially biological origins of cognitive style or (as the brain is not a fixed organ from birth) at least lead to a better insight in how cognitive styles emerge, evolve, and develop.

Nurture

Some scholars examined the influence of culture on cognitive styles by comparing cognitive style differences among people from various nations (*e.g.*, Allinson and Hayes 2000; Hill *et al.* 2000; Tullett 1997). Traditionally, cultural differences have been conceptualized as a dichotomy between the rational, analytic, left-brained ‘West’ and the intuitive, holistic, right-brained ‘East’ (Allinson and Hayes 2000; Redding 1980; Taggart and Robey 1981). However, there are no conclusive results that confirm this dichotomy between the eastern and western way of cognition (Allinson and Hayes 2000). Researchers using Kirton’s model consistently referred to the independence of cognitive style from culture on the basis of the similarities between the psychometric properties of the different language versions of the KAI instrument and the similar results between various occupational groups in different nations (Tullett 1997; Tullett and Kirton 1995). These researchers support the hypothesis that a cognitive style is a fixed and stable cognitive process within adults that is largely uninfluenced by national culture.

Other scholars found cognitive style differences between various cultures, although these results did not confirm the above mentioned East–West dichotomy (Allinson and Hayes 2000; Hill *et al.* 2000). In contrast, Allinson and Hayes (2000) found the reverse image. These scholars suggested it might be more useful to categorize countries in terms of their stage of industrial development rather than the simple East–West dichotomy. Allinson and Hayes (2000) did not elaborate on the possible reasons for these cross-cultural differences. However, Hill *et al.* (2000), who also found cultural differences for cognitive styles, believed in the malleability of cognitive styles through a process of personal and cultural socialization.

Malleability

Furnham (1995) stated that determining the etiology of cognitive style is important because it implicates how and how much a cognitive style may be changed. The nature–nurture debate indeed relates to the issue of the stability of cognitive styles. As stated previously (see issue 1), most researchers tend to assume that cognitive styles are relatively stable characteristics on the basis of test-retest results and pre-post-training comparisons of cognitive style scores. The question is then: when do cognitive styles stabilize (assuming that they do)? To find an answer to this question, a longitudinal approach seems warranted in which the cognitive development of people is followed from birth to adulthood. There are not many studies that investigated cognitive styles at an early age. Research with the KAI demonstrated that cognitive style had emerged as a stable component of cognition by the age of 13–14 years (Tullett 1997). Riding and Taylor (1976) found that a particular cognitive style was strongly apparent in seven-year-olds. No empirical evidence is available for younger children, although this is crucial to find the possible biological component of cognitive styles (Tullett and Kirton 1995). Several scholars called for developing style assessments (*e.g.*, interviews with parents, caregivers, observational studies) for use with young children and infants to further investigate the cognitive style origins and development (Riding 1997; Tullett and Kirton 1995).

No conclusive results can at this moment be drawn from studies that aimed to find the origins of cognitive styles. However, the field of personality research and the field of intelligence research came to the conclusion – after decades of debates between proponents of the nature versus nurture argument – that both influences determine personality and intelligence respectively (Cools and Van den Broeck 2006b). On the basis of twin studies and studies on the influence of experience, learning, culture, and other external factors, most researchers now believe that personality and intelligence are the product of interacting genetic (nature) and environmental (nurture) influences (Sternberg and Grigorenko 1997b; Wright 1999). If only the nature argument would be right (implying that personality and intelligence are completely determined by heredity), personality/intelligence would be fixed from birth and not adaptable by experiences or other external influences. If only the nurture argument would be right, no consideration would be made of the fact that a major part of personality and intelligence is rather stable and consistent. The question remains whether the same conclusion applies to cognitive style. Longitudinal, contextual, cross-cultural research designs can significantly increase our understanding about the origins of cognitive styles, the potential external forces that have an impact on cognitive style development, and the interplay between cognitive styles and cognitive strategies. Due to the difficulty to study dynamism, cross-sectional designs are often privileged over an examination of the complex processes that lead to understanding the dynamics of phenomena across time and space (Pettigrew *et al.* 2001). George and Jones (2000) conclude their article on time in theory building with the statement that “temporality is an essential feature of organizational behaviour and it makes little sense to ignore it, treat it implicitly, or treat it in an inadequate manner” (p. 677).

Proposition 3: The further development of the cognitive style field can benefit from longitudinal, contextual, and cross-cultural research designs which may contribute to increased knowledge about the origins of cognitive styles, the potential external forces that have an impact on cognitive style development, and the interplay between cognitive styles and cognitive strategies.

The fourth blind man walked into the elephant's tusk. He felt the hard, smooth ivory surface of the tusk, then as the elephant lifted the tusk, he could feel its pointed tip. "How wonderful!" he thought. "The elephant is hard and sharp like a spear, and yet it makes noises and smells like an animal!"

ISSUE 4: FROM A MYRIAD OF MODELS TO THE FUNDAMENTAL COGNITIVE STYLE DIMENSIONS

Pluralism in the field

Our attempt to define and demarcate cognitive styles in previous sections clearly showed that cognitive styles are not easy to conceptually or operationally define (Hayes and Allinson 1994; Messick 1996; Riding and Cheema 1991). The literature on cognitive styles is extensive, but also fragmented and this may undermine the viability of the concept for academics and practitioners (Hodgkinson and Sadler-Smith 2003). According to Cassidy (2004), this is due to the large amount of research, the diversity of disciplines and domains in which these studies are conducted, and the varied aims of different studies. Messick (1994: 131) claimed that “the major source of this conceptual messiness is that different investigators use different measures to represent the same style constructs and similar measures to represent different constructs”. Different authors worked in their own contexts, in isolation from one another, developing their own assessment instruments, and giving their own labels to the style they were studying with little reference to the work of others (Shipman and Shipman 1985). As a result, different theorists have been working with different concepts and have referred to them as cognitive/learning style. “A proliferation of models, terms, and meaning in the field of learning [cognitive] style seems to increase with each period of new interest and research activity” (Rayner and Riding 1997: 21).

Hence, there exists a large variety of style dimensions (Hodgkinson and Sadler-Smith 2003), ranging from ‘field dependent’ versus ‘field independent’ (Witkin 1962), and ‘serialist’ versus ‘holist’ constructs (Pask 1976), through ‘levellers’ versus ‘sharpeners’ (Holzman and Klein 1954), and ‘reflection’ versus ‘impulsivity’ (Kagan 1965) to ‘convergers’ versus ‘divergers’ (Hudson 1966), ‘adaptors’ versus ‘innovators’ (Kirton 1976), ‘assimilators’ versus ‘explorers’ (Kaufmann 1979), and ‘analysis’ versus ‘intuition’ (Allinson and Hayes 1996). According to Hayes and Allinson (1994: 56) “this wide array of cognitive style dimensions and the proliferation of empirical studies using different measures of cognitive style have resulted in a complex and confusing field of study”. Coffield *et al.* (2004b) identified 71 cognitive/learning style theories and models in a field review. Curry (2000) even referred to 100 different investigators who have published some version of a cognitive or learning style measurement instrument. This diversity resulted in conceptual fragmentation and incomparable results.

Theoretical categorizations

Riding (2000b) suggested that cognitive style research should recognize and confirm the fundamental cognitive style dimensions within the extensive body of style labels. To advance the field, Jones (1997: 74) also wrote that “although empirical integration of the literature is important, it is equally important to differentiate between the different theoretical foundations of styles, and thus, stimulate theoretical discussion” (p. 74). Several authors attempted to create order by integrating and categorizing different cognitive style theories (*e.g.*, Cassidy 2004; Coffield *et al.* 2004a; 2004b; Grigorenko and Sternberg 1995; Hayes and Allinson 1994; Rayner and Riding 1997; Sadler-Smith and Badger 1998). Some researchers have focused on the extent to which the developers of models believed that cognitive/learning styles are fixed or changeable respectively to categorize the field (*e.g.*, the onion model of Curry (1983) or the literature review of Coffield *et al.* (2004b)).

