

Entrepreneurial Team Cognition: A Review

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Entrepreneurial team scholars highlight the importance of studying entrepreneurial team cognition in gaining a better understanding of why some entrepreneurial teams are capable of developing teamwork leading to successful entrepreneurial outcomes while others are not. However, in the absence of a clear definition of entrepreneurial team cognition, researchers continue to employ a vast diversity of potentially related concepts. To bring clarity to this fragmented area of research, the authors performed a systematic literature review of papers concerned with entrepreneurial team cognition published in the leading management and entrepreneurship journals over the past 20 years. This review was guided by two main research questions: (a) what is entrepreneurial team cognition, and (b) how does entrepreneurial team cognition interact with inputs, processes and outcomes. Based on the published literature, key properties of the concept are identified, and an overarching definition of entrepreneurial team cognition composed of these properties is introduced. Next, the review outlines how entrepreneurial team cognition interacts with other variables within a comprehensive input-mediator-output framework. Finally, the review addresses how future research can build on the proposed definition and framework to advance the theoretical depth and empirical investigation of entrepreneurial team cognition.

Introduction

The vast majority of ventures are founded and led by teams rather than by individuals (Beckman 2006; Cooper *et al.* 1989; Kamm *et al.* 1990; Reynolds and White 1997; Schjoedt *et al.* 2013; West 2007). However, 40% of new ventures fail within the first year (Dimov and De Clercq 2006; Timmons 1990), and more than 60% of these failures are ascribed to problems with the entrepreneurial team (Eisenhardt 2013; Gorman and Sahlman 1989; Kaplan and Strömberg 2004). Research shows that the way in which entrepreneurial team members work together

plays an important role in determining venture outcomes (Chowdhury 2005; Ensley and Pearce 2001; Ensley *et al.* 2003; Kamm and Nurick 1993; Kamm *et al.* 1990). The ability of team members to share and coordinate task-related and non-task-related perspectives (Blatt 2009; Zheng 2012; Zheng and Mai 2013), estimate the effects of possible actions and approach problem-solving (e.g. Foss *et al.* 2008; Shalley and Perry-Smith 2008), make decisions (e.g. Boeker and Karichalil 2002; Boeker and Wiltbank 2005; Eisenhardt 2013; Kamm and Nurick 1993), and allocate appropriate resources (e.g. Forbes *et al.* 2006) influences entrepreneurial teamwork and venture performance. However, why some entrepreneurial teams are capable of developing teamwork leading to successful entrepreneurial outcomes and other teams are not remains unclear.

Entrepreneurship scholars suggest that cognition has the potential to explain how entrepreneurial teams work together in achieving entrepreneurial

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outcomes (e.g. Baron 2007; Chowdhury 2005; Dimov 2007, 2011; Ensley and Pearce 2001; Grégoire *et al.* 2011; Mitchell *et al.* 2002, 2007; Shalley and Perry-Smith 2008; West 2007; Zheng 2012). However, to date, few attempts have been made to structurally define and describe the concept of 'entrepreneurial team cognition'. Instead, a plethora of cognitive team concepts exist, all describing some degree of shared or collective knowledge that enables the team to take coordinated action. For instance, shared strategic cognition (Ensley and Pearce 2001), collective memory (Bryant 2012), strategic consensus (Vissa and Chacar 2009), collective cognition (West 2007), creative cognition (Shalley and Perry-Smith 2008) and transactive memory systems (Zheng 2012; Zheng and Mai 2013) all take into account the cognitive exchanges and processes that occur between team members while residing in the team. However, the diversity of existing concepts and the ambiguity in the way in which the concepts are operationalized constrain the comparability of findings across studies. Thus, the lack of a formal definition of entrepreneurial team cognition hampers the theoretical and empirical development in this area.

Alongside an urgent call for clarification of what entrepreneurial team cognition exactly entails, scholars are also calling for a better understanding of how entrepreneurial team cognition facilitates processes such as decision-making, coordinating and information-processing. Moreover, as the venture creation process evolves over time (Baron 2007; Dimov 2007; Forbes 1999; Gartner 1985; Shane 2003), prior work has demonstrated that cognitive team processes have a profound impact on the selection (e.g. Parker 2009; Ruef *et al.* 2003), addition (e.g. Vanaelst *et al.* 2006) and exit (e.g. Knockaert *et al.* 2011; Ucbasaran *et al.* 2003) of entrepreneurial team members. However, no efforts have been made to synthesize this work and examine how entrepreneurial team cognition affects changes in entrepreneurial composition over the different stages of new venture creation.

Although scholars have investigated the topic of team cognition in organizational teams (e.g. Cannon-Bowers and Salas 2001; DeChurch and Mesmer-Magnus 2010; Mathieu *et al.* 2000; Mohammed and Dumville 2001; van Ginkel and van Knippenberg 2008), their findings are not directly applicable to entrepreneurial teams, as they are fundamentally distinct from the former. Specifically, in contrast to organizational teams, which operate in the

context of established organizations, entrepreneurial teams act in the context of evolving organizations. As such, the entrepreneurial context is characterized by weak social institutions in which behavioural norms and scripts are often undefined (Mischel 1977), job descriptions are non-existent and ambiguous (Staw 1991), and team members must be able to direct their ventures through the various stages of the entrepreneurial process (Forbes 1999; Gartner 1985; Klotz *et al.* 2014).

The purpose of this paper is twofold. First, based on existing research, we seek to describe and define the concept of entrepreneurial team cognition. Second, we organize the literature that has researched how entrepreneurial team cognition concepts interact with other variables into a comprehensive inputs–mediator–outcomes (IMO) framework (e.g. Klotz *et al.* 2014; Mathieu *et al.* 2008; McGrath 1964). By compiling the work on entrepreneurial team cognition within one framework for the first time, we aim to provide valuable directions for future research on this topic. Consequently, this review is guided by the following questions:

- (a) What is entrepreneurial team cognition?
- (b) How does entrepreneurial team cognition interact with inputs, processes and outcomes?

To answer these questions, we employed a systematic literature review of papers concerned with 'entrepreneurial team' and 'cognition' published in the leading management and entrepreneurship journals over the past 20 years. In doing so, this study makes several important contributions.

First, this study is the first to systematically review the fragmented literature concerned with entrepreneurial team cognition. We clarify the conceptual boundaries of entrepreneurial team cognition, outline the strengths and weaknesses of the existing concepts and discuss methodological challenges. Second, we unite existing work and develop an overarching definition of entrepreneurial team cognition composed of the key conceptual components of the concept, its emergence and content. We further clarify how entrepreneurial team cognition is distinct from entrepreneurial team processes and provide future research with a better understanding of the role of team processes in achieving entrepreneurial outcomes. Finally, the proposed IMO framework is the first to clearly map out how entrepreneurial team cognition interacts with team processes in achieving entrepreneurial outcomes.

Methodology

With the aim of developing a conceptual consolidation across a fragmented field of study, we used a systematic review methodology (Transfield *et al.* 2003). This approach seeks to remove the subjectivity of data collection by using a predefined selection algorithm. Following Crossan and Apaydin (2010), we performed three steps: data collection, data analysis and reporting of the results. Each step is described in detail below.

Data collection

In the search of relevant studies, we focused on identifying papers concerning entrepreneurial team cognition published over the past 20 years (1993–2013). Specifically, we focused on the starting year of 1993, as it represents the year that the first article explicitly theorizing on entrepreneurial team composition and decision-making over the stages of new venture formation (Kamm and Nurick 1993) was published.

After defining the starting and ending dates for this review, we established the conceptual boundaries of the investigated phenomenon (Denyer and Tranfield 2009). Specifically, we established the boundary conditions for the terms ‘entrepreneurial team’ and ‘team cognition’. Several definitions exist to describe entrepreneurial teams. One of the most cited definitions is from Kamm *et al.* (1990), who suggest that an entrepreneurial team involves, ‘Two or more individuals who jointly establish a business in which they have an equity (financial) interest [and who] . . . are present during the pre start-up phase of the firm’ (Kamm *et al.* 1990, p. 7). Among other frequently used definitions are Vyakarnam *et al.* ’s (1997) definition, ‘The top team of individuals that is responsible for the establishment and management of the business’ (Vyakarnam *et al.* 1997, p. 2), and Harper’s definition (2008), ‘A group of entrepreneurs with a common goal which can only be achieved by appropriate combinations of individual entrepreneurial actions’ (Harper 2008, p. 614). However, while highly supportive in advancing conceptual thinking on the boundaries of the entrepreneurial team concept, these definitions did not cover the purpose of our review topic. First, Kamm *et al.*’s (1990) definition excludes a consideration of the team members that potentially join the team after the founding phase. Next, the definition by Vyakarnam *et al.* (1997) is bound to those team members responsible for the establishment and management of the

business without addressing specifics of entrepreneurial activities or tasks. Third, Harper’s (2008) definition refers to entrepreneurial teams in a sense that is too broad for the purpose of this review. Consequently, accounting for the nature of our research questions, we draw on Klotz *et al.* ’s (2014) definition of an entrepreneurial team, ‘the group of individuals that is chiefly responsible for the strategic decision-making and on-going operations of a new venture’ (Klotz *et al.* 2014, p. 227). We broadly define a new venture as a firm that is in its early stages of development and growth. Such firms are in the process of bringing their initial products or services to market, forming a customer base, and putting in place organizational processes and procedures (Klotz *et al.* 2014). Furthermore, this definition implies that to be considered an entrepreneurial team member, one must be involved in strategic decision-making, hence outlining the existence of cognitive team processes within the team. Overall, this proposed definition suggests that entrepreneurial teams are characterized by essential interactive components, which allows for the study of team emergent states and team processes.

