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COGNITIVE STYLES IN BUSINESS AND MANAGEMENT:

A REVIEW OF DEVELOPMENT OVER THE PAST TWO DECADES

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ABSTRACT

This paper considers the theory, measurement, and practical relevance of cognitive style for both management practice and organisational behaviour. We simplify matters by confining our discussions to cognitive style per se, deliberately excluding the construct of learning styles. We also confine our analysis to those constructs that have a strong conceptual and empirical foundation in business and management or organisational and occupational settings. We aim to examine ways in which these styles have influenced both management and organisational behaviour from multiple perspectives over the past two decades. To conclude, we draw reasoned and authoritative conclusions about the implications that research into cognitive style has for management practice and organisational behaviour, and ways in which the field needs to develop in order to successfully bridge the relevance gap between theory and practice.

Keywords: Cognitive styles, review, business and management, organisational behaviour, relevance gap, pragmatic science

INTRODUCTION

Cognitive style relates to the characteristic way in which an individual processes and evaluates information, solves problems and makes decisions (Goldstein & Blackman, 1978). According to Messick (1996), cognitive styles are conceptualised as stable attitudes, preferences, or habitual strategies determining a person's typical mode of perceiving, remembering, thinking, and problem solving. As such their influence extends to almost all human activities that implicate cognition, including learning and social and interpersonal functioning. Although research into styles began in the early part of the previous century (e.g., Allport, 1937), activity didn't peak until a period between the 1940s and 1970s. Growing interests in cognitive styles during that period led to the development of a wide diversity of theories and instruments and this was immediately followed by a loss of appeal among cognitive scientists in the 1970s as identified by Kozhevnikov (2007):

“The field was left fragmented and incomplete, without a coherent and practically useful theory and with no understanding of how cognitive styles were related to other psychological constructs and to cognitive science theories” (p. 464).

Paradoxically, around the time that interests in the styles field declined among cognitive scientists, the number of applied styles publications grew rapidly (Riding & Cheema, 1991), demonstrating interest among practitioners to understand the influence of individual differences in cognition. Studies in the field of management grew due to an increased attention on cognitive approaches to industrial, work, and organisational psychology (Hodgkinson, 2003). Empirical studies have shown that cognitive styles can be a better predictor of people's performance in particular situations than general abilities or situational factors, and that differences in cognitive styles influence learning, problem solving, decision making, communication, interpersonal functioning, and creativity in multiple and important ways (Armstrong, 1999; Cools, 2007; Kirton, 2003; Sadler-Smith, 1998). According to Sternberg and Grigorenko (1997), styles will continue to provide a much needed interface between research on cognition and personality and show a great deal of promise for the future in helping us understand some of the variation in job performance that cannot be accounted for by individual differences in abilities.

Fifteen years ago, Hayes and Allinson (1994) reviewed what they considered to be a large and confusing body of literature relating to cognitive styles and addressed some of the potential implications of that research for managerial practice. Their review led to two major findings. Firstly, despite the fact that the field of study is complex with many confusing terms and overlapping definitions, it is possible to bring order to the literature by clarifying the various concepts and adopting appropriate taxonomies. Secondly, they highlighted considerable implications of this literature for the discipline of management and identified a range of important areas for future research. Since they reported these findings, there has been no systematic review of developments in the management field and therefore no way of knowing the extent to which these implications have been explored. The present authors feel that the time is now right to do this, and that is the overarching purpose of this paper where we conduct a detailed review of the field before drawing reasoned and authoritative conclusions as to where the literature is, where it should be going, and what the important questions are left to be asked.

METHODOLOGY

We chose to focus on articles in top-tier peer reviewed academic journals appearing over the past two decades. These were selected, primarily, on the basis of their impact factor (in 2006) in seven categories (i.e., ‘business’, ‘management’, ‘applied psychology’, ‘social psychology’, ‘psychology-multidisciplinary’, ‘educational psychology’, ‘social sciences’) within the Social Science Citation Index (SSCI), which led to a list of 173 journals. Additionally, we also screened the Academic Journal Quality List of the UK Association of Business Schools (www.the-ABS.org.uk) to identify other relevant journals, leading to a further 36 journals being identified and bringing our total to 209.

We used the EBSCO and PsycINFO search engines to locate articles published in the last two decades, which led us to identifying 822 articles. We used the following terms to guide our search: cognitive style; thinking style; intellectual style; personality style; and personality type. These terms all fit into the innermost layer of Curry’s (1983) heuristic model that comprises three main strata resembling the layers of an onion. She used this model to differentiate between a variety of theories and constructs such as learning style, information processing style, instructional preference, and cognitive style.

Curry labeled this innermost layer ‘cognitive personality style’, which she believed to be a relatively permanent personality dimension. Her definition of this layer matches our earlier definition of ‘cognitive style’ – an umbrella term that will now be adopted for the remainder of this paper and which was the most frequently cited term in our review.

We reduced the number of potential articles by excluding book reviews, comments, editorials, and articles that did not focus on the concept of cognitive style or that were not relevant to the management context. After this process we were left with 203 articles that were considered to be relevant for this review. These were then categorised according to different themes partly informed by previous reviews of the field (e.g., Armstrong & Sadler-Smith, 2006; Hayes & Allinson, 1994; Sadler-Smith, 1998), but more significantly from a detailed content analysis of the collected articles.

A REVIEW OF DEVELOPMENT IN THE FIELDS OF BUSINESS AND MANAGEMENT

Ten different categories within business and management were identified including one that concerns aspects of theory and measurement. The order in which the ten categories will be reviewed is as follows: (a) theory and measurement (20 articles); (b) innovation and entrepreneurship (16 articles); (c) sales and marketing (19 articles); (d) groups and teams (10 articles); (e) decision making and problem solving (29 articles); (f) management and organisational learning (42 articles); (g) person-environment fit, careers, and vocational preference (18 articles); (h) leadership (9 articles); (i) culture (13 articles); and (j) other areas of business and management (27 articles).

Theory and measurement

A number of important studies have focused on aspects of both theory and measurement of the cognitive style construct within the context of business and management and these will be considered separately.

Theory. A theoretical study of Hayes and Allinson (1994) identified the most commonly cited dimensions of cognitive styles, examined ways in which they can be classified, and considered their relevance and implications for management practice in a variety of different areas. These authors identified a need to bring order to the literature by clarifying the various confusing and overlapping concepts and adopting appropriate taxonomies. One such taxonomy uses a threefold model with an umbrella term, called intellectual styles, to capture both cognitive and learning style labels (Zhang & Sternberg, 2005). The model, which divides all styles into three basic kinds, not only is a useful heuristic device, but also provides a summary of empirical relationships. Other articles too have attempted to provide an overview of theories, models, and measures but some have focused entirely on learning styles (e.g., Cassidy, 2004) with no clear distinction between the cognitive style and learning style bodies of literature. Desmedt and Valcke (2004), however, realising that the two terms are often used synonymously (leading to confusion), used a citation analysis technique to develop an alternative organisation of the two bodies of literature. Their article clarifies dominant theoretical orientations and serves as a useful road map for novices entering the cognitive style field.