Other scholars have looked at the similarities and differences between various cognitive style models to integrate the field (*e.g.*, the categorization of Hayes and Allinson (1994)). Grigorenko and Sternberg (1995) and Rayner and Riding (1997) have categorized the field in three approaches according to the focus of the work (*i.e.*, distinguishing between cognition-centred, personality-centred, and activity-centred approaches respectively). Desmedt and Valcke (2004) mapped the field in an alternative way by using citation analysis. Cassidy (2004) provided an integration of the integration by bringing different past categorizations together in an overall table. Finally, we can distinguish two types of cognitive style theories on the basis of the number of cognitive style dimensions they identified: unidimensional models (*i.e.*, bipolar models that distinguish between two cognitive styles situated on a continuum) and multidimensional models (*i.e.*, cognitive style theories that distinguish different bipolar dimensions). According to Hodgkinson and Sadler-Smith (2003: 243), “two rival theoretical traditions prevail, one group of scholars arguing that cognitive style is best conceived within complex, multidimensional frameworks, others contending that the various facets of style can be meaningfully subsumed under a single, overarching dimension”. There is currently some controversy between proponents and opponents of the unidimensional conceptualization of cognitive style (Hayes *et al.* 2003; Hodgkinson and Sadler-Smith 2003; Jabri 1991; Mudd 1996; Sadler-Smith 2004).

Empirical integrative approaches

Beside these theoretical works, some scholars have also attempted to get a grip on the diversity of the field by including several cognitive style instruments simultaneously in empirical studies (*e.g.*, Beyler and Schmeck 1992; Bokoros *et al.* 1992; Bostic and Tallent-Runnels 1991; Edwards *et al.* 2002; Leonard *et al.* 1999). These scholars hoped to identify fundamental cognitive style dimensions on the basis of the common factors within the different models. Several scholars stated that an important advancement of the field would lie in relating cognitive style measures developed by one investigator with those used by other investigators.

Bokoros *et al.* (1992), for instance, referred to the usefulness of examining the commonalities between different cognitive style measures because this may lead to better understanding of the underlying psychological processes and the development of new measures (based on the combination of different measures) or the simplification of existing ones. Sadler-Smith (1998) emphasized the need for urgent research to compare several cognitive style instruments to further examine the construct validity of these style measures. An interesting study was done by Church and Waclawski (1998), who used the Myers-Briggs Type Indicator (MBTI) and the Kirton Adaption–Innovation Inventory (KAI) in combination to extend the knowledge about the link between cognitive styles and leadership style. They found four significantly different clusters, which confirmed their proposition that using instruments in combination is more descriptive than each of the instruments alone. Overall, all these theoretical and empirical works have addressed the key issue to identify fundamental dimensions in the field through their ‘meta-focus’ beyond one particular model. However, these works did not lead to universally accepted cognitive style dimensions yet.

Proposition 4: Future theoretical and empirical work in the cognitive style field should continue the search for the fundamental cognitive style dimensions through the development of knowledge networks and the comparison of several cognitive style models.

The fifth blind man found one of the elephant’s legs. He reached around and hugged it. The elephant stomped that feet, and the man let go. “No wonder this elephant frightens the king’s enemies. It is like a tree trunk or a mighty column, yet it bends, is very strong, and strikes the ground with great force.” Feeling a little frightened himself, he fled back to the city.

ISSUE 5: FROM SELF-REPORT QUESTIONNAIRES TO A MULTI-SOURCE, MULTI-METHOD APPROACHES

To empirically study and identify differences in cognitive styles, many diagnostic tools and questionnaires have been developed. Different ways of measuring cognitive styles have evolved, ranging from laboratory-based tests, to the use of perceptual tasks, physiological assessments, computer-based instruments, and paper-and-pencil tests (Armstrong and Sadler-Smith 2006). As cognitive style research stems from the psychometric tradition, cognitive styles have mostly been studied with quantitative research methods, with the majority taking the form of self-report measures.

Perceptual tasks and laboratory tests

Some researchers have used perceptual tasks or laboratory-based tests to study cognitive styles. These measurement approaches infer people's styles from behaviour that is shown during problem solving or decision making, for instance by observing people who perform a certain task or by content analyzing verbal protocols that are collected from people during task performance. Independent judges are often used because people need to be trained to derive people's cognitive styles from observations. These approaches attempt to determine what people actually do rather than what they prefer to do or say to do (Robey and Taggart 1981). However, this way of measuring cognitive styles is not easy to use in an organizational context.

Physiological assessments

As indicated before, some researchers suggested that cognitive styles may have an underlying physiological basis and that cognitive style differences are due to differences in specialization of functioning in particular brain areas (see issue 3). More specifically, differences in left brain–right brain activity may be related to cognitive style differences. Several scholars attempted to examine cognitive style differences by measuring brain activity (Doktor 1978; Ornstein 1977; Riding *et al.* 1997). One approach is using electroencephalograms (EEG) to monitor alpha rhythms in the left and right hemispheres of the brain when individuals are performing specific tasks.

Recently, functional magnetic resonance imaging techniques (fMRI) arose as a more reliable technique to assess the physiological basis of cognitive styles (Armstrong and Sadler-Smith 2006). Until now, researchers found some links between style differences and brain cortical activity (*e.g.*, Prevedi and Carli 1987; Riding *et al.* 1997; Riding *et al.* 1993). However, as the brain is very complex, it is not easy to assess brain activity and hence locate style differences in specific regions of the brain (Riding *et al.* 1997; Taggart *et al.* 1985). Further research is needed with other brain mapping methods to locate the activities in the embedded parts of the brain more precisely (Riding and Rayner 1998). However, using physiological assessments in organizational contexts is rather difficult, given its time consuming nature and the specific equipment and knowledge that is needed to use this approach for measuring cognitive style differences (Robey and Taggart 1981).

Computer-based instruments

Computer-based instruments assess people's performance on simple tasks that are considered to be relevant for information processing in general. The most famous example of a computerized cognitive style instrument is Riding's (1991) Cognitive Styles Analysis (CSA). Riding (2000b) listed several advantages of using computer-based measures rather than self-report inventories, such as (1) the objectivity of the test because it is objectively scored and its method of assessment is not obvious, implying that it is difficult for people to contrive their results; (2) the possibility to use it in a wide range of situations (both education and organizational contexts) because it is a context-free instrument; and (3) the possibility to use it within a wide age range because the test does not contain questionnaire-type items or difficult language. However, some discussion is currently going on concerning the reliability of the CSA (*e.g.*, Peterson *et al.* 2003; Redmond *et al.* 2002).

Self-report questionnaires

The most often used approach to assess cognitive styles is self-reporting questionnaires. In these self-reporting questionnaires, people are asked to assess their own preferences and behaviours. Armstrong and Sadler-Smith (2006) identified a number of valid, reliable, and convenient measures that are potentially useful in the context of career management, such as the Cognitive Style Index (CSI; Allinson and Hayes 1996), the Kirton Adaption–Innovation Inventory (KAI; Kirton 1976), the Myers-Briggs Type Indicator (MBTI; Myers *et al.* 2003), the Rational–Experiential Inventory (REI; Epstein *et al.* 1996), and the Group Embedded Figures Test (GEFT; Witkin *et al.* 1971). However, the latter instrument (measuring field dependence–independence) has been widely criticised for being a measure of ability rather than style (*e.g.*, McKenna 1984; Tiedemann 1989; Tinajero and Paramo 1998; Widiger *et al.* 1980). Self-report inventories have the advantage of being an easy and practical way of collecting information on people’s cognitive styles. A potential weakness of using self-report measures is that people can unduly influence the results. A self-reporting instrument relies on people’s ability to introspect themselves accurately and without notions of social desirability (Riding and Rayner 1998). Therefore, two potential avenues for future research are (1) making use of other-ratings beside self-reports on the one hand and (2) using different methods to study cognitive styles on the other hand.

Multi-source approach

It can be an interesting additional source of evidence to assess people’s cognitive styles from the perspective of others. Previous research on the comparability of personal and group estimates of KAI scores yielded promising results (Rickards and Gaston 1995). Co-workers (*i.e.*, subordinates, peers, supervisors), for instance, are in a unique position to provide valuable cognitive style assessments for two reasons (Berr *et al.* 2000). On the one hand, colleagues are often affected by the consequences of the focal person’s actions. On the other hand, they can observe his or her behaviour over time and in a variety of situations. Multi-source evidence on cognitive styles can be highly valuable given the increased use of 360 degree feedback sessions in organizations in the context of management development (Buttner *et al.* 1999).