Next, we set the boundary conditions for the term ‘cognition’ in the context of the entrepreneurial team. In the absence of a formal definition of entrepreneurial team cognition, we reflect on work from entrepreneurial cognition (Mitchell *et al.* 2002, 2007) and organizational behaviour (Bougon 1992; Cannon-Bowers *et al.* 1993; Cooke *et al.* 2004; DeChurch and Mesmer-Magnus 2010; Kozlowski and Klein 2000; Marks *et al.* 2001; Weick and Roberts 1993) scholars. First, drawing on Mitchell *et al.* (2002), individual entrepreneurial cognition is most commonly defined in the entrepreneurship literature as: ‘the knowledge structures that people use to make assessments, judgments, or decisions involving opportunity evaluation, venture creation, and growth’ (Mitchell *et al.* 2002, p. 97). However, applying a definition of individual cognition to team cognition leads to a conceptual misfit, as it is indifferent to the interactive elements present in teams. Instead, a team perspective represents considerably more than the compilation of individual perspectives (Bougon 1992; DeChurch and Mesmer-Magnus 2010; Kozlowski and Klein 2000; Marks *et al.* 2001; Shalley and Perry-Smith 2008; West 2007), and even aggregated individual cognition is not a proxy for entrepreneurial team cognition. More specifically, an aggregate cognitive map cannot be considered an integration of ideas and concepts from a group of

individuals, as it refers solely to the ‘similarity of meanings’ (Bougon 1992, p. 371). Rather, team cognition emerges from the interplay of the individual cognition of each team member and the team’s process behaviours (Cannon-Bowers *et al.* 1993; Cooke *et al.* 2004; DeChurch and Mesmer-Magnus 2010; Kozlowski and Klein 2000). Furthermore, Weick and Roberts (1993) define team cognition as the ‘collective mind’, i.e. the comprehension of unfolding events by teams of interacting individuals (Weick and Roberts 1993). Although these theoretical perspectives hint at collective knowledge and a sharing process, we were unable to discover clear search terms embodying the richness of the entrepreneurial team cognition concept. Thus, instead of picking one key word, the second boundary condition pertained to the presence of ‘cognitive’ factors and processes in the selected papers. Evidently, the number of papers yielded by these terms was high, and additional manual selection work was required to establish the final sample. The section on data analysis outlines the application of the third boundary condition in detail.

Having established our first two boundary conditions, we used a traditional Boolean search approach connecting the terms ‘entrepreneur* AND team’ to identify articles related to the first boundary conditions for inclusion in the review. Because many synonyms are used for the term ‘entrepreneurial team’, such as ‘founding team’, ‘start-up team’ and ‘new venture team’, we performed searches for these terms as well. The papers included were subject to the second boundary condition for selection in which we identified the presence of the term ‘cognition’, using a Boolean search with the search term ‘cogniti*’.

To ensure a rigorous systematic search, we set the search boundary to academic journals available on the ISI Web of Knowledge’s Social Sciences Citation Index (SSCI) database, the most comprehensive database of peer-reviewed journals in the social sciences. As a result, we ensured that only top tier journals were included in the review (see Table 1 for an overview of the selected journals). Furthermore, we rendered searches using other electronic databases, such as Business Source Complete, Wiley Online Library, Science Direct and JSTOR. Finally, to reduce the risk of excluding key articles because of the rigidity of our systematic review process (Wang and Chugh 2014), we carried out an independent search in Google Scholar to confirm the results of the main search.

Table 1. Overview of selected journals

Abbreviation	Full title
AMJ	Academy of Management Journal
AMR	Academy of Management Reviews
ASR	American Sociology Review
ASQ	Administrative Science Quarterly
ET&P	Entrepreneurship Theory and Practice
ERD	Entrepreneurship and Regional Development
HRMR	Human Resource Management Review
IBR	International Business Review
JBR	Journal of Business Research
JBV	Journal of Business Venturing
JOB	Journal of Organizational Behavior
JOM	Journal of Management
JSBM	Journal of Small Business Management
OSci	Organization Science
RP	Research Policy
SBE	Small Business Economics
SEJ	Strategic Entrepreneurship Journal
SMJ	Strategic Management Journal

Data analysis

The initial search process yielded 266 papers. After applying the second boundary condition for inclusion, namely, the presence of cognitive factors and processes, a sample of 72 papers remained. Owing to the frequency of scholars’ use of ‘cognitive terms’, in all cases we read the full article to ascertain its suitability. During this manual selection, papers were subject to a third boundary condition that pertained to the presence of cognitive factors and processes that could inform us at the team level. In other words, papers were considered for inclusion only if the central focus was on cognitive knowledge structures (individual and team level) that could inform us about cognition at the team level. A second and third researcher ensured accuracy by rechecking the manual selection.

As a result of the manual check, 28 papers were excluded from the analysis (see Figure 1 for a summary of the systematic review process). In these cases, papers contained the key search terms, but did not focus on entrepreneurial teams, nor did they provide meaningful cognitive perspectives on the understanding of entrepreneurial team cognition. For instance, some of the excluded papers focused on outcomes of individual cognition, entrepreneurial education or corporate entrepreneurship, or were conference papers, editorials or solely descriptive studies. Additionally, following previous reviews on cognitive behaviour during new venture formation (Forbes 1999), we excluded trait-specific studies that

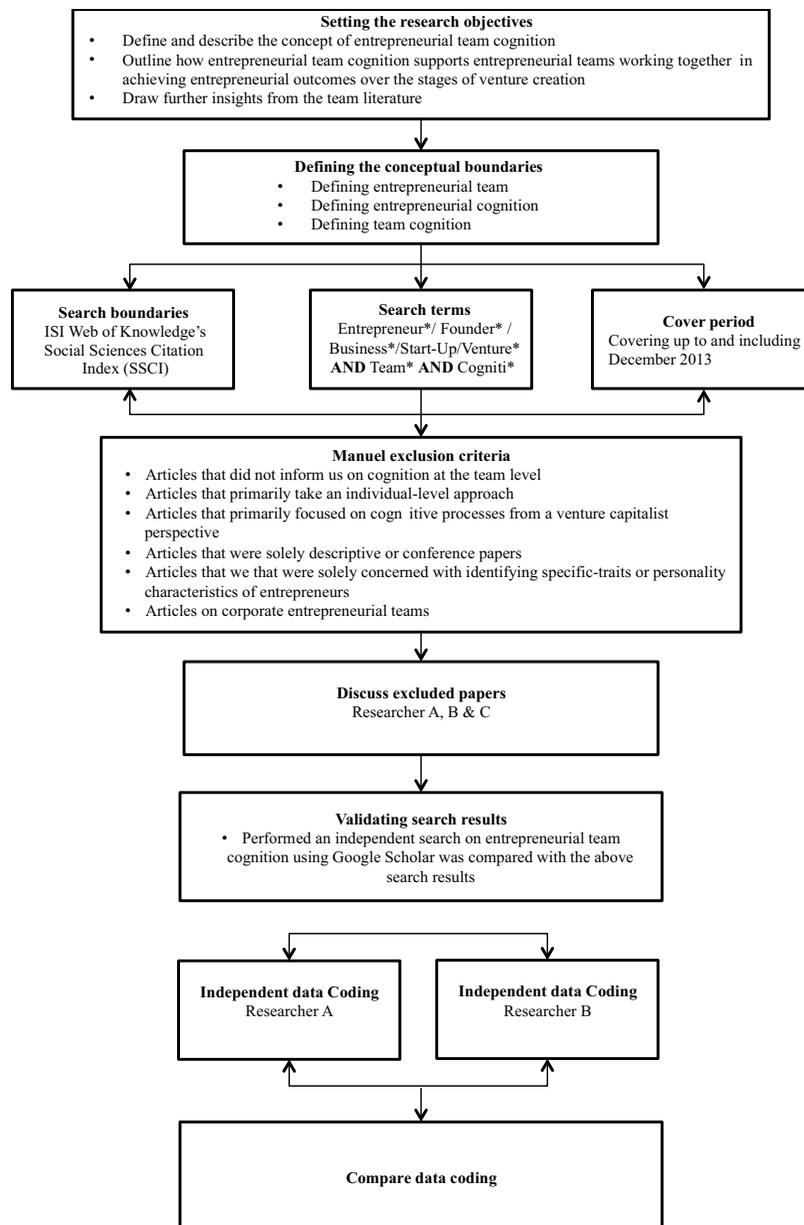


Figure 1. Systematic review process

were merely concerned with identifying the traits or personality characteristics of entrepreneurs. Papers that concentrated on venture capitalists' cognitive processes, external evaluators such as judges, or on the interplay between venture capitalists and entrepreneurial teams were also excluded. As a result, our final sample included 44 papers that all examined inputs, team process or outcomes associated with entrepreneurial team cognition.