Other review articles have been more critical such as Tiedemann's (1989) that attempted to demonstrate severe limitations of the evidence in support of cognitive styles, arguing that while they are not rendered completely useless, a vast amount of empirical research needs to be re-interpreted. In a similar vein, Reynolds (1997) presented a damning critique of styles - but this again confused the two terms of cognitive style and learning style. While acknowledging its intuitive appeal, he points to contrary opinions of the theoretical and empirical validity from within the psychological field and argued for style differences and other forms of labeling to be discontinued. In a reply to this critique, Sadler-Smith (2001) provided a compelling argument to suggest that, while learning styles may suffer from over-usage and a weak theoretical base, there is growing empirical and psychological evidence to suggest that cognitive style is a valid concept that is not to be ignored.

Measurement. With regard to measurement, a number of new instruments have appeared over the past two decades along with a range of reliability and validation studies of those new instruments and of previous ones. The most notable new instruments for the field of management are the Cognitive Style Index (CSI; Allinson & Hayes, 1996) and the Rational-Experiential Inventory (REI; Epstein, Pacini, Denes-Raj, & Heier, 1996). More recently, the Linear/Non-Linear Thinking Styles Profile (LNTSP; Vance, Groves, Paik, & Kindler, 2007) and the Cognitive Style Indicator (CoSI; Cools & Van den Broeck, 2007) have appeared, but these are at an earlier stage of use and development.

The Cognitive Style Index (CSI) assesses an individual's position on the generic analysis-intuition dimension of cognitive style. Answering the call of Allinson and Hayes (1996) for replication and extension, a number of early studies reported reliability and validity figures that were favourable (Armstrong, 1999; Murphy, Kelleher, Doucette, & Young, 1998; Sadler-Smith, Spicer, & Tsang, 2001). However, more recent studies have questioned the theoretical assumption that various facets of style can be subsumed under a single overarching dimension. Hodgkinson and Sadler-Smith (2003a) presented arguments as to why the previously hypothesised unifactorial structure of the CSI should be questioned. While these propositions were refuted by Hayes, Allinson, Hudson, and Keasey (2003) on the grounds of a lack of robustness in their theoretical or empirical arguments, Hodgkinson and Sadler-Smith (2003b) re-asserted their challenge for an alternative two-dimensional conception of the CSI.

Others too have adopted this multidimensional theory approach. On the basis that people commonly experience differences between what they think (head) and feel (heart), Epstein (1991) developed the Cognitive-Experiential Self-Theory (CEST). CEST proposes that people process information by two parallel interactive systems labeled rational and experiential. The rational system operates primarily at the conscious level and is intentional, analytic, and relatively affect free. The experiential system is assumed to be automatic, preconscious, holistic, and intimately associated with affect. Based on this dual process theory (CEST), a new self-report measure of individual differences in intuitive-experiential and analytic-rational thinking known as the Rational-Experiential Inventory (REI) was developed (Epstein et al., 1996).

Vance and colleagues (2007) also advocate multidimensional theories and measures of styles. Having failed to identify an instrument that measures an individual's composite picture of linear and non-linear thinking, these authors elected to develop their own measure. They propose and test a multifaceted construct of thinking styles based on two primary dimensions: linear thinking (e.g., rationality, logic, analytical thinking) and non-linear thinking (e.g., intuition, insight, creativity). A four-factor model emerges in their self-report diagnostic instrument, called the Linear-Nonlinear Thinking Style Profile (LNTSP).

Cools and Van den Broeck (2007) also recently developed a multidimensional instrument for use with professional and managerial groups. Known as the Cognitive Style Indicator (CoSI), the instrument assesses three dimensions, labeled knowing style, planning style, and creating style. People with a knowing style look for data, want to know exactly how things are, retain facts and details, and like complex problems that demand logical and rational solutions. People with a planning style have a need for structure and like to organise and control in a highly structured environment relying on preparation and planning. Those with a creating style like uncertainty and freedom and see problems as opportunities and challenges.

In addition to new instruments, there have been a number of re-examination/validation studies of earlier instruments used in the field of management too. The most notable is Kirton's (1976) Adaption-Innovation Inventory (KAI). Studies of the KAI have supported the scales' internal consistency and reliability (Joniak & Isaksen, 1988). There have been other studies of the KAI, however, that have re-examined Kirton's claim for a three-factor model (Taylor, 1989) with suggestions that the 'sufficiency of originality' sub-scale needs to be divided into sub-factors, a view later supported by Foxall and Hackett (1992).

Summarising, since its publication the CSI has been used most extensively in the fields of business and management with nearly 300 studies being reported on its authors' user database. The KAI also remains a dominant theory. In the reviews that follow, the CSI and KAI are amongst the three most cited instruments together with the longer standing Myers-Briggs Type Indicator (MBTI; Myers, McCaulley, Quenk, & Hammer, 2003).

From the preceding review, it seems apparent that there may be a move away from the previously hypothesised unifactorial structure of cognitive style adopted by Allinson and Hayes (1996) and Kirton (1976) towards multidimensional concepts, such as the REI of Epstein and colleagues (1996), the LNTSP of Vance and colleagues (2007), and the CoSI of Cools and Van den Broeck (2007). Their uptake in the fields of business and management, however, is yet to be determined. Let us now turn our attention to the application of cognitive styles theory in the fields of business and management over the past two decades.

Innovation and entrepreneurship

A number of articles were devoted to innovation and entrepreneurship. Given their importance for economic growth, wealth creation, business expansion, and technological progress, researchers sought to understand how innovations and opportunities are discovered, created and exploited, by whom, and with what consequences (Wickham, 2004).

Over the past decade, a more cognitive approach has been adopted to the study of entrepreneurship (Baron, 2004), providing an alternative lens through which the phenomenon may be explored. Studies have focused on detecting knowledge structures and mental models that entrepreneurs use to make assessments, judgments or decisions involving opportunity evaluation, venture creation, and growth (Mitchell et al., 2002). In line with this new perspective, style differences have been studied in relation to the opportunity process to try to answer the question of why some people are able to discover and exploit particular entrepreneurial opportunities, while others are not (e.g., Dimov, 2007; Hmieleski & Corbett, 2006). Other studies have focused on the link between cognitive styles and firm growth and performance, making a comparison between the cognitive profiles of entrepreneurs from high performing and low performing firms (e.g., Ginn & Sexton, 1990; Sadler-Smith, 2004). Some scholars also compared entrepreneurs' cognitive styles with those of non-entrepreneurs (e.g., Allinson, Chell, & Hayes, 2000; Buttner & Grysiewicz, 1993).