Multi-method approach

As it is impossible to do an unflawed study, it is a great asset to obtain corroborating evidence from using a mixed-method approach (Creswell 2003; Scandura and Williams 2000; Shah and Corley 2006). The last decade has seen an increase in the use of mixed-method studies (Johnson and Onwuegbuzie 2004). In adopting a mixed-method approach, the strengths of quantitative and qualitative strategies are combined, which gives researchers the unique opportunity to strengthen their conclusions (Bachiochi and Weiner 2002). Despite the call for more qualitative research in organizational behaviour and management studies (*e.g.*, Gephart 2004; Symon *et al.* 2000), we did not find many studies that used a qualitative approach to examine cognitive styles. A few recent examples are the works of Priola *et al.* (2004), Evans (2004), and Gallén (2006). Different scholars addressed the need for more qualitative research in the cognitive style field to gain deeper insight in the implications of cognitive style differences (Armstrong and Rayner 2002; Ford and Chen 2001; Riding 2000a).

Recently, Rayner (2006) stated that there can be no doubt that the psychometric tradition and positivist paradigm have dominated the cognitive style research domain. He calls for more functional research that takes practitioner awareness and applications of cognitive styles into account. We also believe that the cognitive style field can significantly increase its credibility and relevance towards practice by more extensive use of qualitative research methods in addition to the large body of available quantitative research. Qualitative research has the advantage of leading to a better understanding of the meaning of what is observed because it results in data of greater depth and richness (Bachiochi and Weiner 2002; Patton 2002). Priola *et al.* (2004) also called for methodological triangulation in the field to enhance the understanding of the complex phenomenon of people (with different cognitive styles) behaving in particular environments. “Methodological diversity may help the researcher reduce the limitations of the particular view through which the investigation is shaped with the adoption of a different view according to the different method” (Priola *et al.* 2004: 592). Importantly, choosing the best approach for a study needs to be driven by the research problem, as a match between the research question and the research approach is necessary (Creswell 2003).

Proposition 5: To further advance the cognitive style field, scholars should strive towards multiple sources of data and a mixture of qualitative and quantitative research methods as this can significantly enhance the insights about cognitive style differences and strengthen the validity of findings.

The sixth blind man found the elephant's tail. "I don't see what the excitement is all about", he said. "The elephant is nothing but a frayed bit of rope." And, like the others, he was satisfied with his quick first impression and headed back to the city.

ISSUE 6: BRIDGING THE RELEVANCE GAP THROUGH DIFFERENT APPROACHES OF KNOWLEDGE CREATION AND DISSEMINATION

The relevance gap

After touching on the five previous issues, it is clear that the field of cognitive styles is characterized by a lack of a coherent or consensual theory (Armstrong and Rayner 2002; Rayner 2006). According to some scholars, so much energy has been devoted to developing such a theory and criticizing each other's theories that the real world seemed to be forgotten (Coffield *et al.* 2004a, 2004b; Curry 2006). Rayner (2006: 8) wrote: "A weakness in style differences research is a continuing focus on technical issues regarding reliability and validity of the psychometric instruments and on theoretical questions regarding the psychological relationship with other constructs such as personality and intelligence. Meanwhile, a functional purpose to style research and the valuable efforts of practitioners in the field, and their possible successes, run the risk of being overlooked." It is hardly a new observation that there is often a gap between research and practice (*e.g.*, McKenney and Keen 1974).

Moreover, the gap between theory and practice is not only an issue in the cognitive style field. It is a widely discussed topic in many research domains, such as organizational change research (Miller *et al.* 1997), the field of management (Tranfield and Starkey 1998; Van de Ven and Johnson 2006), work and organizational psychology (Hodgkinson *et al.* 2001; Rynes *et al.* 1999), and human resource management research (Wilkerson 1999). Discussions about the causes of the gap and possible solutions to bridge it are widely debated.

Hodgkinson *et al.* (2001) developed an interesting four-fold taxonomy of managerial knowledge varieties that distinguishes four types of knowledge on the basis of an evaluation of the extent of practical relevance (low–high) and the extent of theoretical rigour (low–high) in management and organizational behaviour research. These scholars addressed the need for a shift towards pragmatic science, which combines high theoretical rigour and high practical relevance. We want to support this proposition and call for a ‘pragmatic reflex’ in cognitive style research. Optimally, research is of high academic quality and of high relevance to users. Rigorous academic research should be pertinent to managers’ professional development needs and, in an applied sense, to their actual work in their organizations (Wilkerson 1999). This way, we join other scholars in the field who called for a functional perspective in style research. Armstrong and Rayner (2002) called for a paradigm shift in the field and emphasized the importance of filling the ‘relevance gap’. In their perspective, this means that valence is an equally important element for the continuation of style research in addition to validity and reliability. Valence in their model means authenticity, credibility, and impact and refers to the extent to which the findings of a study are relevant to a particular context. Validity, reliability, and valence are three important elements (called ‘verities’ by Armstrong and Rayner (2002)) that need to be taken into account in the design of research and in the process of inquiry. This implies, for instance, not developing an overarching individual differences model or searching fundamental cognitive style dimensions just for the sake of doing it. Keeping in mind the practical relevance is equally important in this process (*e.g.*, developing a model that takes the context into account).

Furthermore, the cognitive style field is not the only field that lacks a consensual theory. The fields of entrepreneurship or organizational change research – to name only two examples – are also characterized by many reviews and continuous debates on the pluralism and fragmentation in the respective research fields (*e.g.*, Gartner 2001; Pettigrew *et al.* 2001). This does not need to be a surprise, for the simple reason that it is not easy to get a grip on complex phenomena. In sum, the main challenge for academics is to increase the actual and perceived relevance of their research to practitioners and managers, while at the same time not sacrificing their works rigour and breadth. Or – to refer to the call from Rayner (2006) – the key is to work on two critical issues to advance the cognitive style field: (1) to generate a consensual theory of style differences that demonstrates construct validity, and at the same time (2) to seek an integration of theoretical and applied research methodologies to produce functional theory and practically relevant findings. In this respect, we provide some relevant criteria to assess the rigour and relevance of cognitive style research in Appendix 1.

Several authors developed theories to conceptualize the gap between theory and practice and made suggestions to bridge it by referring for instance to (1) different modes of knowledge production (Starkey and Madan 2001; Tranfield and Starkey 1998) or (2) different channels of knowledge dissemination (Kelemen and Bansal 2002; Rynes *et al.* 2001). Van de Ven and Johnson (2006) elaborated on the continuous debate within the management field about criteria of usefulness and what constitutes relevant knowledge. To create useful knowledge for practitioners, researchers need to bridge some of the assumptional differences that characterize knowledge creation and knowledge utilization activities in research and in practice. We focus concisely on these two issues, which link to earlier suggested theoretical and measurement aspects (*e.g.*, longitudinal research, in environmental contexts, using a mixture of quantitative and qualitative research methods).

Different approaches of knowledge creation

Offermann and Spiros (2001) suggested that researchers could influence practice better by including an applied practice focus in research. This means “gearing research toward practice in context; using real-world situations, field studies, and longitudinal designs; and writing reports in plain language that includes ‘how and when to’s’” (Offermann and Spiros 2001: 389). According to Amabile *et al.* (2001: 418), academic–practitioner collaboration includes “framing research questions in a way that will be meaningful for practitioners, gaining access to sites for field research, designing data collection instruments and methods appropriate for today’s workforce, and interpreting results accurately within the business context”. Starkey and Madan (2001) suggested that the formation of knowledge networks can align the needs of researchers and practitioners. These knowledge networks involve the practitioners from the beginning of the research process (*e.g.*, formulating the research agenda, choosing the topic and mode of research) and make sure dissemination of research findings takes place as an integral part of the actual research process. Rynes *et al.* (1999) also suggested that the collaboration between academics and practitioners in designing, conducting, and implementing research in real organizational settings will improve the exchange of knowledge between them. However, these authors also listed some concerns regarding research in organizations, such as the risk of focusing on narrow and short-term research questions, the possible challenges to both internal and external validity, and questions concerning the independence and objectivity of the researcher.