The following thematic codes were used to analyse the articles included in Table 2: (1) Name(s) of the author(s); (2) Year of publication; (3) Journal title; (4) Definition of entrepreneurial team; (5) Concept used to describe entrepreneurial team cognition; (6) Model inputs; (7) Mediating and/or moderating mechanism; (8) Emergent state studied; (9) Entrepreneurial team processes studied; (10) Entrepreneurial team outcomes studied; (11) Stage of venture

Table 2. Overview of included papers

Author	Year	Journal	Method	Keyword Figure 2	Keywords	Sample
Aldrich and Kim	2007	SMJ	Conceptual	Networking creation	Social network, entrepreneurship, team, new venture, broker, startup	N/A
Barney <i>et al.</i>	1996	JBV	Quantitative	Learning	Learning, evaluation of learning, venture capital, previous experience	205 venture capital backed firms
Beckman	2006	AMJ	Quantitative	Shared prior experience	Prior company affiliations, shared understanding, exploration and exploitation	329 founders
Blatt	2009	AMR	Conceptual	Schema	Schema, trust, relational capital, new venture performance	N/A
Boeker and Karichahil	2002	AMJ	Quantitative	Team member exit	Founder departure, prior experience, board composition	78 semiconductor ventures
Boeker and Wiltbank	2005	AMJ	Quantitative	Team membership change	Team membership change, functional diversity, shared perspectives	86 semiconductor ventures
Bruneel <i>et al.</i>	2010	SEJ	Quantitative	Learning	Internationalization, young firms, organizational learning, interorganizational, learning	114 nascent technology ventures
Bryant	2012	ETP	Conceptual	Collective memory	Collective memory, imprinting, dynamic process	N/A
Chaganti <i>et al.</i>	2008	JBV	Quantitative	Strategy formulation	Growth intentions, cognitive style, and perceived competitive conditions, decision-making	112 Asian and Latino entrepreneurs
Chowdhury	2005	JBV	Qualitative	Cognitive comprehensiveness	Ethnicity, cognitive frames, strategy formulation	147 entrepreneurs in 79 teams
Clarysse and Moray	2004	JBV	Case study	Learning	Team composition, team member learning, team learning, shocks	1 team 7 team members
Discua Cruz <i>et al.</i>	2013	ETP	Case study	Shared commitment	Shared commitment, entrepreneurial stewardship, team formation, trust	7 family business firms in Honduras
Eisenhardt	2013	SBE	Conceptual	Decision-making	Strategic decision-making, heuristics, Organizational structure, strategy as simple rules	N/A
Ensley and Hmieleski	2005	RP	Quantitative	Shared strategic cognition	Team composition, shared strategic cognition, cohesion, conflict, performance	102 high-technology university-based start-ups and 154 independent high-technology new ventures. 158 Inc 500 teams
Ensley and Pearce	2001	JOB	Quantitative	Shared strategic cognition	Shared strategic cognition, mental models, group dynamics, performance	
Ensley <i>et al.</i>	2003	HRMR	Conceptual	Shared leadership	Outcome of team cohesion and collective vision	N/A
Fern <i>et al.</i>	2012	SMJ	Quantitative	Venture performance	Knowledge diversity, team, strategy, team knowledge	120 ventures
Forbes <i>et al.</i>	2006	ETP	Case study	Team membership change	Team member addition, resource seeking behavior, interpersonal attractiveness	3 cases
Foss <i>et al.</i>	2008	SEJ	Conceptual	Creativity	Creativity, team diversity, thought processes	N/A
Francis and Sandberg	2000	ETP	Conceptual	Decision-making	Decision-making, effectiveness, friendship, problem-solving	N/A
Furr <i>et al.</i>	2012	SEJ	Quantitative	Information-Processing	Cognitive flexibility, team, domain-knowledge, information-processing	68 ventures
Godwin <i>et al.</i>	2006	ETP	Conceptual	Legitimacy	Legitimacy, gender, female entrepreneurs, resource acquisition	N/A

Grossman <i>et al.</i>	2012	JOM	Quantitative	Networking creation	Resource search, interpersonal similarity, networks	1407 entrepreneur-contact dyads
Gruber <i>et al.</i>	2012	JOM	Quantitative	Opportunity recognition	Opportunity recognition, diverse human capital, cognitive diversity	42 VC-backed firms
Harper Kamm and Nurick	2008 1993	JBV ETP	Conceptual Conceptual	Information-Processing Decision-making	Entrepreneurial team formation, discovery, information-processing Decision-making, venture formation, emergent process	N/A N/A
Karatas-Ozkan	2011	ERD	Case study	Learning	Learning, prior experience, cognitive frames	1 case 5 team members
Knockaert <i>et al.</i>	2011	ETP	Case study	Shared vision	Knowledge transfer, mental models, team performance	1 academic spin-out
Kontinen and Ojala	2011	IBR	Case study	Opportunity recognition	Opportunity recognition, diverse human capital, cognitive diversity	8 Swedish family firms
Leung <i>et al.</i>	2006	JBV	Case study	Networking creation	Interpersonal dynamics, new member recruitment, social capital	10 entrepreneurial firms
Mosakowski	1998	OSci	Conceptual	Venture performance	Cognitive resources, cognitive capabilities, entrepreneurial team resources	N/A
Parker	2009	SEJ	Conceptual	Team membership change	Cognitive biases, homophily, team formation	N/A
Perry-Smith and Coff	2011	SEJ	Experiment	Creativity	Creativity, mood, emergent process	187 representing 41 student groups
Ruef <i>et al.</i>	2003	ASR	Quantitative	Team formation	Homophily, personal attraction, functional diversity	816 nascent entrepreneurs
Sardana and Scott-Kemmis	2010	JSBM	Quantitative	Learning	Learning, previous experience, cognitive diversity	32 entrepreneurs
Shalley and Perry-Smith	2008	SEJ	Conceptual	Creativity	Team creative cognition, creativity, emergent process	N/A
Soutaris and Maestro	2010	SMJ	Quantitative	Decision-making	Decision-making, polychronicity of entrepreneurial teams, decision-speed	129 ventures
Uebasaran <i>et al.</i>	2003	ETP	Quantitative	Team membership change	Team member turnover, functional heterogeneity, diversity	90 ventures
Vanaelst <i>et al.</i>	2006	ETP	Case study	Team membership change	Change in tea composition, functional heterogeneity, shared vision, dynamics	10 spin-out ventures
Vissa and Chacar	2009	SMJ	Quantitative	Network creation	Social capital, strategic consensus, structural holes, functional diversity	74 Indian ventures
West	2007	ETP	Repertory grid technique	Collective cognition	Collective cognition, decision-making, new venture performance	22 venture teams
Zheng and Mai	2013	SEJ	Quantitative	Transactive memory systems	TMS, strategy, response to surprises, emergent economies	147 start-up teams
Zheng	2012	JBV	Quantitative	Transactive memory systems	TMS, prior shared experience, team trust, new venture performance	100 Chinese start-ups
Zolin <i>et al.</i>	2011	JBR	Quantitative	Team member exit/addition	Entrepreneurship, entrepreneurial team, resource flexibility, novice entrepreneurs, habitual entrepreneurs	114 teams