Innovation is also considered to represent an important competitive advantage for contemporary organisations (Beckman & Barry, 2007). Several authors have investigated how cognitive styles can be used to stimulate innovation in organisational processes (e.g., Beckman & Barry, 2007; Leonard & Straus, 1997; Rhodes & Thame, 1988). These studies emphasised the importance of style versatility (i.e., having a mixture of cognitive style profiles) or whole-brain thinking for effective innovation at the organisational level. Individuals with a more intuitive or holistic cognitive style are expected to be more effective in the initiation phase of the innovation process (i.e., the stage in which new ideas are generated), whereas individuals with a more analytical style may be better in the implementation phase (i.e., the stage in which ideas are put in practice).

While several studies have been conducted in the areas of entrepreneurship and innovation using various cognitive style models (e.g., KAI, CSI, MBTI), research has been somewhat limited. The recent focus on cognition as a way of enhancing our understanding of processes such as opportunity recognition, innovation, and entrepreneurial activity in small and medium-sized enterprises will hopefully stimulate more research into the influence of style differences. Areas of interest might include: the link between cognitive styles and the firm's entrepreneurial orientation; entrepreneurial teams and style differences; innovation and creativity in a team context; social entrepreneurship; and longitudinal studies on successful innovation, entrepreneurship, and intrapreneurship that also take contextual and situational aspects into account.

Sales and marketing

Articles within this theme were found to fall into three sub-categories. In the first sub-category, labeled 'consumer perception and information use', two distinct areas of interest were discerned, relating to: antecedents of people's interpretation of a market and information use in advertising. The second sub-category, labeled 'individual differences in consumer behaviour', focuses on consumer innovation, preference for technology, and indulgence. The final category we labeled 'customer relations' and the studies here focused on the influence of cognitive styles on sales people's behaviours and orientations toward the customers.

Consumer perception and information use. White, Varadarajan, and Dacin (2003) sought to delineate antecedents of people's interpretation of a market situation. They found that managers with more extroverted, judging, intuiting and thinking cognitive styles (compared with more introverted, perceiving, sensing and feeling styles) tend to perceive situations as more controllable. Consequently, they are likely to perceive less risk when interpreting a given market situation, and they are more likely to appraise that situation as an opportunity.

With regard to information use in advertising, Cole and Gaeth (1990) studied the effects of cognitive style using the Group Embedded Figures Test (GEFT; Witkin, Oltman, Raskin, & Karp, 1971) on the use of information on consumer packaging. People with high field dependence scores (i.e., more global information processors) took longer to dis-embed relevant information than those with low field dependence scores (i.e., more analytical information processors). Other studies (e.g., Keller & McGill, 1994; Thompson & Hamilton, 2006) examined the effects of information processing mode on consumers' responses to comparative advertising (where explicit comparisons are made between two or more brands). Comparative advertisements were found to be more effective when consumers use analytical processing, whereas non-comparative advertisements were more effective when consumers use imagery processing. People's responses to visual and verbal stimuli in advertisements were evaluated by Sojka and Giese (2006). Drawing on Epstein's (1991) theory that affect and cognition work independently or together they argued for four distinct processing styles of affective, cognitive, combined, or low motivated processors. Results revealed that high affect individuals respond more favourably to a visual advertisement than other groups. Individuals high on both affect and cognition respond more favourably to a combined visual/verbal advertisement.

Individual differences in consumer behaviour. First adopters of new products and brands are often referred to as consumer innovators and researchers have sought to determine the role they play in the creation of markets. A study by Foxall (1994) discusses five empirical studies of innovative consumer behaviour using the KAI. Three were concerned with the early adoption of new food products and brands (purchase innovativeness); two were concerned with consumers' use of personal computers to solve a range of problems (use innovativeness). There were no associations between consumer behaviour and the innovator cognitive style. Innovators and adopters were found among both groups.

Using Epstein and colleagues' (1996) Rational-Experiential Inventory (REI), Simon and Usunier (2007) investigated consumer differences in the use of technology-based self-services (e.g., ATMs or self service fuel pumps) compared with personnel-in-contact services. Their study revealed that rational engagement has a strong positive effect on the preference for technology-based self-services; persons scoring high on the experiential style prefer interactions with service personnel. Service complexity moderates the influence of cognitive styles on preference for service technology.

Ramanathan and Williams (2007) investigated emotional consequences of indulgence impulsive consumption (e.g., credit card debt, obesity, binge drinking) and how impulsive personality traits affect emotional responses to indulgent choices. Impulsive versus prudent personality traits (Rook & Fisher, 1995) showed that consumers feel simultaneous mixtures of both positive and negative emotions in response to indulgences and that the specific components of those emotional mixtures vary, depending on differences in individual impulsivity.

Customer relations. Altering sales behaviours during customer interactions based on perceived information about the nature of the selling situation is referred to as 'adaptive selling' (Spiro & Weitz, 1990). Adaptiveness is seen as the key advantage of personal selling as a marketing tool. Using the MBTI, McIntyre, Claxton, Anselmi, and Wheatle (2000) found cognitive style to be an antecedent to adaptive selling behaviour. Their study found that salespeople who prefer information intake by intuiting (rather than sensing) and prefer information processing by thinking (rather than feeling) were found to be more likely to practice adaptive selling. The more adaptive selling that was practiced, the greater customer orientation became. The greater the customer orientation, the better the self-perceived selling performance. Another study by McIntyre and Meloche (1995) using the MBTI sought to determine whether cognitive style was an antecedent of sales people's orientation towards the customer or the sale. The study found that STs were significantly less customer oriented than NTs, SFs, and NFs on Myers-Briggs' Thinking-Feeling (TF) and Sensing-Intuition (SN) dimensions. Finally, Ruiz and Sicilia (2004) investigated the impact of cognitive style on consumer response to advertising appeals. They found that informational and informational-emotional advertising appeals which match consumers' processing styles (thinking and thinking-feeling processes respectively) generate more positive attitudes towards the brand, purchase information, and brand choice.

In summary, studies in the area of sales and marketing have made use of a variety of instruments, such as the MBTI, GEFT, REI, and KAI. While the studies reviewed have made an important contribution, their application has been rather limited, focusing on aspects of behaviour and relationships in the field of marketing, and information use in the area of sales. Areas of future research might also consider the implications of cognitive styles for market research and buying behaviour, product concepts, branding and management, personal selling and sales behaviour, advertising, publicity and sponsorship, and international marketing to name but a few.

Groups and teams

A number of articles have focused on the influence of cognitive styles on groups and teams. Areas of interest ranged from behaviours of members of self-managed work-teams, team role preferences, creativity and idea generation, and the development of stereotypes.

Armstrong and Priola (2001) sought to examine how differences and similarities in the analytic-intuitive dimension of cognitive styles affected the behaviour of members of self-managed work-teams (SMWT's) on task and emotionally-expressive dimensions. As hypothesised, intuitive individuals and homogeneous intuitive SMWT's were found to initiate more social-emotional acts. Contrary to expectations, intuitive individuals and homogeneous intuitive teams engaged in more task-oriented behaviours too. This was thought to be due to the nature of the task facing the teams, which was relatively unstructured and organic. It was concluded that, had the task been more structured and mechanistic, the original hypotheses that analytics and homogenous analytic SMWT's would perform more task than social-emotional oriented acts may have been supported. This was later tested by Priola, Smith, and Armstrong (2004). In this study, it was found that due to the mechanistic and strictly defined problem, intuitive individuals could not relate to the task, nor could they find the right solution. They focused on maintaining the group cohesiveness and the group integrity against the external, hostile, and undecipherable setting (the exercise). The analytics comfortably and successfully implemented the logical thought process required by the kind of structured problem, which corresponded to their preferred problem-solving style.