Different approaches of knowledge utilization

Joint knowledge creation by academics and practitioners is not yet enough to enhance the relevance and usefulness of cognitive style research. Another important element in knowledge exchange is the ability of users to absorb the knowledge that is transferred (Mohrman *et al.* 2001; Starkey and Madan 2001). Offermann and Spiros (2001: 389) wrote that “the relevance of both basic and application-focused research needs to be more effectively communicated to their likely consumers through appropriate mechanisms”. This can be established both in a direct way (*e.g.*, direct contact between researchers and users) and in an indirect way (*e.g.*, publications, journal articles) (Beyer and Trice 1982). Rynes *et al.* (1999) found that the likelihood of the implementation of findings of organizational research in organizations increased to the extent that the researchers made implicit or explicit recommendations in their reports to organizations. As Argyris (1996: 84) wrote: “a deeper problem related to conducting empirical research that is primarily descriptive surfaces when researchers attempt to develop action implications from such research”. He invites researchers to define how to get from here to there, not only conceptually, but also operationally so that the implications can be tested in the world of practice. “In order for knowledge to be actionable [in the world of practice], it must specify the sequence of action required to achieve the specified intended consequence” (Argyris 1996: 85). Starkey and Madan (2001: S12) formulated following writing advice: “Authors who strive to craft relevant articles for practitioners need to focus on the concerns of practice, provide real value to professionals, and apply a pragmatic rather than academic tone. Ideally, they should also describe how the ideas discussed or actions suggested would be implemented in practice, allowing for contextual differences that are important to different readership communities.”

Proposition 6: In addition to theoretical rigour, the practical relevance of cognitive style research should be enhanced by taking a pragmatic reflex in style research and by focusing attention to reliability, validity, and valence in the design of research and in the process of inquiry

But finally, an old blind man came. He took his time and studied the elephant thoroughly. He walked all around the elephant, touching every part of it, smelling it, listening to all of its sounds. Finally, he returned to the city, only to find it in an uproar. Each of the six young blind men had acquired followers who eagerly heard his story. But then, as the people found that there were six different contradictory descriptions, they all begun to argue. The old man quietly listened to the fighting. “It’s like a snake!” “No, it’s like a fan!” “No, it’s like a wall!” “No, it’s like a spear!” “No, it’s like a tree!” “No, it’s like a rope!”

CHARACTERIZING A PERFECT ELEPHANT: A POTENTIAL AGENDA FOR FUTURE COGNITIVE STYLE RESEARCH

We started this article with listing key issues that needed to be addressed to advance the cognitive style field (based on Riding (2000) and Curry (2006)). These issues dealt with:

- the theory of cognitive styles: the need for conceptual clarification about what cognitive styles are and what the relationship between cognitive style and other individual differences constructs is, and the identification of the fundamental cognitive style dimensions;
- the measurement of cognitive styles: the development of simple, direct, and valid cognitive style measures and the identification of valid, reliable, and convenient cognitive style measures; and
- the practical relevance of cognitive styles: the call for explicitly addressing the ‘so what’ question in empirical research and for searching observable applications of cognitive style in practice.

We aimed to address each of these critical aspects in this article. To conclude, we want to make abstraction of previous discussions and bring the proposed suggestions together in a potential future research agenda for the field of cognitive styles in general (see Figure 1). To build this framework, we used the key issues of Riding (2000) and Curry (2006).

To avoid repetition, we concisely focus on some aspects of the model. The underlying meanings of all elements in the framework were addressed in previous sections of the article.

Insert Figure 1 About Here

With regard to theoretical advancement, we believe the cognitive style field can take advantage of building networks of cognitive style scholars. A multidisciplinary approach can also help to overcome the fragmented perspective of many studies in the field. Rather than working in isolation, from different perspectives, and using different models and measurement instruments, building a joint research agenda can lead to the further development of the field. Developing such a joint research agenda can, for instance, start with clearly defining what cognitive styles are and what differentiates them from other concepts, and with making an overview of what we already know about the impact of cognitive styles in education, management, and organizational behaviour and which areas are still unexplored. This way, the field can make progress in identifying fundamental cognitive style dimensions, developing an overarching individual differences model, and listing relevant issues for further research. Several recent reviews in the cognitive style field also called for (1) investigating the contribution of different cognitive style models on the basis of extensive reviews and meta-analyses on the one hand, and (2) examining the validity, reliability, and practicality of cognitive style measures for use in educational and organizational contexts on the other hand (Armstrong and Sadler-Smith 2006; Cassidy 2004; Coffield *et al.* 2004b; Rayner 2006). Joint multidisciplinary research teams can be a useful means to do so.

In the area of measurement, we believe in the usefulness of evolving towards longitudinal studies in natural settings that make use of multiple methods and multiple sources. Additionally, using several cognitive style measures simultaneously can lead to interesting perspectives and potentially even to the identification of fundamental cognitive style dimensions and to the development of an overarching cognitive style measure.

Finally, we elaborated on useful suggestions to further bridge the relevance gap. To evolve in the direction of pragmatic science (*i.e.*, high scientific rigour combined with high practical relevance), different approaches of knowledge creation and knowledge dissemination need to be considered. Building joint networks of researchers and practitioners can be worthwhile in this regard.

The old man went home, laughing as he remembered his own foolishness as a young man. He once hastily concluded that he understood the whole of something when he had experienced only a part. He laughed again as he remembered his greater foolishness of once being unwilling to discover truth for himself, depending wholly on others' teachings.

CONCLUSION

All scholars within the management and organizational behaviour fields attempt in their unique way to understand why people act the way they do. Understanding and predicting organizational behaviour remains a challenge because many factors influence the interaction between people and situations. Many scholars have tried, with various methods and approaches, to find the ultimate way to do so. Furnham and Springfield (1993: 827-828) even compared it with the search for the Holy Grail: "The search for personality [individual differences] correlates and determinants of organizational behaviour (success and failure) has a lot in common with the search for the Holy Grail. However, the search has been very long standing, full of myths and legends, and largely unsuccessful". Tett *et al.* (2000) also concluded that the complexity of managerial and organizational behaviour poses various challenges on those who attempt to predict, regulate, and understand it. In this respect, we are all blind men who try to characterize the elephant.

But the difficulties to find the Holy Grail may not prevent us from seeking it. Or, like Furnham (1995: 411) wrote: "A pessimist might argue that despite 50 years of research into cognitive/learning styles, we still know precious little if the above questions have not been answered or even attempted. An optimist, though, might be impressed by the research effort that has gone into this topic, by the proliferation of ideas, and by the evidence already accumulated." Let's conclude with an optimistic note.

We are convinced that taking into account the proposed research agenda in further work can help us – cognitive style scholars – to come one step closer in our search for understanding the impact of cognitive style differences on people’s organizational behaviour, work attitudes, and performance. Hence, the search goes on...

But he laughed hardest of all as he realized that he had become the only one in the city who did not know what an elephant is like.

NOTES

[1] The story of ‘the blind men and the elephant’ is an old Indian story. We were inspired by Gartner (2001), who used a similar approach to list recommendations for the advancement of the entrepreneurship field. For additional references to this story, we refer to Gartner (2001).