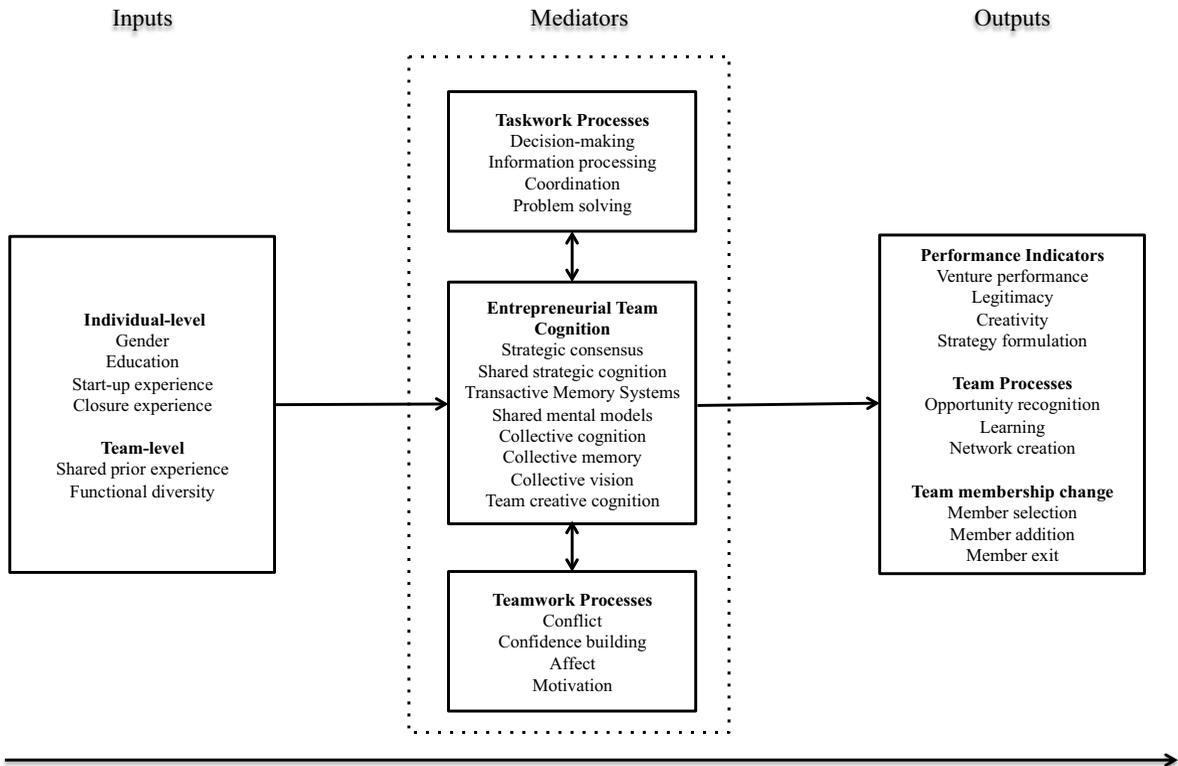


Figure 2. Entrepreneurial team cognition framework

creation; (12) Method used; (13) Unit of analysis; (14) Sample; (15) Keywords. All articles were manually coded based on the pre-defined codes to ensure accuracy. Two of the authors independently read and coded the articles based on the pre-defined theme. To confirm the coding, experts in the field of cognitive science checked it, and any discrepancy in the coding was discussed and adjusted accordingly.

Results

General overview

The analysis included a total of 44 articles (for a full overview of the selected articles see Table 2). Of the 44 articles, 31 were empirical studies, and 13 were conceptual works. The majority of the empirical papers employed a quantitative research design (21). The remaining 10 papers reported on qualitative designs (1), experiments (1) or case studies (8). Among the case studies, the number of cases studied varied between 1 and 10. The majority of the papers

focused on non-family-founded teams (41), which included spin-off teams (3), student teams (1) and teams composed of friends (1). Three papers employed a research design in which non-family entrepreneurial teams were compared with spin-off teams (1), family teams (1) or top-management teams (1).

What is entrepreneurial team cognition?

The literature review revealed that authors draw on a diversity of concepts to conceptualize and measure entrepreneurial team cognition. However, all these works refer to three key properties capturing the essence of the concept. In particular, existing work suggests that entrepreneurial team cognition can be described as (a) an emergent state, (b) embedded in team processes and (c) involving sharing content-related knowledge.

An emergent state. In providing an answer to the question as to how entrepreneurial team cognition

develops, research suggests that team cognition is an emergent state (Ensley and Pearce 2001; Shalley and Perry-Smith 2008; West 2007; Zheng 2012; Zheng and Mai 2013). This emergent state arises from complex interactions among (cognitions) of individual members of an entrepreneurial team and thus cannot be reduced to the sum of its parts. For example, Ensley and Pearce (2001) argue that the process of developing shared understanding is the outcome of discussions about strategic issues and is impacted by task-related disagreements. This conceptualization of team cognition as an emergent state further finds its origins in the work of leading organizational behaviour scholars (DeChurch and Mesmer-Magnus 2010; Kozlowski and Ilgen 2006; Kozlowski and Klein 2000; Marks *et al.* 2001; Salas *et al.* 2009). In particular, DeChurch and Mesmer-Magnus (2010) define team cognition as an emergent state that refers to ‘the manner in which knowledge important to team functioning is mentally organized, represented, and distributed within the team and allows team members to anticipate and execute actions’ (DeChurch and Mesmer-Magnus 2010, p. 3).

Emergent states further describe the ‘cognitive, motivational, and affective properties of teams [that are] . . . dynamic in nature and vary as function of team context, inputs, processes, and outcomes’ (Marks *et al.* 2001, p. 357). Therefore, emergent states describe conditions that dynamically enable and underlie effective teamwork. Besides team cognition, the literature identifies several other emergent states, such as team confidence, empowerment, team climate, cohesion and trust. Yet these examples of emergent states all describe emotional attraction to the team, or beliefs about its capability to perform tasks, whereas entrepreneurial team cognition describes the knowledge architecture of the team. Consequently, being conceptualized as a distinct, reciprocally related aspect of teamwork, scholars indicate that team cognition contributes to team outcomes in a unique manner (DeChurch and Mesmer-Magnus 2010).

Furthermore, we denote that entrepreneurial team cognition is a bottom-up emergent construct, originating in the cognition of individuals. This cognition of individuals present within the team manifests as a pattern, which ultimately constitutes the entrepreneurial team cognition construct (Kozlowski and Klein 2000). Consequently, entrepreneurial team cognition is a construct of compilational emergence, meaning that the construct manifested at the team

level is different in form from the individual-level counterpart. Contrasting with compilational team constructs are compositional team constructs, in which the individual-level building blocks are similar in form and function to their manifestation at the team level.

Thus, entrepreneurial team cognition refers to an emergent state of the team that is dynamic in nature and that varies as a function of team context, inputs, processes and outcomes. Moreover its compilational emergence makes entrepreneurial team cognition non-isomorphic to the individual-level elemental cognitive content (DeChurch and Mesmer-Magnus 2010, p. 35), but instead is new substance arising from the patterning of knowledge between team members and therefore cannot be reduced to the sum of its parts.

Embedded in team processes. By conceptualizing entrepreneurial team cognition as an emergent state, the concept is, by definition, distinct from entrepreneurial team processes. In contrast to emergent states, team processes are ‘team members’ interdependent acts that convert inputs to outcomes through cognitive, verbal, and behavioural activities directed toward organizing taskwork to achieve collective goals’ (Marks *et al.* 2001, p. 357). In this perspective, team processes are the means through which entrepreneurial team members work interdependently to use various resources to achieve meaningful entrepreneurial outcomes. In contrast, entrepreneurial team cognition is the product of team experiences, including team processes, and it offers new input to processes and outcomes. For example, entrepreneurial teams with high levels of team cognition (an emergent state) may be more inclined to improve an existing conflict (the process), which may decrease additional conflicts and increase team cognition. Thus, entrepreneurial team cognition functions as input, and affects the execution of teamwork processes and task work. This reoccurring pattern continues until entrepreneurial teams achieve conclusive outcomes, such as innovation or team satisfaction.

Team creative cognition is an example of a concept in which this dynamic iteration among cognitive processes is explicitly conceptualized. Shalley and Perry-Smith (2008) define team creative cognition as ‘a shared repertoire of cognitive processes among team members that provides a framework for how the team goes about solving problems creatively’ (Shalley and Perry-Smith 2008, p. 27). From this perspective, team creative cognition exists when

team members share a common view of how to approach problems creatively. These processes are not identical for all teams, but vary from situation to situation. Team cognition is evident in team members actively working together to address problems at hand, exploring multiple options, challenging assumptions, seeking different perspectives, combining different viewpoints, reflecting on past actions, questioning ideas raised, and actively evaluating different options as a team (Shalley and Perry-Smith 2008).

Sharing content-related knowledge. This review revealed that there are ambiguities inherent to the terms ‘collective’ and ‘shared’ that are used to label entrepreneurial team cognition concepts. Shalley and Perry-Smith (2008) denote team cognition as ‘sharing’ cognitive processes, implying a notion of simultaneous engagement in thought processes among team members. However, Ensley and Pearce (2001) refer to sharing as ‘having in common’. As such, the concept of shared strategic cognition is defined as a situation in which two or more team members ought to have some degree of common knowledge (Ensley and Pearce 2001). In particular, strategic cognition is the outcome of group processes that occur during the development of strategy, and refers to the extent to which these mental models about strategy are shared (Ensley and Pearce 2001). It does not mean that team members need fully redundant knowledge. A typical example here is a team member working on the marketing strategy of the venture and a team member working on the technical development of the product. They cannot be expected to have identical knowledge, but portions of their knowledge bases ought to be in common. More specifically, shared strategic cognition (Ensley and Hmieleski 2005; Ensley and Pearce 2001), or thinking and agreeing about the venture’s strategy at the group level, draws on the importance of sharing task-specific knowledge structures. In a similar vein, Ensley and Pearce (2001) label collective vision as the degree to which the entrepreneurial team holds a common mental model of the strategy of the organization (Ensley *et al.* 2003). Thus, while team creative cognition pertains explicitly to the sharing of cognitive processes, strategic consensus, collective vision and shared strategic cognition make strong references to having common task-specific knowledge.

Contrary to these aforementioned notions of sharing, Vissa and Chacar (2009) put forward yet

another perspective on the connotation of the term. Following Miller *et al.* (1998), the authors define strategic consensus as ‘the extent to which team members agree on what the strategy and goals of the business ought to be’ (Vissa and Chacar 2009). In this notion, the value and beliefs of the team members about the venture’s future ought to be similar and agreed upon in order to move towards successful entrepreneurial outcomes. Thus, in the context of strategic consensus, ‘shared’ describes the team members as holding similar, if not identical, knowledge. That is, team members must hold similar attitudes and beliefs in order to draw common interpretations.