Further studies explored the relationship between Belbin's (1981) Team Role Preferences Inventory (BTRPI) and Kirton's KAI (1976). On the basis of a comparison between the theoretical underpinnings of the two theories, Fisher, Macrosson, and Wong (1998) hypothesised a correlation matrix variously described as strong, weak, and negligible with each of the Kirton sub-scales (sufficiency versus proliferation of originality; efficiency; rule/group conformity) and the overall KAI score. Only 13 out of 24 sub-scale relationships were supported, revealing only a modest confirmation of the validity of the BTRPI construct. However, in a later study, Aritzeta, Senior, and Swailes (2005) demonstrated stronger convergent validity between the KAI and BTRPI. KAI sub-scale correlations were much more coherent than those reported by Fisher and colleagues (1998). Aritzeta and colleagues (2005) concluded that implementers, completer-finishers, team workers, and specialists will display an adaptive style; monitor evaluators and coordinators will act as bridges (moderating tensions occurring between high adaptors and innovators); and plants, shapers, and resource investigators will display an innovative cognitive style. A change in Adaptor-Innovator balance in any team must be brought about by changes in personnel in order to ensure the optimal team, which will of course be contingent on performance tasks and needs.

In the context of innovation and creativity, large companies are taking major initiatives involving teams in the hope of generating new paradigm breaking ideas that can transform their products and services (Stepanek, 1999). Many are creating 'ideas factories' in which teams brainstorm using email, web-based groupware, and face-face meetings in the hope of generating ideas to spark changes to existing business paradigms. In relation to this, a study by Garfield, Taylor, Dennis, and Satzinger (2001) examined ways in which groupware-based creativity techniques, the ideas generated by other team members, and an individual's own creative style can influence creativity in terms of the types of ideas produced by the participants. Using the MBTI and KAI, they found that individuals who were intuition-feeling (NF) types or KAI innovators generated more paradigm-modifying ideas than did MBTI sensing-thinking types (ST) or KAI adaptors. KAI innovators also generated more novel ideas.

Finally, the concept of stereotypes has received attention from styles researchers to investigate factors that influence their development. Information processing styles have been shown to play a major role (Sherman, 2001). Chow and Esses (2005) built on this work to investigate the relationship of personal need for structure (Neuberg, Judice, & West, 1997), need for closure (Webster & Kruglanski, 1994), and personal fear of invalidity (Neuberg et al., 1997) on stereotype development. Their findings revealed that personal fear of invalidity, personal need for structure, and need for closure all clearly affect stereotype development.

Once again, while the studies reviewed in this category have been useful for enhancing our understanding of some aspects of groups and teams in the workplace, there is significant scope for further studies. For example, cognitive styles will almost certainly impact on aspects of perception and communication in teams, membership formation, group norms and deviancy, individual versus group goals, team leadership, group problem solving and decision making, and group conflict. There is a dearth of studies in these areas.

Decision making and problem solving

Cognitive styles may help explain why managers with similar skills and abilities make different decisions. The relevance of cognitive styles for decision making and problem solving has attracted significant interest among style researchers over the past 20 years. Areas investigated cover strategic decision making, decision support system design, and general managerial decision making.

Strategic decision making. Sparrow (1999) argues that managers cannot avoid having to deal with emotionality in today's complex world and that rational, strategic thought is often not appropriate in such a context. He highlights the need to consider cognitive styles, particularly intuitive skills and creativity when considering aspects of strategic cognition. A number of studies have used the MBTI for exploring the effects of cognitive styles on strategic decision situations. In an examination of how cognitive styles affect strategic decision outcomes, Hough and Ogilvie (2005) found that Intuiting/Thinking (NT) managers used their intuition to make cognitive leaps based on objective information to craft more decisions of higher quality than other managers, whereas Sensing/Feeling (SF) types used time to seek socially acceptable decisions which led to a lower number of decisions and lower perceived effectiveness.

Extravert managers were also perceived to be more effective than introverted managers even though extroverts were not more decisive than introverted managers. Gallén (2006) examined the effect of cognitive styles on managers' preferences for strategic decisions using the typology of Miles and Snow's (1978) three generic strategies of 'defender' (stable products or services, compete on basis of value and cost), 'prospector' (broad product market domain and often first to market), and 'analyser' (combined characteristics of prospector and defender). Intuitive managers were found to view the prospector or the analyser strategy as the most viable future alternative for the firm, whereas the defender or analyser strategy was preferred by sensing managers. Hayley and Stumpf (1989) revealed that different Jungian types habitually use distinct heuristics to gather data, and then generate and evaluate alternatives in strategic decision making processes. In a later study, Stumpf and Dunbar (1991) analysed the effects of cognitive styles on the type and radicalness of choices made in strategic decision situations. Their results showed that individuals with different preferences (i.e., ST; NT; SF; NF) take patterns of actions that reflect specific biases (i.e., selective perception; positivity; social desirability; and reasoning by analogy, respectively). Nutt (1990) also drew on Jungian style classifications (ST, SF, NT, NF) to identify 'data' and 'process' dominant styles of strategic decision making. Decision styles were found to be a key factor in explaining the likelihood of taking strategic action and the risk seen in this action. Some managers applied intuitive processes with subjective data and heuristics. Others used a goal-directed process using logic and objective information. Still others were flexible in their approach, using both logic and intuition. Views of both adoption and risk were found to be influenced by decision style. The more judicial (SF) top executive was found to be more action oriented, the systematic (ST) top executive action averse, with the speculative and heuristic (NT and NF) top executives taking nearly identical and neutral positions.

Hodgkinson and Clarke (2007) outline an alternative two-dimensional framework to inform the investigation of the impact of cognitive styles on organisational strategising. Development of their framework led to four broad types, depending on an individual's preference for analysis (lo/hi) or intuition (lo/hi). People occupying the lo/lo, lo/hi, hi/lo, hi/hi preferences with regard to analysis and intuition respectively are labeled 'non-discerning', 'detail conscious', 'big picture conscious', and 'cognitively versatile'. These basic information processing tendencies are believed by these authors to be fundamental to the ways in which strategists approach their work. While individuals normally favour certain styles, other evidence suggests that managers can make appropriate shifts in their style to fit the problem at hand (Robey & Taggart, 1981).

Cognitively versatile individuals in Hodgkinson and Clarke's framework, for example, are more likely to switch between analytic and intuitive processing strategies according to the varying contingencies confronting them.