REFERENCES

- Allinson, C.W., Armstrong, S.J., & Hayes, J. (2001). The effects of cognitive style on leader-member exchange: a study of manager-subordinate dyads. *Journal of Occupational and Organizational Psychology*, *74*, 201-220.
- Allinson, C.W., & Hayes, J. (1996). The Cognitive Style Index: a measure of intuition-analysis for organizational research. *Journal of Management Studies*, *33*, 119-135.
- Allinson, C.W., & Hayes, J. (2000). Cross-national differences in cognitive style: implications for management. *International Journal of Human Resource Management*, *11*, 161-170.
- Amabile, T.M., Patterson, C., Mueller, J., Wojcik, T., Odomirok, P.W., Marsh, M., & Kramer, S.J. (2001). Academic-practitioner collaboration in management research: a case of cross-profession collaboration. *Academy of Management Journal*, *44*, 418-431.
- Argyris, C. (1996). Unrecognized defenses of scholars: impact on theory and research. *Organization Science*, *7*, 79-87.
- Aritzeta, A., Senior, B., & Swailes, S. (2005). Team role preference and cognitive styles: a convergent validity study. *Small Group Research*, *36*, 404-436.
- Armstrong, S.J. (2000). The influence of cognitive style on performance in management education. *Educational Psychology*, *20*, 323-339.
- Armstrong, S.J., Allinson, C.W., & Hayes, J. (1997). The implications of cognitive style for the management of student-supervisor relationships. *Educational Psychology*, *17*, 209-217.
- Armstrong, S.J., Allinson, C.W., & Hayes, J. (2002). Formal mentoring systems: an examination of the effects of mentor/protégé cognitive styles on the mentoring process. *Journal of Management Studies*, *39*, 1111-1137.

Armstrong, S.J., Allinson, C.W., & Hayes, J. (2004). The effects of cognitive style on research supervision: a study of student-supervisor dyads in management education. *Academy of Management Learning and Education*, 3, 41-63.

Armstrong, S.J., & Priola, V. (2001). Individual differences in cognitive style and their effects on task and social orientations of self-managed work teams. *Small Group Research*, 32, 283-312.

Armstrong, S.J., & Rayner, S.G. (2002). Inquiry and style: research verities and the development of a consensual theory? In M. Valcke, D. Gombeir, S.J. Armstrong, A. Francis, M. Graff, J. Hill, S. Rayner, E. Sadler-Smith, & D. Spicer (Eds.), *Learning styles: reliability & validity* (pp. 25-36). Proceedings of the 7th Annual ELSIN conference, June 26-28, Ghent University, Department of Education, Ghent.

Armstrong, S.J., & Sadler-Smith, E. (2006). *Cognitive style and its relevance for the management of careers*. Paper presented at the 66th Academy of Management Conference, August 11-16, Atlanta.

Bachiochi, P.D., & Weiner, S.P. (2002). Qualitative data collection and analysis. In S.G. Rogelberg (Ed.), *Handbook of research methods in industrial and organizational psychology* (pp. 161-183). Malden, MA: Blackwell.

Barsade, S.G., & Gibson, D.E. (2007). Why does affect matter in organizations? *Academy of Management Perspectives*, 21, 36-59.

Berr, S.A., Church, A.H., & Waclawski, J. (2000). The right personality is everything: linking personality preferences to managerial behaviors. *Human Resource Development Quarterly*, 11, 133-157.

Beyer, J.M., & Trice, H.M. (1982). The utilization process: a conceptual framework and synthesis of empirical findings. *Administrative Science Quarterly*, 27, 591-622.

Beyler, J., & Schmeck, R.R. (1992). Assessment of individual differences in preferences for holistic-analytic strategies: evaluation of some commonly available instruments. *Educational and Psychological Measurement*, 52, 709-719.

- Bokoros, M.A., Goldstein, M.B., & Sweeney, M.M. (1992). Common factors in five measures of cognitive style. *Current Psychology: Research & Reviews*, *11*, 99-109.
- Bostic, J.Q., & Tallent-Runnels, M.K. (1991). Cognitive styles: a factor analysis of six dimensions with implications for consolidation. *Perceptual and Motor Skills*, *72*, 1299-1306.
- Buttner, E.H., Gryskiewicz, N., & Hidore, S.C. (1999). The relationship between styles of creativity and managerial skills assessment. *British Journal of Management*, *10*, 228-238.
- Cassidy, S. (2004). Learning styles: an overview of theories, models, and measures. *Educational Psychology*, *24*, 419-444.
- Chatman, J.A., & Flynn, F.J. (2005). Full-cycle micro-organizational behavior research. *Organization Science*, *16*, 434-447.
- Church, A.H., & Waclawski, J. (1995). The effects of personality orientation and executive behavior on subordinate perceptions of workgroup enablement. *International Journal of Organizational Analysis*, *3*, 20-51.
- Church, A.H., & Waclawski, J. (1998). The relationship between individual personality orientation and executive leadership behaviour. *Journal of Occupational and Organizational Psychology*, *71*, 99-125.
- Clapp, R.G. (1993). Stability of cognitive style in adults and some implications: a longitudinal study of the Kirton Adaption-Innovation Inventory. *Psychological Reports*, *73*, 1235-1245.
- Coffield, F., Moseley, D., Hall, E., & Ecclestone, K. (2004a). *Should we be using learning styles? What research has to say to practice*. London: Learning & Skills Research Centre.
- Coffield, F., Moseley, D., Hall, E., & Ecclestone, K. (2004b). *Learning styles and pedagogy in post-16 learning: a systematic and critical review*. London: Learning & Skills Research Centre.

- Cools, E., & Van den Broeck, H. (2006a). Values, attitudes and emotions. In M. Buelens, H. Van den Broeck, K. Vanderheyden, R. Kreitner, & A. Kinicki (Eds.), *Organisational behaviour, third edition* (pp. 89-125). London: McGraw-Hill.
- Cools, E., & Van den Broeck, H. (2006b). Personality dynamics. In M. Buelens, H. Van den Broeck, K. Vanderheyden, R. Kreitner, & A. Kinicki (Eds.), *Organisational behaviour, third edition* (pp. 42-88). London: McGraw-Hill.
- Côté, S., & Miners, C.T.H. (2006). Emotional intelligence, cognitive intelligence, and job performance. *Administrative Science Quarterly*, *51*, 1-28.
- Creswell, J.W. (2003). *Research design: qualitative, quantitative and mixed methods approaches (second edition)*. Thousand Oaks, CA: Sage.
- Curry, L. (1983). An organization of learning style theory and constructs. In L. Curry (Ed.), *Learning style in continuing medical education* (pp. 115-123). Halifax: Dalhousie University.
- Curry, L. (1990). A critique of the research on learning styles. *Educational Leadership*, *48*, 50-56.
- Curry, L. (2000). Review of learning style, studying approach, and instructional preference research in medical education. In R.J. Riding & S.G. Rayner (Eds.), *International perspectives on individual differences. Volume 1: cognitive styles* (pp. 239-276). Stamford, CT: Ablex.
- Curry, L. (2006). *Enabling life long learning at work and at school: what should we do if we meant it?* Keynote address, Enabling Lifelong Learning in Education, Training and Development, Eleventh Annual Conference of the European Learning Styles Information Network, June 12–14, Oslo, Norway.
- Dane, E., & Pratt, M.G. (2007). Exploring intuition and its role in managerial decision making. *Academy of Management Review*, *32*, 33-54.
- Desmedt, E., & Valcke, M. (2004). Mapping the learning styles jungle: an overview of the literature based on citation analysis. *Educational Psychology*, *24*, 445-464.

- Doktor, R.H. (1978). Problem solving styles of executives and management scientists. *TIMS Studies in the Management Sciences*, 8, 123-134.
- Edwards, J.A., Lanning, K., & Hooker, K. (2002). The MBTI and social information processing: an incremental validity study. *Journal of Personality Assessment*, 78, 432-450.
- Epstein, S., Pacini, R., Denes-Raj, V., & Heier, H. (1996). Individual differences in intuitive-experiential and analytical-rational thinking styles. *Journal of Personality and Social Psychology*, 71, 390-405.
- Evans, C. (2004). Exploring the relationship between cognitive style and teaching style. *Educational Psychology*, 24, 509-530.
- Federico, P.A., & Landis, D.B. (1984). Cognitive styles, abilities, and aptitudes: are they dependent or independent? *Contemporary Educational Psychology*, 9, 146-161.
- Fleenor, J.W., & Taylor, S. (1994). Construct validity of three self-report measures of creativity. *Educational and Psychological Measurement*, 54, 464-470.
- Ford, N., & Chen, S.Y. (2001). Matching/mismatching revisited: an empirical study of learning and teaching styles. *British Journal of Educational Technology*, 32, 5-22.
- Fuller, L.R., & Kaplan, S.E. (2004). A note about the effect of auditor cognitive style on task performance. *Behavioral Research in Accounting*, 16, 131-143.
- Furnham, A. (1995). The relationship of personality and intelligence to cognitive learning style and achievement. In D.H. Saklofske & M. Zeidner (Eds.), *International handbook of personality and intelligence* (pp. 397-413). New York: Plenum Press.
- Furnham, A., & Stringfield, P. (1993). Personality and occupational behavior: Myers-Briggs Type Indicator correlates of managerial practices in two cultures. *Human Relation*, 46, 827-848.
- Gallén, T. (2006). Managers and strategic decisions: does the cognitive style matter? *Journal of Management Development*, 25, 118-133.