The term ‘collective’ is also used to describe the notion of ‘overlapping’ knowledge and expectations between team members (West 2007). Entrepreneurial team collective cognition emerges when two types of perspectives, namely, differentiation and integration of strategic perspectives, merge within the team (West 2007). Differentiation of strategic perspectives points to the degree to which each strategic construct is construed as different from every other strategic construct. The integration of strategic perspectives pertains to the degree to which entrepreneurial team members think in a similar fashion about a set of strategy constructs.

A final stream of reviewed papers draws on the perspective that the knowledge that team members have about each other’s expertise creates the value of team cognition. In particular, the transactive memory system perspective argues that team members need to understand each other’s preferences, strengths, weaknesses and tendencies in order to maximize performance. Over time, team members learn the distribution of expertise within the team. This type of team-specific knowledge allows team members to anticipate one another’s actions and provide relevant information. Finally, it ensures the allocation of resources according to team member expertise (Zheng 2012; Zheng and Mai 2013). As a result, once acquainted with one another, team members will modify their behaviour, depending on what action they expect from each other. In this perspective, sharing refers to complementarity and points to ‘the extent to which team members’ cognitions are complementary in structure and/or content fitting together like puzzle pieces’ (Rentsch and Klimoski 2001; Rentsch *et al.* 2009, p. 145). For an overview of the definitions of the entrepreneurial team cognition concepts discussed, see Table 3.

Table 3. Existing concepts

What	Definition	Measured	Authors
Transactive memory systems	A transactive memory system is defined as the sum of the individual knowledge and shared understanding of the location of expertise among team members. It is commonly referred as 'who knows what' or directory knowledge.	Likert scale Transactive memory system scale (Lewis 2003) along three key dimensions: specialization, credibility and coordination	Zheng 2012; Zheng and Mai 2013
Strategic consensus	The extent to which individual mental models of strategy overlap.	Likert scale Three items that rate agreement on short-term and long-term goals	Vissa and Chacar 2009
Collective memory	Collective memory emerges through iterative feedback processes, the collective mindset of a founding team becomes embedded in organizational culture and founders' values and beliefs become imprinted onto the venture's culture and norms of behaviour.	N/A Conceptual	Bryant 2012
Collective cognition	Collective cognition emerges when two type of perspectives, differentiation and integration of strategic perspectives, merge within the team.	Socio-cognitive grid analysis Grid captures a rating by each member of 20 possible strategic goals and 21 possible means	West 2007
Shared mental models	Shared mental models are an organized understanding or mental representation of knowledge that is shared by team members (Mathieu <i>et al.</i> 2000).	Likert scale and similarity ratings	Knockaert <i>et al.</i> 2011 (case study context)
Team creative cognition	Team creative cognition refers to the shared repertoire of cognitive processes (e.g. ideas related to solving problems, new practices, or new procedures, as well as ideas about new products or services) among entrepreneurial team members that provides a framework for how the team approaches problems creatively.	N/A Conceptual	Shalley and Perry-Smith 2008
Shared strategic cognition	Shared strategic cognition is defined as the extent to which strategic mental models held in the hearts and minds of the new venture team members overlap or agree.	Likert scale. Strategic Orientation of Business Enterprises scale measuring strategy through 7 dimensions; aggressiveness, analysis, defensiveness, futurity, proactiveness, innovativeness, and riskiness	Ensley and Pearce 2001

Defining entrepreneurial team cognition

Synthesizing existing scholarly perspectives, we provide an answer to the question of what entrepreneurial team cognition entails, and Table 4 captures the key elements of the definition of the concept. Guided by the three key properties of the concept described in the previous section, we formulated three questions that we suggest pertain to the key elements defining entrepreneurial team cognition:

- (1) How does entrepreneurial team cognition develop?
- (2) How is entrepreneurial team cognition distinct from team processes?
- (3) What is the content of entrepreneurial team cognition, or what ought to be shared?

Consequently, we propose the following overarching definition:

Entrepreneurial team cognition is an emergent state that refers to the manner in which knowledge is mentally organized, represented and distributed within the team and allows entrepreneurial team members to approach problem-solving and make assessments, judgments or decisions concerned with milestones and outcomes relevant to the entrepreneurial process, such as identifying and evaluating different opportunities, or defining and implementing launch and growth strategies.

This definition incorporates the building blocks of entrepreneurial team cognition and provides clarity on issues that previously remained conceptually underspecified (see Table 4). The first part of this definition establishes that entrepreneurial team cog-

nition is an emergent state that arises from complex interactions among cognitions of individual members of the entrepreneurial team, and thus cannot be reduced to the sum of its parts. Next, this definition illustrates that rather than being a team process, entrepreneurial team cognition is the product of team experiences and team processes that become new inputs to subsequent processes and outcomes. Third, by labelling team cognition as knowledge ‘organized, represented, and distributed’ within the team, this definition integrates the reviewed descriptions of the terms collective and sharing. Thus, rather than limiting a formal definition to the boundaries inherent to the terms shared and collective, we suggest emphasizing the distribution of knowledge structures across team members. Finally, this definition holds that team cognition consists of knowledge that is important to entrepreneurial team functioning and achievement of entrepreneurship-relevant outcomes. Examples of these outcomes relevant to the entrepreneurial process are, but are not limited to, opportunity identification and evaluation, partner selection, team membership change, defining and implementing launch or growth strategies, product development and market focus.

Operationalizing entrepreneurial team cognition

The assessment of entrepreneurial team cognition requires psychometrically sound measures. Unfortunately, the empirical methods and scales measuring entrepreneurial team cognition are scarce and do not always address some of the crucial aspects of team cognition. First, for several entrepreneurial team

Table 4. Integrating existing concepts

	Conceptual issues associated with entrepreneurial team cognition	Solution as integrated in the overarching definition
1	How is entrepreneurial team cognition developed and how is it different from team processes?	Entrepreneurial team cognition is an emergent state, in contrast to team processes, which pertain to members’ interdependent acts to convert team inputs to outcomes through entrepreneurial team cognition.
2	What is the content of entrepreneurial team cognition?	Entrepreneurial team cognition consists of knowledge that allows team members to approach problem-solving and make assessments, judgments or decisions concerned with milestones and outcomes relevant to the entrepreneurial process, such as identifying and evaluating different opportunities, or defining and implementing launch and growth strategies towards attaining entrepreneurial outcomes.
3	How do the notions of shared, common and collective merge into the entrepreneurial team cognition concept?	Entrepreneurial team cognition pertains to mentally organizing, representing and distributing knowledge within the team.

cognition concepts, no empirical measures exist. To our knowledge, no measurements of collective memory and team creative cognition exist. Consequently, empirical work has substantially lagged behind the conceptual development of these entrepreneurial team cognition concepts.

Second, for several concepts, such as shared strategic cognition and strategic consensus, collective measurements are used, meaning that individual team members' knowledge is aggregated to the team level. While informative, aggregating individual cognition scores does not reflect the essence of entrepreneurial team cognition as put forward in our definition. Instead, our definition calls for measurements that emphasize the distribution of knowledge in the team. Thus, rather than averaging individual scores, calculating distributions and creating computational models would yield more insight into how cognition is distributed within the team. Techniques to capture these relationships between elements in a team member's mind include concept mapping, causal mapping, cognitive mapping, UCINET, the repertory grid technique and Pathfinder. While used by team scholars in the field of organizational behaviour and psychology (Mohammed and Dumville 2001; West 2007), to our knowledge entrepreneurial team scholars have not yet fully explored the use of these methods to assess entrepreneurial team cognition concepts. The exception is West (2007), who developed a socio-cognitive grid method to measure entrepreneurial team collective cognition. The goal of the socio-cognitive grid method is to create a matrix for subsequent analysis that captures dimensions considered relevant by individuals and the team to which they belong (West 2007). Table 3 provides an overview of the entrepreneurial team cognition concepts and their measurements.

How does entrepreneurial team cognition interact with inputs, processes and outcomes?

As described in the previous section, entrepreneurial team cognition is related to team member inputs, team processes and team outcomes. To gain a better understanding of these specific interactions, we have mapped all these interactions into a comprehensive IMO framework (see Figure 2). The employment of an IMO framework has proved to support the development of informative theoretical models of team

outcomes, with team processes and emergent states occupying a central role (e.g. Gist *et al.* 1987; Guzzo and Shea 1992; Hackman 1987; Klotz *et al.* 2014).

Inputs

First, we untangled which individual-level and team-level inputs support the development of entrepreneurial team cognition. In organizational team research, individual-level inputs are often aggregated to the team level to create team-level constructs such as prior shared experience or functional diversity. Surprisingly, the entrepreneurship literature is not very mature in terms of exploring these team-level antecedents. More specifically, the review does not include a single study devoted to the sole examination of the antecedents of entrepreneurial team cognition. Few scholars have outlined the antecedents of entrepreneurial team cognition concepts (e.g. prior shared experience, demographics, functional experience) in mediating models, yet in these studies, entrepreneurial team cognition was never the final outcome towards which these antecedents were directed. For example, Zheng (2012) demonstrates that, in explaining new venture performance, prior shared experience affects transactive memory systems and that this effect is further strengthened by two team-level factors – task similarity and intra-team trust.