Decision support systems. Rao, Jacob, and Lin (1992) formulated evidence against Robey and Taggart's (1982) use of the microscopic approach of neuroscience (analytic-intuitive hemispheric specialisation) for providing theoretical foundations for decision support system (DSS) design. They did, however, concede that the psychological construct of cognitive styles has an important part to play in the DSS design process. By relating cognitive styles to decision making situations, they suggest that a DSS would have the appropriate capabilities and tools to allow an analytic/intuitive decision maker to perform effectively. In a rebuttal of Rao and colleagues' article, Robey (1992) makes it clear that the most important feature of their earlier brain metaphor (Robey & Taggart, 1982) was the notion of integration of the intuitive and analytic styles, not their separation. Rather than thinking of individuals as either intuitive or analytic, they saw human decision makers as integrated processors capable of defining and solving problems using both intuitive and analytic processes. Researchers adopting an integrated, organic view of human information processing, in place of the analytic-intuitive dichotomy, should discover more challenges and more rewards in their efforts in DSS design according to Robey.

General managerial decision making. Bar-Tal (1994) explored the influence of individuals' need for cognitive structure (NCS) and ability to achieve cognitive structure (AACS) when coping with uncertainty in decision making situations. High NCS and low AACS individuals experience the greatest difficulties in their decision making; the more they perceived conflict in the situation, the more time they spent making the decision. Those with a high AACS and high NCS experienced least difficulty in the situation. Tetlock (2000) used cognitive style items adapted from Webster and Kruglanski's (1994) need for closure (NFC) scale to assess tolerance for ambiguity and strength of personal preference for simple comprehensive explanations of phenomena, for working on problems with clear-cut solutions, and for working in homogenous as opposed to heterogeneous social units. Cognitive styles emerged as a consistent predictor of the value spins that managers placed on decisions based on scenarios that depicted decision making processes at micro, meso, and macro levels of analyses. Dreu, Koole, and Oldersma (1999) also used the NFC scale to study its effect on negotiation in a decision making setting.

Negotiators with high NFC were more influenced by focal points when setting limits and making concessions than those with low NFC. Negotiators with high NFC were also more influenced by stereotypic information when making concessions than were negotiators with low NFC.

A number of investigations in this category involved the use of Kirton's (1976) KAI theory. For example, the tendency for a person to increase commitment to a previously chosen course of action when the outcome of one's previous decision is negative is referred to as escalation of commitment; a phenomenon which has significant implications for organisational decision making (Fox & Straw, 1979). Singer (2001) sought to determine whether there is a significant association between escalation and cognitive styles using the KAI. While previous studies of individual difference variables such as locus of control (Singer & Singer, 1986) have been found to be significantly associated with escalation, cognitive styles were not. Another study used both KAI and GEFT (Antonietti & Gioletta, 1995) to explore the implications of cognitive style for analogical problem solving. Their results showed that field independent subjects were more likely to be analogical problem solvers than field dependent subjects, and rates of analogical solutions were higher in adaptors than innovators.

This decision making and problem solving category contains the second highest number of research articles out of the ten categories reviewed in this paper. Despite this, there is still enormous scope for further studies in this important field. Examples include structured versus unstructured decision making approaches, group and organisational decision making, rationality versus irrationality, decision behaviour under conditions of uncertainty, skills development in decision making, risk taking, information use, problem definition, evaluation and choice, and analysis and interpretation techniques.

Management and organisational learning

This category has received most attention by researchers over the past two decades. Both theoretical and empirical studies are reported that consider the influence of styles on the process of research supervision in management education, learning performance, course design, work-based learning, and organisational learning.

Influence of styles on research supervision in management education. Armstrong, Allinson, and Hayes (2004) examined the effects of differences and similarities in the analytic-intuitive dimensions of cognitive style on the research supervision process in management education. Findings suggested that analytic supervisors were perceived to be significantly more nurturing and less dominant than their more intuitive counterparts, indicating a higher degree of closeness in their relationships. This led to increased liking in the relationship, and significantly higher performance outcomes for the student. These effects were highest in dyads whose students and supervisors were more analytic. An earlier study by the same authors (Armstrong, Allinson, & Hayes, 1997) reported a relative lack of empathy being perceived by intuitive students allocated to intuitive supervisors. Armstrong (2004) also analysed the impact of supervisors' cognitive styles on the quality of the research supervision process. Results revealed that students perceived the quality of supervision to increase significantly with the degree to which supervisors were analytic in their cognitive style. Students whose supervisors were more analytic also achieved significantly higher grades for their dissertations.

Learning performance. A number of studies have examined the influence of cognitive styles on academic performance. Armstrong (2000) found that management students whose dominant cognitive styles were analytic attained higher grades in modules that focused on long-term solitary tasks involving careful planning and analysis of information. Contrary to expectations, tasks believed to be more suited to the intuitive style were also higher for analytic individuals, as was overall ability defined by final degree grades. Backhaus and Liff (2007) also examined the role of intuition and analysis as well as approaches to studying in management education using the CSI and the Revised Approaches to Studying Inventory (RASI; Entwistle & Tait, 1994). Results again revealed a relationship between analytical orientation and grade point average. There was also a correlation between academic performance and higher scores on the Deep, Strategic, Metacognitive Awareness, and Academic Self Confidence scales of the RASI. Using the MBTI, Cooper and Miller (1991) found that business professors were more likely to teach in an intuitive manner, whereas more students wanted to learn in a sensing style. The level of style congruency was positively related to academic performance. Witkin and colleagues' (1971) field dependence-field independence has also been found to be an important factor influencing performance of business students across various assessment techniques.

Au (1997) found that field independent students perform better than field dependent students in all forms of assessment, which included a multiple choice test, a written report, and a final examination. In a review article, Hayes and Allinson (1996) examined the effects of matching and mismatching learning activity with trainer and trainee style on learning achievement. While 13 out of 23 studies reviewed offered some support for the hypothesis that matching style with learning activity would have a positive effect on performance, their major conclusion was that - although matching may have a positive effect on trainees' attitude towards their trainer - they do not believe there is significant evidence of the positive effects of such a match on learning. In a later study, Armstrong (1999) highlighted the need for a clearer and more systematic research program aimed at studying the matching hypothesis on the basis that its effect will always be mediated by the nature of the work context.

Course design. A number of studies have implications for course design in formal management education and for training and development in organisational contexts. Sadler-Smith (1999) found support for the belief that learning preferences, defined as an individual's propensity to choose or express a liking for a particular teaching or learning technique, is a correlate of cognitive style. Using the CSI, he found that analysts expressed a preference for reflective and individually oriented methods of learning, whereas intuitive types expressed a dis-preference for these methods. Later studies also found that style and gender interacted in their relationship with learning preferences for both business students (Sadler-Smith, 2001) and UK personnel practitioners (Sadler-Smith, Allinson, & Hayes, 2000). Adkins (2005) also considered the implications of cognitive styles and learning preferences on course design, drawing on Epstein's (1991) cognitive-experiential self theory (CEST). Using a learning course in human resource management, she highlights the importance of applied learning where methods of instruction such as a lecture are directed towards the rational system, and applied approaches such as simulations are directed towards the experiential system of information processing.