- Gartner, W.B. (2001). Is there an elephant in entrepreneurship? Blind assumptions in theory development. *Entrepreneurship Theory and Practice*, 26, 27-39.
- George, J.M., & Jones, G.R. (2000). The role of time in theory and theory building. *Journal of Management*, 26, 657-684.
- Gephart, R.P., Jr. (2004). Qualitative research and the *Academy of Management Journal*. *Academy of Management Journal*, 47, 454-462.
- Goldsmith, R.E. (1994). Creative style and personality theory. In M.J. Kirton (Ed.), *Adaptors and innovators: styles of creativity and problem solving* (pp. 34-50). New York: Routledge.
- Grigorenko, E.L., & Sternberg, R.J. (1995). Thinking styles. In D.H. Saklofske & M. Zeidner (Eds.), *International handbook of personality and intelligence* (pp. 205-229). New York: Plenum Press.
- Grigorenko, E.L., & Sternberg, R.J. (1997). Styles of thinking, abilities, and academic performance. *Exceptional Children*, 63, 295-312.
- Guilford, J.P. (1980). Cognitive styles: what are they? *Educational and Psychological Measurement*, 40, 715-735.
- Hattrup, K., & Jackson, S.E. (1996). Learning about individual differences by taking situations seriously. In K.R. Murphy (Ed.), *Individual differences and behavior in organizations* (pp. 507-547). San Francisco, CA: Jossey-Bass.
- Hayes, J., & Allinson, C.W. (1994). Cognitive style and its relevance for management practice. *British Journal of Management*, 5, 53-71.
- Hayes, J., & Allinson, C.W. (1996). The implications of learning styles for training and development: a discussion of the matching hypothesis. *British Journal of Management*, 7, 63-73.
- Hayes, J., & Allinson, C.W. (1998). Cognitive style and the theory and practice of individual and collective learning in organizations. *Human Relations*, 51, 847-871.

- Hayes, J., Allinson, C.W., Hudson, R.S., & Keasey, K. (2003). Further reflections on the nature of intuition-analysis and the construct validity of the Cognitive Style Index. *Journal of Occupational and Organizational Psychology*, 76, 269-278.
- Higgs, M. (2001). Is there a relationship between the Myers-Briggs Type Indicator and emotional intelligence? *Journal of Managerial Psychology*, 16, 509-533.
- Hill, J., Puurula, A., Sitko-Lutek, A., & Rakowska, A. (2000). Cognitive style and socialisation: an exploration of learned sources of style in Finland, Poland and the UK. *Educational Psychology* 20, 285-305.
- Hodgkinson, G.P., Herriot, P. & Anderson, N. (2001). Re-aligning stakeholders in management research: lessons from industrial, work and organizational psychology. *British Journal of Management*, 12, S41-S48.
- Hodgkinson, G.P., & 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, 243-268.
- Holzman, K., & Klein, G.S. (1954). Cognitive system-principles of levelling and sharpening: individual differences in visual time-error assimilation effects. *Journal of Psychology*, 37, 105-122.
- Honey, P., & Mumford, A. (1992). *The manual of learning styles: revised edition*. Maidenhead: Peter Honey.
- House, R.J., Shane, S.A., & Herold, D.M. (1996). Rumors of the death of dispositional research are vastly exaggerated. *Academy of Management Review*, 21, 203-224.
- Hudson, L. (1966). *Contrary imaginations*. Harmondsworth: Penguin.
- Hunt, R.G., Krzystofiak, F.J., Meindl, J.R., & Yousry, A.M. (1989). Cognitive style and decision making. *Organizational Behavior and Human Decision Processes*, 44, 436-453.
- Iaccino, J.F. (1993). *Left brain-right brain differences: inquiries, evidence, and new approaches*. Hillsdale, NJ: Lawrence Erlbaum Associates.

- Izard, C.E. (1993). Four systems of emotion activation: cognitive and noncognitive processes. *Psychological Review*, *100*, 68-90.
- Jabri, M.M. (1991). The development of conceptually independent subscales in the measurement of modes of problem solving. *Educational and Psychological Measurement*, *51*, 975-983.
- Johns, G. (2006). The essential impact of context on organizational behaviour. *Academy of Management Review*, *31*, 386-408.
- Johnson R.B., & Onwuegbuzie A.J. (2004). Mixed methods research: a research paradigm whose time has come. *Educational Researcher*, *33*, 14-26.
- Jones, A.E. (1997). Reflection-impulsivity and wholist-analytic: two fledglings? ... or is R-I a cuckoo? *Educational Psychology*, *17*, 65-77.
- Judge, T.A., & Cable, D.M. (1997). Applicant personality, organizational culture, and organizational attraction. *Personnel Psychology*, *50*, 359-394.
- Kagan, J. (1965). Individual differences in the resolution of response uncertainty. *Journal of Personality and Social Psychology*, *2*, 154-160.
- Kaufmann, G. (1979). The explorer and the assimilator: a cognitive style distinction and its potential implications for innovative problem solving. *Scandinavian Journal of Educational Research*, *23*, 101-108.
- Kelemen, M., & Bansal, P. (2002). The conventions of management research and their relevance to management practice. *British Journal of Management*, *13*, 97-108.
- Kirton, M. (1976). Adaptors and innovators: a description and measure. *Journal of Applied Psychology*, *61*, 622-629.
- Kirton, M.J. (1994). A theory of cognitive style. In M.J. Kirton (Ed.), *Adaptors and innovators: styles of creativity and problem solving* (pp. 1-33). New York: Routledge.
- Kirton, M.J. (2003). *Adaption-innovation in the context of diversity and change*. London: Routledge.

- Kirton, M.J., & de Ciantis, S.M. (1986). Cognitive style and personality: the Kirton Adaption-Innovation and Cattell's Sixteen Personality Factor Inventories. *Personality and Individual Differences*, 7, 141-146.
- Kolb, D.A. (1984). *Experiential learning: experience as a source of learning and development*. New Jersey: Prentice-Hall.
- Leonard, D., & Straus, S. (1997). Putting your company's whole brain to work. *Harvard Business Review*, 75, 111-121.
- Leonard, N.H., Scholl, R.W., & Kowalski, K.B. (1999). Information processing style and decision making. *Journal of Organizational Behavior*, 20, 407-420.
- Lewin, K. (1951). *Field theory in social science*. New York: Harper.
- Martinsen, O., & Kaufmann, G. (2000). The Assimilator-Explorer cognitive styles and their relationship to affective-motivational orientations and cognitive performance. In R.J. Riding & S.G. Rayner (Eds.), *International perspectives on individual differences. Volume 1: cognitive styles* (pp. 3-39). Stamford, CT: Ablex.
- McKenna, F.P. (1984). Measures of field dependence: cognitive style or cognitive ability? *Journal of Personality and Social Psychology*, 47, 593-603.
- McKenney, J.L., & Keen, P.G.W. (1974). How managers' minds work. *Harvard Business Review*, 52, 79-90.
- Messick, S. (1984). The nature of cognitive styles: problems and promises in educational practice. *Educational Psychologist*, 19, 59-74.
- Messick, S. (1994). The matter of style: manifestations of personality in cognition, learning, and teaching. *Educational Psychologist*, 29, 121-136.
- Messick, S. (1996). Bridging cognition and personality in education: the role of style in performance and development. *European Journal of Personality*, 10, 353-376.
- Michie, S., & West, M.A. (2004). Managing people and performance: an evidence based framework applied to health service organizations. *International Journal of Management Reviews*, 5/6, 91-111.