Beckman (2006) demonstrates that this shared understanding in the team derives from these prior experiences and is able to influence firm behaviours. As such, shared team-understanding functions as the driver for exploitative and explorative behaviour as well as firm ambidexterity. In addition to prior shared experience of team members, research shows that individual-level cognitions, changes in team composition resulting in the addition of new cognitions and loss of existing cognitions, organizational processes and industry characteristics affect the development of entrepreneurial team cognition (West 2007). Moreover, West (2007) positions collective cognition as a mediating mechanism between the aforementioned antecedents and the outcomes of team decision-making and subsequent new venture performance (West 2007). The findings supported an inverted U-shaped relationship between collective cognition and new venture performance, showing that ventures led by entrepreneurial teams with very high or low collective cognition experienced lower levels of performance than those led by entrepreneurial teams with moderate levels of collective

cognitions. While no papers studied the direct effect of demography on entrepreneurial team cognition, Chowdhury (2005) examined how cognitive comprehensiveness, or how effectively entrepreneurial teams develop a complete set of possible solutions to problems, positively relates to team effectiveness even when controlling for the demographic diversity of team members.

Ensley and Pearce (2001) theorize that the group processes that occur while developing a strategy, such as cognitive and affective conflicts, influence the development of shared strategic cognition. Cognitive conflict is another emergent state and refers to disagreements among team members related to their differing ideas concerning the best way to accomplish the team's objectives (Jehn 1997). In contrast, affective conflict is more emotive in nature and is suggested to be destructive to the development of strategic consensus. However, while the positive relationship between cognitive conflict and shared strategic cognition was confirmed, no empirical support was found for the proposed negative relation between affective conflict and shared strategic cognition. Findings further revealed that, in predicting venture performance, the group processes leading to the development of shared strategic cognition are more important than the outcome of team cognition.

Processes interacting with entrepreneurial team cognition

Entrepreneurial team cognition is embedded in several team processes (e.g. Blatt 2009; Eisenhardt 2013; Souitaris and Maestro 2010). These team processes can be categorized as either 'taskwork' or 'teamwork' (McIntyre and Salas 1995; Stout *et al.* 1999). Processes pertaining to taskwork describe functions that individuals must perform to accom-

plish a team's task. These processes can be focused on activities related directly to goal accomplishment (i.e. action phases), while at other times they can be reflecting on past performance and planning for future action (i.e. transition phases) (Marks *et al.* 2001). Decision-making, coordinating, information-processing and planning are examples of taskwork processes in which entrepreneurial team cognition is strongly embedded.

Teamwork processes refer to what Marks *et al.* (2001) call 'interpersonal processes', which describe the interaction between team members (McIntyre and Salas 1995). Examples are motivation, conflict, affect and confidence building. Team processes and entrepreneurial team cognition alternate between each other, yet conceptually the two are distinct. Table 5 provides an overview of the definitions of the reviewed team processes to highlight these differences.

Taskwork processes. The majority of the papers examining team processes studied entrepreneurial team decision-making (Boeker and Karichalil 2002; Boeker and Wiltbank 2005; Chaganti *et al.* 2008; Eisenhardt 2013; Kamm and Nurick 1993; Souitaris and Maestro 2010; West 2007). Entrepreneurial team decision-making involves the alignment of perspectives and opinions leading to entrepreneurial outcomes (Kamm and Nurick 1993). Entrepreneurial team cognition supports this alignment of perspectives, and feedback loops occur between the decision-making process and entrepreneurial team cognition. The articles reviewed in this section demonstrate that entrepreneurial team cognition facilitates decision-effectiveness. By relying on 'simple rules' heuristics to perform significant activities such as new product development and internationalization (Eisenhardt 2013), entrepreneurial teams become

Table 5. *Defining team processes*

Process	Definition
Decision-making	The thought process of selecting a logical choice from the available options (West 2007).
Information-processing	Information-processing activity pertains to gathering, interpreting, and synthesizing information cues (Tushman and Nadler 1978).
Coordination	Coordination ensures that a team functions as a unified whole, planning and communication are the basic mechanisms of coordination (Cannon-Bowers <i>et al.</i> 1993; Espinosa <i>et al.</i> 2004; Wittembaum <i>et al.</i> 1996).
Communicating	Communicating is concerned with the physical characteristics of information and the mechanics of its transmission (Daft and Macintosh 1981).
Use of schema	Schema's refers to the mental codification of experience that includes a particular organized way of cognitively perceiving and responding to a complex set of stimuli. Adopting communal relational schemas benefits entrepreneurial teams in developing relational capital (Blatt 2009).

more efficient. Eventually, these simple cognitive rules residing in the team can become the strategy of the firms. Other predictors of efficient decision-making are decision speed and entrepreneurial team cognitive conflict and sympathy (Eisenhardt 2013). Deriving from the perspective that the entrepreneurial team is a prerequisite for the shaping of venture strategy, Souitaris and Maestro (2010) find that the 'polychronicity' of entrepreneurial teams, i.e. the extent to which team members mutually prefer and tend to engage in multiple tasks simultaneously or intermittently instead of one at a time and believe this is the best way to do things, positively influences the speed and comprehensiveness of strategic decisions and, subsequently, financial performance (Souitaris and Maestro 2010). Thus, the shared belief that 'this is the right way' to do things implies a shared knowledge base consisting of related entrepreneurial team cognition. Kamm and Nurick (1993) introduced a model of multi-founder venture formation in which ventures emerge in stages following an a priori sequence of transitions in which decision-making within the team is a crucial element (Kamm and Nurick 1993, p. 17). The relevant outcomes of team decision-making include, for example, the execution of a particular strategy (Chaganti *et al.* 2008) or a decision to leave the venture (Boeker and Karichalil 2002; Boeker and Wiltbank 2005).

Information-processing, or the gathering, interpreting and synthesizing of information cues (Tushman and Nadler 1978), is argued to be a key team process that directly influences team outputs and is strongly facilitated by entrepreneurial team cognition. Surprisingly, this review revealed only two papers on this topic (Amason *et al.* 2006; Furr *et al.* 2012). The authors distinguish novelty from newness and argue that the tasks of entrepreneurial team members change with new venture novelty. Next, as novelty increases, the information-processing requirements of the entrepreneurial team change as well. Assuming that team members' demographic characteristics influence their information-processing abilities, entrepreneurial team performance should reflect, at least partially, the fit between entrepreneurial team member characteristics and the level of venture novelty. Furr *et al.* (2012) argue that the cognitive flexibility of team members to process information is influenced by intra-domain knowledge of the team. Consequently, intra-domain expert teams undertake more technology change compared with extra-domain expert teams.

No papers that explicitly elaborate on the supporting role of entrepreneurial team cognition in coordinating activities were included in the review. Coordination ensures that a team functions as a unified whole through planning and communication, and team cognition is presumably an important means to facilitate these behaviours and, hence, to facilitate coordination. Although Harper (2008) denotes that entrepreneurial team members in emergent ventures may coordinate their actions without communicating with one another (Harper 2008, p. 623), the conceptual relationship between coordination and team cognition is not outlined in this paper.

Blatt (2009) conceptualizes how adopting communal relational schemas benefits entrepreneurial teams in developing relational capital (Blatt 2009). The application of schema in teams describes the process of mental codification of experiences that includes a particular organized way of cognitively perceiving and responding to a complex set of stimuli.

Teamwork processes. A relatively smaller stream of research has investigated the relationship between interpersonal team processes and team cognition. Teamwork processes are processes that team members use to manage interpersonal relationships. Apart from the previously mentioned study supporting a positive relationship among cognitive conflict, another emergent state and shared strategic cognition (Ensley and Pearce 2001), this review did not reveal papers that explicitly examined how entrepreneurial team cognition is embedded in interpersonal processes. Ensley and Pearce (2001) further showed how cognitive conflict is positively associated with profit, sales and growth in new ventures (Ensley and Pearce 2001), and it is suggested to shape the actual process of creating shared cognition at the group level (Ensley and Pearce 2001). Thus, there seem to be certain conditions under which cognitive conflict can improve team performance. However, it should be noted that organizational scholars take a rather sceptical view of the effects of cognitive conflict on team outcomes (Bradley *et al.* 2012). Therefore, rather than drawing any conclusions regarding the relation between entrepreneurial team cognition and other emergent states based on very limited empirical evidence, we call on future researchers to take a deeper interest in how emergent states such as cognitive conflict affect team outcomes.