Work-based learning. Few studies have considered style in the context of work-based learning to inform training and development practice. In one theoretical article, Sadler-Smith and Smith (2004) identified challenges for instructional designers and facilitators engaged in the delivery of flexible learning in the workplace and suggested ways in which individual differences in styles may need to be accommodated.

Another theoretical contribution (Berings, Poell, & Simons, 2005) combined theory from the educational psychology and workplace learning literatures, including personality types, cognitive style, thinking style, decision making style, and learning styles, to gain insights into employees' on-the-job learning activities to help them improve their on-the-job learning by developing an adaptive flexibility in the use of the various strategies.

Organisational learning. The importance of styles in the context of management learning has been extended to the concept of organisational learning. Hayes and Allinson (1998) reviewed two disparate literatures from adjacent fields of individual and organisational learning to identify implications for theory and practice. The article focused on the extent to which the individual level construct cognitive style can be meaningfully applied to aid the understanding of learning at the level of the organisation as well as the level of the individual. Ways in which consideration of cognitive styles can improve the effectiveness of interventions designed to improve individual and organisational performance were also identified. Another article by Ortenblad (2005) considered the importance of individual cognitive styles in the sculpting of learning organisations, arguing for a heterogeneous mix of Jung's four personality types to ensure effective organisational learning.

While the preceding section on management and organisational learning has received most attention over the past 20 years compared with other categories, there remains enormous scope for future research. From a theoretical perspective, more needs to be known about the implications of cognitive styles for the management learning and knowledge transfer processes in the context of individual, collective, and collaborative learning. From the perspective of management education and development, more research is needed to help us understand how cognitive styles can be usefully employed to help learners develop their self-awareness and meta-cognitive skills; can help determine whether and when to match or mismatch instruction to the learner; can influence the success of distance learning, web-based instruction and technology in the classroom; can influence diversity in the context of learning; and might influence how we assess students with widely differing styles.

Person-environment fit, careers, and vocational preference

A number of articles have considered the usefulness of cognitive styles for selection, recruitment, job design, and workforce planning (e.g., Armstrong & Sadler-Smith, 2006; Hayes & Allinson, 1994; Sadler-Smith, 1998).

Two major topics can be distilled within this sub-category: style differences and vocational preferences, and cognitive styles and work environment fit..

Firstly, a number of articles focus on the influence of style differences on vocational choice and career preferences (e.g., Blustein & Phillips, 1988; Sullivan & Hansen, 2004; Zhang, 2004). These studies sought insights into how individual differences impact on career decision making and vocational development. An underlying assumption was that people self-select for jobs and careers in which the work demands are compatible with their preferred ways of perceiving and processing information and making decisions. Ways in which people differ in their occupational choices and the functions they choose to serve to match their preferences for task and job characteristics are typical areas of study. Hayes and Allinson (1998) suggested that, due to self-selection, people within many groups in organisations will share similar cognitive styles that are related to the information processing requirements of their work. In this respect, Foxall and Payne (1989) examined the cognitive profiles of people in various managerial functions and two other studies looked at vocational choice within medicine. Leong, Hardin, and Gaylor (2005) and Stratton, Witzke, Elam, and Cheever (2005) investigated the influence of cognitive and learning style differences on career specialty choice of medical students. Mazen (1989) tested Vroom's instrumentality theory, which distinguishes between preference and actual choice, and Holland's vocational interest typology among women, and finally, Gailbreath, Wagner, Moffett, and Hein (1997) studied the assumed homogeneity in cognitive profiles among leaders in a military environment.

Secondly, a number of studies have examined the interaction between individual difference characteristics and the work environment, believed to be central to person-environment (PE) fit models (D'Amato & Zijlstra, 2008). Chan (1996) introduced the concept of cognitive misfit, which refers to the degree of mismatch between an individual's cognitive style and the predominant style demands of the work context. Consistent with other PE fit studies, a fit between one's cognitive style and the job demands is expected to yield positive outcomes (e.g., job satisfaction, career success), while a mismatch is expected to lead to negative outcomes (e.g., increased turnover, higher levels of work-related stress). Chan (1996) concluded from his study with engineers that cognitive misfit was unrelated to employee performance, but was significantly related to job turnover.

In other occupational groups, Chilton, Hardgrave, and Armstrong (2005) found that performance decreased and stress levels increased as the gap between software developers' cognitive styles and the perceived demands of the work environment became wider. In their study of entrepreneurs, Brigham, De Castro, and Shepherd (2007) also found that cognitive misfit led to lower levels of satisfaction within the work environment, higher levels of intent to leave as well as actual staff turnover.

Given the amount of investment in attracting, recruiting, selecting, and retaining high-quality employees, it is hardly surprising that there is considerable interest in the concept of person-environment fit to further our understanding of vocational behaviour in order to develop effective human resource management strategies (Ehrhart & Ziegert, 2005; Ployhart, 2006). Knowing more about staff turnover and job satisfaction will potentially lead to improvements in selection and retention resulting in substantial monetary savings. It is clear from the studies reviewed that understanding the link between cognitive styles, vocational preferences, and work environment-fit remains a challenge. Each study investigates a particular aspect but together these studies do not lead to unequivocal insights. Future research should take account of Chan's (1996) study that highlighted the possibility of underlying mediating variables and the multidimensional nature of PE fit. Both have implications for helping us further understand the impact of cognitive misfit. Other scholars have conceptualised PE fit as a multidimensional construct that is composed of fit (which evolves over time) with the vocation, organisation, job, group, and other people (Jansen & Kristof-Brown, 2006). Jansen and Kristof-Brown (2006) quite rightly argue that attempting to increase our understanding of single dimensions of fit in isolation of time and context is no longer sufficient. Future studies on cognitive misfit therefore need to embrace more complex models in which various individual and environmental factors are taken into account, involving multiple levels of analyses and longitudinal perspectives.

Leadership

Under this sub-category, our review revealed articles in the areas of effective leadership, leader-member exchange relationships, leadership and creativity, and leading and managing change.

With regard to effective leadership, Martin (2007) was concerned with how successful leaders think. Drawing from interviews with more than 50 leaders with exemplary records, he identified a predisposition and capacity to hold in their heads two opposing ideas before creatively resolving the tension between those ideas by generating a new one that is superior to both. He termed this process of consideration and synthesis 'integrative thinking' compared with more 'conventional thinking'. Integrative thinkers welcome complexity, whereas conventional thinkers seek simplicity. While he does not draw on specific cognitive style theory, these terms do resonate with those discussed by Agor (1984) and Kirton (1994). Drawing from adult learning theory, Buckingham (2005) refers to three predominant styles (i.e., analysing; doing; watching) related to effective leadership and management and argues that these are not mutually exclusive. The analysing style refers to someone who understands a task by taking it apart, examining its elements, and reconstructing it piece by piece. The most powerful learning moment for analysers occurs prior to the performance. The doing style in contrast refers to someone whose most powerful learning moment occurs during the performance where trial and error are integral to the learning process. Watchers are argued to learn a great deal when they are given the chance to see the total performance because they have a preference for viewing the complete picture. It is argued that great leaders do not try to change a person's style but recognise the differences and know that the most effective way to invest their time is to identify exactly how each employee is different, and then to figure out how best to incorporate those enduring idiosyncrasies into his/her overall plan.