- Miller, D., Greenwood, R., & Hinings, B. (1997). Creative chaos versus munificent momentum: the schism between normative and academic views of organizational change. *Journal of Management Inquiry*, 6, 71-78.
- Mohrman, S.A., Gibson, C.B., & Mohrman, A.M., Jr. (2001). Doing research that is useful to practice: a model and empirical exploration. *Academy of Management Journal*, 44, 357-375.
- Moorhead, G., & Griffin, R.W. (2004). *Organizational behavior: managing people and organizations (seventh edition)*. New York: Houghton Mifflin.
- Mudd, S. (1996). Kirton's A-I theory: evidence bearing on the style/level and factor composition issues. *British Journal of Psychology*, 87, 241-254.
- Murdock, M.C., Isaksen, S.G., & Lauer, K.J. (1993). Creativity training and the stability and internal consistency of the Kirton Adaption-Innovation Inventory. *Psychological Reports*, 72, 1123-1130.
- Murphy, K.R. (1996). Individual differences and behavior in organizations: much more than g. In K.R. Murphy (Ed.), *Individual differences and behaviour in organizations* (pp. 3-30). San Francisco, CA: Jossey-Bass.
- Myers, I.B., McCaulley, M.H., Quenk, N.L., & Hammer, A.L. (2003). *MBTI manual: a guide to the development and use of the Myers-Briggs Type Indicator*. Palo Alto, CA: Consulting Psychologists Press.
- Nordvik, H. (1996). Relationship between Holland's vocational typology, Schein's career anchors and Myers-Briggs' types. *Journal of Occupational and Organizational Psychology*, 69, 263-275.
- Offerman, L.R., & Spiros, R.K. (2001). The science and practice of team development: improving the link. *Academy of Management Journal*, 44, 376-392.
- Ornstein, R.E. (1977). *The psychology of consciousness (second edition)*. New York: Harcourt, Brace, Jovanovich.
- Pask, G. (1976). Styles and strategies of learning. *British Journal of Educational Psychology*, 46, 128-148.

- Patton, M.Q. (2002). *Qualitative research & evaluation methods* (third edition). Thousand Oaks, CA: Sage.
- Peterson, E.R., Deary, I.J., & Austin, E.J. (2003). The reliability of Riding's Cognitive Style Analysis test. *Personality and Individual Differences*, 34, 881-891.
- Pettigrew, A.M., Woodman, R.W., & Cameron, K.S. (2001). Studying organizational change and development: challenges for future research. *Academy of Management Journal*, 44, 697-713.
- Prevedi, G.P., & Carli, M. (1987). Adaption-Innovation typology and right-left hemispheric preferences. *Personality and Individual Differences*, 8, 681-686.
- Priola, V., Smith, J.L., & Armstrong, S.J. (2004). Group work and cognitive style: a discursive investigation. *Small Group Research*, 35, 565-595.
- Rayner, S. (2006). What next? Developing global research and applied practice in the field of cognitive and learning styles. In L. Lassen, L. Bostrom & 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.
- Rayner, S., & Riding, R.J. (1997). Towards a categorization of cognitive styles and learning styles. *Educational Psychology*, 17, 5-27.
- Redding, S.G. (1980). Cognition as an aspect of culture and its relation to management processes. *Journal of Management Studies*, 17, 127-148.
- Redmond, J.A., Mullally, A.A.P., & Parkinson, A.B. (2002). Test re-test reliability of Riding's CSA. In M. Valcke, D. Gombeir, S.J. Armstrong, A. Francis, M. Graff, J. Hill, S. Rayner, E. Sadler-Smith, & D. Spicer (Eds.), *Learning styles: reliability & validity* (pp. 303-313). Proceedings of the 7th Annual ELSIN conference, June 26-28, Ghent University, Department of Education, Ghent.
- Rickards, T., & Gaston, K. (1995). A re-examination of personal and group estimates of the Kirton Adaption-Innovation scores. *Psychological Reports*, 77, 491-498.

- Riding, R.J. (1991). *Cognitive Styles Analysis*. Birmingham: Learning and Training Technology.
- Riding, R.J. (1997). On the nature of cognitive style. *Educational Psychology, 17*, 29-49.
- Riding, R.J. (2000a). Cognitive style: a strategic approach for advancement. In R.J. Riding & S.G. Rayner (Eds.), *International perspectives on individual differences. Volume 1: cognitive styles* (pp. 365-377). Stamford, CT: Ablex.
- Riding, R.J. (2000b). Cognitive style: a review. In R.J. Riding & S.G. Rayner (Eds.), *International perspectives on individual differences. Volume 1: cognitive styles* (pp. 315-344). Stamford, CT: Ablex.
- Riding, R., & Agrell, T. (1997). The effect of cognitive style and cognitive skills on school subject performance. *Educational Studies, 23*, 311-323.
- Riding, R., Burton, D., Rees, G., & Sharratt, M. (1995). Cognitive style and personality in 12-year-old children. *British Journal of Educational Psychology, 65*, 113-124.
- Riding, R., & Cheema, I. (1991). Cognitive styles: an overview and integration. *Educational Psychology, 11*, 193-215.
- Riding, R., Glass, A., & Douglas, G. (1993). Individual differences in thinking: Cognitive and neurophysiological perspectives. *Educational Psychology, 13*, 267-279.
- Riding, R.J., Glass, A., Butler S.R., & Pleydell-Pearce C.W. (1997). Cognitive style and individual differences in EEG alpha during information processing. *Educational Psychology, 17*, 219-234.
- Riding, R., & Pearson, F. (1994). The relationship between cognitive style and intelligence. *Educational Psychology, 14*, 413-425.
- Riding, R., & Rayner, S. (1998). *Cognitive styles and learning strategies: understanding style differences in learning and behaviour*. London: Fulton.

- Riding, R.J., & Taylor, E.M. (1976). Imagery performance and prose comprehension in seven-year-old children. *Educational Studies*, 2, 21-27.
- Riding, R.J., & Wigley, S. (1997). The relationship between cognitive style and personality in further education students. *Personality and Individual Differences*, 23, 379-389.
- Robey, D., & Taggart, W. (1981). Measuring managers' minds: the assessment of style in human information processing. *Academy of Management Review*, 6, 375-383.
- Rousseau, D.M., & Fried, Y. (2001). Location, location, location: contextualizing organizational research. *Journal of Organizational Behavior*, 22, 1-13.
- Rynes, S.L., Bartunek, J.M., & Daft, R.L. (2001). Across the great divide: knowledge creation and transfer between practitioners and academics. *Academy of Management Journal*, 44, 340-355.
- Rynes, S.L., McNatt, D.B., & Bretz, R.D. (1999). Academic research inside organizations: inputs, processes and outcomes. *Personnel Psychology*, 52, 869-898.
- Sadler-Smith, E. (1997). 'Learning style': frameworks and instruments. *Educational Psychology*, 17, 51-63.
- Sadler-Smith, E. (1998). Cognitive style: some human resource implications for managers. *International Journal of Human Resource Management*, 9, 185-202.
- Sadler-Smith, E. (1999a). Intuition-analysis cognitive style and learning preferences of business and management students: a UK exploratory study. *Journal of Managerial Psychology*, 14, 26-38.
- Sadler-Smith, E. (1999b). Intuition-analysis style and approaches to studying. *Educational Studies*, 25, 159-173.
- Sadler-Smith, E. (2001). The relationship between learning style and cognitive style. *Personality and Individual Differences*, 30, 609-616.
- Sadler-Smith, E. (2004). Cognitive style and the management of small and medium-sized enterprises. *Organization Studies*, 25, 155-181.