Outcomes of entrepreneurial team cognition

We delineated three specific types of outcomes that have proved valuable in examining team effectiveness: (a) the team's production of a high-quality product, be it a physical product, a decision, a plan or other output; (b) the team's contribution to the well-being and growth of the team; and (c) the continuing capability of members to work together in the future (Hackman 1987; Hackman and Wageman 2005). If we apply this model of team effectiveness to the entrepreneurial team context, the first category pertains to papers examining explicit performance indicators as an outcome of entrepreneurial team cognition. Examples of these types of outcomes studied are, but are not limited to, products and services (e.g. Chaganti *et al.* 2008), strategy formulation (e.g. Chowdhury 2005), creativity (Foss *et al.* 2008; Perry-Smith and Coff 2011; Shalley and Perry-Smith 2008), new venture performance (e.g. Fern *et al.* 2012; Mosakowski 1998) and legitimacy (Godwin *et al.* 2006). The second category pertains to team processes that are the outcome of entrepreneurial team cognition, such as learning (e.g. Barney *et al.* 1996; Bruneel *et al.* 2010; Clarysse and Moray 2004; Karataş-Özkan 2011; Sardana and Scott-Kemmis 2010) and opportunity recognition (e.g. Gruber *et al.* 2012; Kontinen and Ojala 2011). The final category pertains to outcomes such as team membership change, team member selection, team member addition and team member exit (e.g. Forbes *et al.* 2006; Parker 2009; Ruef *et al.* 2003).

Performance indicators. Although legitimacy is a frequently studied phenomenon in the individual entrepreneurship literature, the review did not reveal any empirical papers examining how entrepreneurial team cognition affects legitimacy. In a conceptual work, Godwin *et al.* (2006) suggest that cognitive frames are gender-specific and that, to overcome these challenges, female entrepreneurs are encouraged to partner with a male founder.

Few papers discussed how creativity is a relevant outcome of entrepreneurial team cognition (Foss *et al.* 2008; Perry-Smith and Coff 2011; Shalley and Perry-Smith 2008). Foss *et al.* (2008) argue that superior creative output stems from both cognitive diversity among team members and the team's ability to integrate and apply diverse thought processes. In turn, Perry-Smith and Coff (2011) demonstrate empirically how optimal entrepreneurial team moods vary for the generation and selection stages of

creativity. The findings suggest that the inability to transition to the appropriate mood results in less favourable outcomes. While mood is conceptually very distinct from cognition, the results indicate that there is a dynamic aspect to mood that might interact with other team processes and outcomes. Shalley and Perry-Smith (2008) conceptualize how team creative cognition leads to superior entrepreneurial creativity by creating a context in which teams are effective at both generating diverse alternatives and culling them to select the best solution. Thus, entrepreneurial team creativity stems from the ability of entrepreneurial teams to use relevant cognitive frameworks, 'connect the dots' between seemingly unrelated events or trends and then detect patterns in these connections.

Team processes. We previously discussed that entrepreneurial team cognition is embedded in several team processes, such as decision-making, information-processing and coordination. However, the literature also points to a few team processes that are conceptualized as intermediate outcomes of entrepreneurial team cognition.

For instance, social network researchers demonstrate that entrepreneurial team cognition contributes to networking behaviours. In particular, Vissa and Chacar (2009) argue that the presence of structural network holes can be amplified by a team's strategic consensus. Next, conceptual work has shed light on the importance of common professional standards between a founder and a potential co-founder and posits that these standards increase the likelihood of a formal partnership (Aldrich and Kim 2007). Emphasizing the value of common values and goals during the network creation process, Leung *et al.* (2006) show that, while environmental constraints appear to be important considerations for adapting recruitment practices through networks, it is in fact the strategic needs and interpersonal dynamics of entrepreneurial team members that are the key drivers of the evolution of such practices (Leung *et al.* 2006). When moving through the stages of venture creation, entrepreneurial team members, in particular, use strong ties to find additional team members with common values and goals. Contrary to these findings, Grossman *et al.* (2012) did not observe direct interpersonal similarity effects in tie formation.

Opportunity recognition is another cognitive team process strongly influenced by entrepreneurial team cognition. Opportunity recognition is described as the cognitive process through which entrepreneurs

identify meaningful patterns in complex arrays of events or trends (Baron and Ensley 2006). Pattern recognition indicates that cognitive frameworks acquired through experience play a central role in this process. These cognitive frameworks provide team members with a basis for noticing connections between seemingly independent events or trends and for detecting meaningful patterns in these connections. The reviewed works propose that, in order for opportunity recognition to lead to true team action, entrepreneurial team cognition plays an essential role, because it contains a continuous sharing of experience and task-related knowledge. Opportunity recognition is predominantly attributed to a teams' prior experience (e.g. Fern *et al.* 2012; Gruber *et al.* 2012; Kontinen and Ojala 2011). For example, building on the idea that experienced entrepreneurial team members have developed particular cognitive schemata that facilitate the identification of opportunity patterns, Gruber *et al.* (2012) examined how four types of pre-entry human capital (the characteristics of the founding team) shape the identification of market opportunities. The research model suggests that prior entrepreneurial and management experience enhance the number of market opportunities identified, while marketing and technological endowments constrain them (Gruber *et al.* 2012). Consequently, intra-domain expert teams undertake more technology change compared with extra-domain expert teams. Contrary to these findings, Kontinen and Ojala (2011) do not find a significant relationship between prior experience and opportunity recognition. Examining the antecedents creating a context for opportunity recognition, Chaganti *et al.* (2008) found that the presence of ethnic immigrants in the team leads to the formulation of a more aggressive prospector strategy, pointing to a difference in knowledge structures between ethnic immigrants and non-ethnic non-immigrants.

Learning, or becoming able to respond to task-demand or environmental pressures in a different way as a result of an earlier response to the same task (practice) or as a result of other intervening relevant experience (Weick 1991, p. 161), is strongly influenced by entrepreneurial team cognition. Scholars direct us towards the notion that the capability to learn as a team greatly depends on the cognitive structures the team members have developed through previous experience (Barney *et al.* 1996; Bruneel *et al.* 2010; Clarysse and Moray 2004; Karataş-Özkan 2011; Sardana and Scott-Kemmis 2010). Moreover, prior experience, the division of

(decision-making) labour, and the knowledge characteristics of the venture team shape learning (Sardana and Scott-Kemmis 2010). Entrepreneurial team cognition further impacts how the team copes with crisis situations during the start-up phase and how both the team as a whole and the team members individually learn from these crises (Clarysse and Moray 2004).

Team membership change. Entrepreneurial team cognition also affects team membership changes, such as team member selection, team member addition and team member exit.

For instance, the cognitive structures that entrepreneurs have developed over time affect the partner selection process. Parker (2009) argues that entrepreneurs choose co-founders with beliefs similar to their own, because they are prone to cognitive biases. In particular, two cognitive biases, over-optimism and self-serving attributions, enhance the creation of homogenous entrepreneurial teams (Parker 2009). Approaching the team member selection process from a sociological and ecological perspective, Ruef *et al.* (2003) argue that homophily and network constraints based on strong ties have the most pronounced effect on entrepreneurial team composition. In this case, a cognitive bias towards preferring team members on the basis of similar characteristics is prevalent in the development of partner selection intentions.

The review revealed one paper that examined partner selection in family venture teams. Evidently, in family firms, other cognitive processes than those that are prevalent in traditional entrepreneurial teams, influence team member selection. In family firms, a joint commitment to the stewardship of the family's assets, shared values and trust underpin the formation of family teams (Discua Cruz *et al.* 2013). Thus, instead of evaluating the resources that team members bring to the team, which is a common motive for selecting team members in the traditional entrepreneurial team setting (Forbes *et al.* 2006), relationships and social capabilities determine team member selection in family ventures.

Francis and Sandberg (2000) propose that friendship facilitates team formation and enhances decision-making processes. Different circumstances, such as the functional completeness of a venture's top management team composed of friends, may exert either positive or negative influences on team member turnover. Unfortunately, the work on friendship in entrepreneurial teams is limited to one

conceptual paper, hindering us from drawing general conclusions on the role of friendship and its relationship with entrepreneurial team cognition in entrepreneurial teams.

Forbes *et al.* (2006) put forward two primary motivations for the addition of entrepreneurial team members: functional resource-seeking behaviour and interpersonal attraction (Forbes *et al.* 2006). The tendency towards adding team members to whom original team members feel interpersonally attracted will merely lead to a homogeneous team. If adding new team members is not an option, the original founding team may also opt to modify existing roles within the team, to ensure that key issues and activities are accomplished. However, research shows that modifying a team member's work role is extremely difficult. Moreover, the ability of team members to modify their work role is highly influenced by the strength of ties between team members (Zolin *et al.* 2011), suggesting that embedded team members are more successful in role modification.

The review did not reveal conclusive findings on the role of entrepreneurial team cognition on the process of team member exit. While Ucbasaran *et al.* (2003) demonstrate that a large team size strongly reduces the changes in team member exit, these findings do not inform us about the role of entrepreneurial team cognition. Furthermore, the findings reveal that the heterogeneity of prior entrepreneurial experience is significantly positively associated with team member exit (Ucbasaran *et al.* 2003), implying the valuable role of diversity in previously developed cognitive structures. However, more conceptual and empirical work is needed to validate this assumption. While strong ties within the team are beneficial to entrepreneurial teamwork overall (Zolin *et al.* 2011), they also complicate team member exit and may reduce human resource flexibility.

Research further demonstrates that the consequences of team member exit may be even more profound in academic spin-offs (Knockaert *et al.* 2011) and may eventually lead to venture failure. Tacit knowledge is most effectively transferred when a substantial part of the original research team remains on board during the spinout process. While commercial expertise remains important to ensure new venture performance over the spinout process as a whole, team members with a strong commercial background will have greater difficulty integrating with the team. As a result, these commercial team members are only able to integrate successfully if the cognitive distance between the original and new team

members is small and if norms and values are aligned (Knockaert *et al.* 2011).