With regard to leader-subordinate relations, Atwater and Yammarino (1993) found that personal attributes accounted for a significant portion of variance in subordinates' ratings of transformational and transactional leaders. In particular, feeling type leaders were rated more highly on transformational and transactional leadership by both superiors and subordinates than thinking types as defined by the MBTI. Those who process information via feelings as opposed to rational thinking are known to be more interpersonally oriented (Myers et al., 2003). Information processing that emphasises the feelings of others may therefore be more conducive to leadership than a more rational emphasis.

This notion was explored in a study of leader-member exchange (LMX) relationship by Armstrong (1999) and Allinson, Armstrong, and Hayes (2001). They found that intuitive leaders may be less dominating and more nurturing in LMX relationships than their analytic colleagues. Intuitive leaders were also more liked and respected by analytic members than analytic leaders were by intuitive members.

Clapham (2000) noted that the role of leadership is crucial in facilitating employee creativity and that individual characteristics such as cognitive styles as well as the relationship between employees and their leaders may be critical factors in determining the creative performance of employees. A study of leadership and employee creativity by Tierney, Farmer, and Graen (1999) revealed a clear link between employee cognitive style and supervisor ratings of creative performance depended on the quality of the LMX relationship. Employees with innovative cognitive styles tended to have high creativity ratings regardless of leader-member relationships. However, employees with adaptive cognitive styles had higher creativity ratings when in positive leader-member relationships than when in less positive relationships.

Finally, a study by Tullett (1995) also revealed that cognitive styles are an important factor when leading change projects. The preferred cognitive style of leaders who are managing change processes is more innovative compared with managers in general. This finding was consistent with previous studies (Foxall & Hackett, 1994; Kirton, 1994) that found that those who occupy positions which operate across functional boundaries will have a tendency towards an innovative cognitive style.

Leadership is known to be critical for giving direction in times of organisational change, for developing a vision, sharing that vision, setting direction, and managing change by aligning, motivating and inspiring others. While the studies outlined in this section provide incremental contributions, they represent only a small part of the overall subject area. Other areas that would benefit from research into the implication of cognitive styles include: skills based approaches to leadership; leadership styles; situational leadership; contingency and transformational approaches to leadership; team leadership; culture and leadership; and gender in the context of leadership.

Culture

Our review revealed two major topics in this sub-category. The first is concerned with cross-cultural differences in cognitive styles; the second with the influence of style differences on cross-cultural adaptation.

Several studies examined cultural differences in cognitive style across different nations (e.g., Abramson, Lane, Nagai, & Takagi, 1993; Allinson & Hayes, 2000; Hill, Puurula, Sitko-Lutek, & Rakowska, 2000; Kubeš, 1998; Tullett & Kirton, 1995). Traditionally, cultural differences have been conceptualised as a dichotomy between the rational, analytic, left-brained ‘West’ and the intuitive, holistic, right-brained ‘East’ (Allinson & Hayes, 2000; Nisbett, Peng, Choi, & Norenzayan, 2001; Park, Nisbett, & Hedden, 1999). There are, however, no conclusive results that confirm this dichotomy. Researchers using Kirton’s (1976) KAI are firm in their belief that cognitive style is independent of culture. This is on the basis of similar results being obtained across various occupational groups in different nations (Kubeš, 1998; Tullett, 1997). They also believe that cognitive style is a stable cognitive process within adults that is largely uninfluenced by national culture. Other scholars, however, have reported clear differences between cultures, though results did not confirm the analytic West – intuitive East dichotomy. On the contrary, Allinson and Hayes (2000) found the reverse to be true and also argued for a more useful categorisation of countries in terms of their stage of industrial development, rather than the simple east–west dichotomy. Reasons for these cross-cultural differences were not discussed by these authors. However, in a separate study of managers in Finland, Poland, and the UK, Hill and colleagues (2000), based on qualitative empirical evidence, attributed cultural differences in cognitive style to different learning processes, involving personal and cultural socialisation.

A second topic of interest in this category focused on the effects of styles on cross-cultural and expatriate adaptation (e.g., Yamazaki & Kayes, 2007; Yiu & Saner, 2000; Yuen & Lee, 1994). Given the increased importance of doing business in a globalised context, these studies aimed to deliver a better understanding of how successful cross-cultural adaptation is dependent on people’s cognitive and learning styles, skills, and abilities.

Understanding the implications of style differences in a cross-cultural context is important in an increasingly globalised business world. However, the research on cross-cultural adaptation remains rather exploratory and mainly focuses on learning styles and learning/teaching approaches in particular expatriate contexts.

Further research is needed in this area, which looks at more and diverse cultural contexts and which also takes into account cognitive style differences. Moreover, the question still remains unanswered as to whether cognitive styles are biologically based, the result of early learning, lifelong learning, all of these, or none of these (Furnham, 1995). Answers to these questions will indicate the extent to which cognitive styles are likely to be influenced by external factors such as culture, education, and other social environments. More cross-cultural research is therefore needed to give us further insight into these relationships.

Other areas of business and management

Our review identified a number of other articles in business and management related areas that were less represented but may offer other interesting areas for future work. Subjects covered include interpersonal relationships, job performance, and ethical judgments and reasoning.

With regard to articles that were associated with the influence of cognitive styles on dyadic interpersonal relationships, Armstrong, Allinson, and Hayes (2002) found that the analysis-intuition dimension of cognitive style was partly responsible for shaping the overall effectiveness of mentoring relationships between mentor and protégé. Findings revealed that in dyads whose mentor is more analytic, congruence between the partners' cognitive styles enhances the quality of their mentoring relationships. Rickards and Moger (1994) also found that differing styles on the Adaptor-Innovator dimension (KAI) had significant effects on interpersonal relationships. They concluded that homogeneity of style may increase the likelihood of satisficing behaviours, whereas heterogeneity reduces satisficing tendencies but with concomitant personal costs.

With regard to job performance, a study of the effects of cognitive styles on rating accuracy when evaluating job performance revealed that styles may significantly affect how accurate one is (Lee, 1988). Raters whose cognitive style was more articulated (i.e., field independents) rated job performance more accurately than raters whose cognitive style was more global (i.e., field dependents). A study by Guglielmino and Roberts (1992) revealed a positive relationship between readiness for self-directed learning and job performance ratings for employees in both the US and Hong Kong. It was argued that this has important implications for businesses that are rapidly changing or require a high degree of problem solving ability and creativity.