- Sadler-Smith, E., & Badger, B. (1998). Cognitive style, learning and innovation. *Technology Analysis and Strategic Management*, *10*, 247-265.
- Scandura, T.A., & Williams, E.A. (2000). Research methodology in management: current practices, trends, and implications for future research. *Academy of Management Journal*, *43*, 1248-1264.
- Shah, S.K., & Corley, K.G. (2006). Building better theory by bridging the quantitative–qualitative divide. *Journal of Management Studies*, *43*, 1821-1835.
- Shipman, K.S., & Shipman, V.C. (1985). Cognitive styles: some conceptual, methodological and applied issues. In E.E. Gordon (Ed.), *Review of research in education* (Vol. 12, pp. 199-210). Washington, DC: American Educational Research Association.
- Shrivastava, P. (1987). Rigor and practical usefulness of research in strategic management. *Strategic Management Journal*, *8*, 77-92.
- Spicer, D. (2004). *The impact of approaches to learning and cognition on academic performance in business and management*. Working Paper Series, Bradford University School of Management, February 2004, Working Paper No 04/03.
- Starkey, K., & Madan, P. (2001). Bridging the relevance gap: aligning stakeholders in the future of management research. *British Journal of Management*, *12*, S3-S26.
- Sternberg, R.J., & Grigorenko, E.L. (1997a). Are cognitive styles still in style? *American Psychologist*, *52*, 700-712.
- Sternberg, R.J., & Grigorenko, E. (1997b). *Intelligence, heredity and environment*. Cambridge, MA: Cambridge University Press.
- Streufert, S., & Nogami, G.Y. (1989). Cognitive style and complexity: implications for I/O psychology. In C.L. Cooper & I. Robertson (Eds.), *International review of industrial and organizational psychology* (pp. 93-143). Chichester: Wiley.
- Symon, G., Cassell, C., & Dickson, R. (2000). Expanding our research and practice through innovative research methods. *European Journal of Work and Organizational Psychology*, *9*, 457-462.

- Taggart, W., & Robey, D. (1981). Minds and managers: on the dual nature of human information processing and management. *Academy of Management Review*, 6, 187-195.
- Taggart, W., Robey, D., & Kroeck, K.G. (1985). Managerial decision styles and cerebral dominance: an empirical study. *Journal of Management Studies*, 22, 175-192.
- Taylor, J.A. (1994). Stability of schoolchildren's cognitive style: a longitudinal study of the Kirton Adaption-Innovation Inventory. *Psychological Reports*, 74, 1008-1010.
- Tett, R.P., Guterman, H.A., Bleier, A., & Murphy, P.J. (2000). Development and content validation of a "hyperdimensional" taxonomy of managerial competence. *Human Performance*, 13, 205-251.
- Thomas, K.W., & Tymon, W.G., Jr. (1982). Necessary properties of relevant research: lessons from recent criticisms of the organizational science. *Academy of Management Review*, 7, 345-352.
- Tiedemann, J. (1989). Measures of cognitive styles: a critical review. *Educational Psychologist*, 24, 261-275.
- Tierney, P., Farmer, S.M., & Graen G.B. (1999). An examination of leadership and employee creativity: the relevance of traits and relationships. *Personnel Psychology*, 52, 591-620.
- Tinajero, C., & Paramo, M.F. (1998). Field dependence-independence cognitive style and academic achievement: a review of research and theory. *European Journal of Psychology of Education*, 13, 227-253.
- Tranfield, D., & Starkey, K. (1998). The nature, social organization and promotion of management research: towards policy. *British Journal of Management*, 9, 341-353.
- Tullett, A.D. (1997). Cognitive style: not culture's consequence. *European Psychologist*, 2, 258-267.
- Tullett, A.D., & Davies, G.B. (1997). Cognitive style and affect: a comparison of the Kirton Adaption-Innovation and Schutz's Fundamental Interpersonal Relations

- Orientation-Behaviour Inventories (KAI and FIRO-B). *Personality and Individual Differences*, 23, 479-485.
- Tullett, A.D., & Kirton, M.J. (1995). Further evidence for the independence of adaptive-innovative (A-I) cognitive style from national culture. *Personality and Individual Differences*, 19, 393-296.
- Van de Ven, A.H., & Johnson, P.E. (2006). Knowledge for theory and practice. *Academy of Management Review*, 31, 802-821.
- Volkema, R.J., & Gorman, R.H. (1998). The influence of cognitive-based group composition on decision-making process and outcome. *Journal of Management Studies*, 35, 105-121.
- Wardell, D.M., & Royce, J.R. (1978). Toward a multi-factor theory of styles and their relationships to cognition and affect. *Journal of Personality*, 46, 474-505.
- Widiger, T.A., Knudson, R.M., & Rorer, L.G. (1980). Convergent and discriminant validity of measures of cognitive styles and abilities. *Journal of Personality and Social Psychology*, 39, 116-129.
- Wilkerson, J.M. (1999). On research relevance, professors' "real world" experience and management development: are we closing the gap? *Journal of Management Development*, 18, 598-613.
- Witkin, H.A. (1962). *Psychological differentiation: studies of development*. New York: Wiley.
- Witkin, H.A., Moore, C.A., Goodenough, D.R., & Cox, P.W. (1977). Field-dependent and field-independent cognitive styles and their educational implications. *Review of Educational Research*, 47, 1-64.
- Witkin, H.A., Oltman, P.K., Raskin, E., & Karp, S.A. (1971). *A manual for the Embedded Figures Test*. Palo Alto, CA: Consulting Psychologists Press.

Woolhouse, L.S., & Bayne, R. (2000). Personality and the use of intuition: individual differences in strategy and performance on an implicit learning task. *European Journal of Personality, 14*, 157-169.

Wright, L. (1999). *Twins: and what they tell us about what we are*. New York: Wiley.

FIGURE 1

A research agenda for future cognitive style research

<i>Curry</i>				
<i>Riding</i>	THEORY	MEASUREMENT	RELEVANCE FOR PRACTICE	
	IDENTIFY FUNDAMENTAL DIMENSIONS	<i>Knowledge networks of cognitive style scholars</i>	<i>Research with various cognitive style measures simultaneously</i>	<i>Attention for knowledge dissemination to practitioners</i>
	DEVELOP SIMPLE, VALID & DIRECT MEASURES	<i>Scrutinize existing cognitive style measures</i>	<i>Develop an overarching instrument</i>	<i>Research in environmental settings</i>
	SITUATE COGNITIVE STYLES	<i>Develop overarching theory</i>	<i>Longitudinal designs</i>	<i>Provide relevant, contextualized, and concrete practical implications</i>
	LINK WITH OBSERVABLE BEHAVIOUR	<i>Interdisciplinary research teams</i>	<i>Multi-method approach</i> <i>Multi-source approach</i>	<i>Joint networks of scholars and practitioners</i>

APPENDIX 1

Criteria to assess the reliability and validity of cognitive style models and instruments, and to evaluate the practical relevance of cognitive style research

Criteria to evaluate the reliability and validity of models and instruments^a

<i>Theoretical specification</i>	Does the model have a reasonably complete, well-specified, and internally consistent style theory that is connected with the existing body of research?
<i>Internal validity</i>	Is the underlying structure of the data as predicted by the theory (using factor analysis or some other method of internal analysis to check this)?
<i>Convergent validity</i>	Does the style instrument correlate with other measures with which, in theory, it should correlate (<i>e.g.</i> , other cognitive style instruments)?
<i>Discriminant validity</i>	Does the style instrument not correlate with other measures with which, in theory, it should not correlate (<i>e.g.</i> , ability)?
<i>Criterion-related validity</i>	Does the style instrument show links with objectively observable behaviour in such a way as predicted by the theory (<i>e.g.</i> , link with occupational choices)?

Criteria to evaluate the practical relevance of cognitive style research^b

<i>Descriptive relevance (meaningfulness)</i>	Are the research findings accurate in capturing phenomena encountered by practitioners in real life?
<i>Goal relevance</i>	Do the outcome variables in the research correspond with things practitioners wish to influence?
<i>Non-obviousness (innovativeness)</i>	Does the research meet or exceed the complexity of common sense theories that are already used by practitioners?
<i>Operational validity (actionability)</i>	Is it possible for practitioners to implement the practical implications of the research?
<i>Timeliness</i>	Are the research findings available to practitioners in time to use it
<i>Cost of implementation</i>	to deal with problems? Are the suggested solutions feasible in terms of their costs?

Note. ^a These criteria were developed on the basis of following works: Riding (2000a), Sadler-Smith (2001), and Sternberg and Grigorenko (1997a). ^b These criteria for practical relevance are based on the work of Thomas and Tymon (1982) and Shrivastava (1987).