Finally, our review revealed some notable studies of the influence of cognitive styles on ethical judgments and reasoning. McIntyre and Capen (1993) tested the proposition that cognitive styles can influence one's perceptions of what is and is not a matter of ethics. Findings revealed that intuitive-feeling (NF) types were more likely to consider ethical questions than did either sensing-thinking (ST) types or intuitive-thinking (NT) types. They concluded that NF types focus on morality, and should thus prove more comprehensive regarding what constitutes a question of ethics than STs. In a study of ethical reasoning among accountants, Abdolmohammadi, Read, and Scarborough (2003) provided evidence that a selection-socialisation effect exists in the accounting profession that result in recruiting accountants with disproportionately higher levels of the Sensing-Thinking (ST) cognitive style. The study again found that ST types are associated with relatively low levels of ethical reasoning.

Clearly more research is needed in each of these areas, as all are considered by the present authors to be important for the general fields of business and management. Given the increased importance of interpersonal skills for effective management, more research on the influence of cognitive style differences on interpersonal cooperation would be highly desirable. Similarly, in the light of the continuing discussion on the link between styles and abilities – considered to be unrelated by some scholars and related by others – more research on style differences and job performance is needed. Finally, corporate governance and ethics are deemed to be exceedingly important for contemporary organisations, which justify the need for more studies on cognitive styles and ethical behaviour.

CONCLUSIONS AND AREAS FOR FUTURE RESEARCH

The broad appeal of cognitive styles has the potential for considerable usefulness in the field of business and management, especially in light of increased attention on cognitive approaches to industrial, work, and organisational psychology (Hodgkinson, 2003) and great promise for helping us understand some of the variation in job performance that cannot be accounted for by differences in abilities (Sternberg & Grigorenko, 1997). In this paper, we have attempted to highlight a number of key developments in the field over the past 20 years. From a theoretical perspective, several useful attempts to clarify the various concepts and identify appropriate taxonomies have been identified together with developments of new instruments specifically designed for managerial and professional groups.

From the perspective of practical applications of the theory and construct of cognitive style, there have been a number of important studies that have taken place in various sub-disciplines as shown in Table 1 below.

Insert Table 1 About Here

However, the number of applied publications has to be considered to have remained relatively low. More than 100,000 articles were published over the past two decades in the 209 journals identified by this study as being potentially relevant for the field of business and management. Only about 0.8 per cent of these (822 articles) were devoted to examining the influence of cognitive styles. Moreover, only 203 of these 822 identified articles (about 25 per cent) were considered to be relevant in the context of business and management research. This is disappointing when one considers the range of potential implications of cognitive styles for management practice identified by Hayes and Allinson (1994). They highlighted areas of task and learning performance, internal communication, career choice and vocational preference, career guidance and counseling, personnel selection and placement, team composition and team building, conflict management, training and development, person-environment fit, and decision making. If one considers the category of person-environment fit, careers and vocational preference alone, there has on average been less than one article per year devoted to this important area. This is despite the fact that cognitive style theory and research is known to have the potential to affect a significant number of career-relevant aspects, such as: selection, vocational choice and career success; group processes; diversity and conflict management; gender differences and careers; intuition and emotion in the workplace; education, training and development; styles profiling and career management; and cross-cultural career management (Armstrong & Sadler-Smith, 2006). Furthermore, there are other major sub-disciplines that would benefit from research in the field which are hardly represented at all. These include international management; management consulting; organisational cognition; organisational development and change; technology management and design; gender and diversity management; operations management and logistics to name but a few. There is clearly a need to promote more research in these areas.

One way of stimulating this might be through the idea of developing research communities (Rayner, 2006; 2008). The present authors believe that the cognitive styles field would gain significantly from international networks of scholars who adopt multidisciplinary perspectives in order to overcome the fragmented view of many studies in the field. Developing a joint research agenda across disciplines to produce a concise overview of what is already known about the impact of cognitive styles would enable us to identify important unexplored areas. This paper may be seen as one small part of such a process.

From a practical viewpoint, for people in the context of business and management to derive relevant conclusions from empirical studies in the styles field, it is important to take a functional perspective that takes both practitioner awareness and applications of cognitive styles into account (Armstrong & Rayner, 2002; Rayner, 2006). In the field of management, Hodgkinson, Herriot, and Anderson (2001) addressed the need for a shift towards pragmatic science, which combines high theoretical rigor with high practical relevance for users, a view later endorsed by other notable scholars in the field such as Van de Ven and Johnson (2006) and Vermeulen (2007). Within the field of cognitive style, Armstrong and Rayner (2002) also called for a paradigm shift in order to bridge the 'relevance gap' between theory and practice. 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 (referred to as 'verities' in their model) that need to be taken into account in the design of research and in the process of inquiry.

Organisations would, for instance, benefit from more research into the influence of cognitive styles on aspects of intrapersonal development and interpersonal relationships as a way of improving management practice in the workplace. Whetten, Cameron, and Woods (2000) emphasised the importance of intrapersonal self-awareness and thorough analyses of one's strengths and weaknesses as one way of improving management effectiveness. In this respect, understanding the interplay between stylistic preferences and day-to-day workplace behaviour is known to be crucial for implementing effective individual development efforts (Berr, Church, & Waclawski, 2000).

Armed with higher levels of intrapersonal style awareness, organisations might then benefit from more research into ways in which this new knowledge can be put into the management practice through the development of more cohesive interpersonal relationships. μ

The ability to work well with others and to enable others to act has become a critical differentiator between success and failure in executive ranks (Kouzes & Posner, 2002). Getting results as a manager requires a balance between effective task-oriented and people-oriented practices, with the latter being regarded as being most important (Longenecker & Simonetti, 2001). Understanding the implications of differences in cognitive style is thought to be a firm basis for fostering better interpersonal working relationships (Armstrong, 1999; Hayes & Allinson, 1994; Priola et al., 2004). Overlooking their impact can lead to interpersonal disagreements and conflict situations, as people with different cognitive styles may not understand or respect each other (Leonard & Straus, 1997). Respect for diversity is also important to enhance problem solving and creative thinking and may increase the organisation's flexibility to respond to changing environments (Jarzabkowski & Searle, 2004). An awareness of the importance of cognitive differences is important here too. Again, further research is needed in these areas.

Finally, to give one last example, matching or mismatching cognitive styles may also be an important factor in social interaction that needs further empirical consideration, whether at the level of the dyad or the group. Despite the efforts of researchers over the past thirty years, the effects of matching or mismatching cognitive styles remain unclear. Evidence from the field of education has been inconsistent and, at times, contradictory. There remains a dearth of studies examining the matching hypothesis in relation to organisation members working in an industrial context.

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TABLE 1**Breakdown of 203 articles reviewed by sub-disciplinary area**

Sub-discipline	Articles	Per year (on average)
Theory and measurement	20	1
Innovation and entrepreneurship	16	0.8
Sales and marketing	19	1
Groups and teams	10	0.5
Decision making and problem solving	29	1.5
Management and organizational learning	42	2
Person-environment fit, careers and vocational preference	18	0.9
Leadership	9	0.5
Culture	13	0.7
Other areas of business and management	27	1.4