Discussion

The purpose of this paper was to (a) describe and define the concept of entrepreneurial team cognition and (b) organize the literature that has researched how entrepreneurial team cognition interacts with other variables into a comprehensive IMO framework. We achieved these objectives by reviewing 44 articles published on the topics related to entrepreneurial team cognition over the past 20 years. Below, we discuss the findings and offer suggestions for future research.

Theoretical boundaries of entrepreneurial team cognition

The review revealed that there are three main factors associated with entrepreneurial team cognition that have been hampering development of the concept.

First, we discovered that the literature is ambiguous about what entrepreneurial team cognition exactly is and how it develops. Confusion remains as to whether team cognition is merely the aggregation of individual cognition or whether it goes beyond that and emerges from the interplay of the individual cognition of each team member and the team's social interactions through processes. This ambiguity in defining entrepreneurial team cognition as either an aggregate of individual cognition or a separate compilational entity is illustrated in the diverging operationalization of the concept in empirical works.

Related to this issue, few attempts have been made to outline explicitly how entrepreneurial team cognition is conceptually distinct from entrepreneurial team processes. Consequently, the parameters of entrepreneurial team cognition and interactional process indicators (e.g. information-processing, decision-making) are intermingled, leading to a serious confounding of constructs.

Furthermore, there are ambiguities inherent to the terminology used to describe cognitive concepts, such as the labels 'shared' and 'collective', that need to be addressed. Team mental models (Knockaert *et al.* 2011), collective cognition (West 2007), transactive memory systems (Zheng 2012; Zheng and Mai 2013), team creative cognition (Shalley and Perry-Smith 2008), collective memory (Bryant 2012), strategic consensus (Vissa and Chacar 2009),

and shared strategic cognition (Ensley and Hmieleski 2005; Ensley and Pearce 2001) are all concepts hinting at collective or shared elements inherent to the team cognition concept. However, it is ambiguous whether these terms refer to overlapping, similar or common entities. Additionally, while the review finds general support for the notion that entrepreneurial team members can retain information through knowledge sharing in a way that transcends the cognitive facilities of individuals (e.g. Blatt 2009; Bryant 2012; Ensley and Pearce 2001; Knockaert *et al.* 2011; Vanaelst *et al.* 2006; West 2007; Zheng 2012; Zheng and Mai 2013), conceptual confusion remains as to what kind of knowledge should be shared or held in common.

A major contribution of the integrative review is the introduction of an overarching definition of entrepreneurial team cognition. This definition is composed of the key elements embracing the theoretical foundations of existing entrepreneurial team cognition concepts and their emergence, content and distribution, hereby providing clarity on the issue raised here. Yet, while the introduction of a formal definition of entrepreneurial team cognition reduces a large part of the conceptual confusion surrounding the concept, research on entrepreneurial team cognition is still in a developmental stage. Therefore, we highlight a need for continued conceptual advancement of the concept and empirical research studying the link between entrepreneurial team cognition and team outcomes. In particular, we encourage future researchers to delve into the following questions pertaining to the three aforementioned issues.

First, accepting the notion that entrepreneurial team cognition is an emergent state, several questions remain unanswered about its emergence. For instance, is there a specific time-frame underlying the development of entrepreneurial team cognition once the team is formed? Moreover, how do performance drawbacks affect entrepreneurial team cognition over time? We hope that future researchers will examine more closely how impervious entrepreneurial team cognition is over time.

Second, questions remain about the incorporation of entrepreneurial team cognition in the execution of several team processes. Figure 2 shows that entrepreneurial team cognition plays a significant role in achieving outcomes relevant to the entrepreneurial process through its interplay with team processes. Yet, regardless of the added value of entrepreneurial team cognition in understanding team processes, the literature fails to inform us empirically on its role in

coordination, planning or goal-setting efforts. Additionally, except for a study on cognitive conflict, we did not find any works examining the relationship between entrepreneurial team cognition and other interpersonal processes, such as confidence-building, affect and motivation.

Third, regarding questions surrounding the content of entrepreneurial team cognition, we call on scholars to specify explicitly whether concepts focus on task-specific or teamwork-specific knowledge structures. Thus, it is recommended that future conceptual work disentangles how specific types of knowledge structures, teamwork-specific vs. taskwork-specific, interact and affect team outcomes. For instance, while teams can have refined task-specific knowledge structures, less-refined teamwork-specific knowledge can severely undermine the development of entrepreneurial team cognition.

IMO framework

The fragmentation and complexity of the research on entrepreneurial team cognition make it difficult to develop a single and overarching framework that captures how the concept interacts with other variables. However, by compiling all the work on entrepreneurial team cognition within one framework for the first time, this review provides a valuable resource to scientists with different perspectives for future research and aims to make an important contribution to the current literature. In particular, several themes have emerged from the development of the IMO framework depicted in Figure 2.

First, research examining the antecedents of entrepreneurial team cognition is fairly limited. Apart from a few papers studying the effect of prior shared experience on the emergence of entrepreneurial team cognition and the role of cognitive conflict in developing shared cognition, the review did not reveal any empirical works directly examining antecedents of entrepreneurial team cognition. Given the importance of shared knowledge in creating a context for entrepreneurial team cognition, the benefits of shared company experiences (Beckman 2006), common education or work experience are presumable. Although Chaganti *et al.* (2008) did not find an effect of ethnicity on cognitive comprehensiveness, we would encourage future researchers to examine how cultural values affect the emergence of entrepreneurial team cognition.

Second, entrepreneurial team cognition is directed towards three types of outcomes as distinguished by

the team effectiveness model delineating taskwork and teamwork processes (e.g. Hackman 1987; Hackman and Wageman 2005; Marks *et al.* 2001). While these categorizations are useful, it is important to note that entrepreneurial teams come in many different configurations and are tasked with performing different types of team roles. Thus, the categories themselves are simply proxies for more substantive issues, and the outputs depicted in Figure 2 are not exhaustive. The findings demonstrate that entrepreneurial team cognition leads to outcomes of explicit performance indicators, team processes and team membership changes.

Furthermore, the review shows that the configuration of team cognition (emergence and content) driving team outcomes is dependent on the type of outcome the entrepreneurial teams' resources are directed to. Thus, for different types of teams and tasks, different configurations of team knowledge are more desirable. Consequently, the value of sharing cognitive frames depends on several factors, such as the environment in which the entrepreneurial team operates, the tasks that needs to be accomplished, interdependence among team members, team roles and the stage of venture formation. Integrating the findings from the review, we suggest that, if all team members have distinct roles that require unique information in order to accomplish the task, an entrepreneurial team cognition composed of distributed task-specific knowledge, overlapping teamwork knowledge and a balance of diversity and consensus in belief structures is most likely to result in higher collective performance for heterogeneous teams.

Many of the works reviewed calculate team composition variables measuring the average of member attributes. Using this methodology, the pooled value of a characteristic is presumed to affect a team, regardless of how that characteristic is distributed among members. However, since our proposed definition emphasizes that entrepreneurial team cognition entails the manner in which knowledge is mentally organized, represented and distributed within the team, we suggest abstaining from using composition measures when calculating team inputs. Instead, using compilational models for calculating both team inputs and entrepreneurial team cognition will further align findings across studies. Consequently, we encourage scholars to develop measurements that truly capture the theoretical foundations of the entrepreneurial team cognition as communicated in our definition. Ideal measure-

ments would seek to reflect the key notions of entrepreneurial team cognition as denoted in the formal definition, its emergence, content and distribution. The development of such measurement requires longitudinal research designs to monitor how team cognition emerges. Qualitative efforts would ideally examine what knowledge is important to the team members. Finally, scholars are encouraged to assess how this knowledge is mentally organized, represented and distributed within the team.

On a more general note, the findings of the paper lead us to question how entrepreneurial team cognition should be researched in the future. First, even more so than in studying tangible concepts such as the teams' functional resources, we suggest that, when studying an intangible concept such as entrepreneurial team cognition, the concept should be clearly defined upfront. Doing so ensures the alignment of scholarly perspectives about the true meaning of entrepreneurial team cognition. We believe that our proposed definition can support this alignment of perspectives. In particular, the building blocks of this definition comprise important elements that have proved to be capable of explaining variances in entrepreneurial team outcomes. Furthermore, the section on the operationalization of entrepreneurial team cognition highlighted several difficulties associated with measuring team cognition that indicate that quantifying an intangible concept is extremely difficult. With the introduction of our formal definition, we hope to offer to future researchers the building blocks for developing measurements of entrepreneurial team cognition.

Recognizing this difficulty of studying entrepreneurial team cognition, we call on researchers to (a) cite and learn from each other's work, (b) continue developing solid measurements, (c) integrate emergent states and processes in their research models, and (d) dare to be innovative in terms of data collection and interdisciplinary efforts.

References

- Aldrich, H.E. and Kim, P.H. (2007). Small worlds, infinite possibilities? How social networks affect entrepreneurial team formation and search. *Strategic Entrepreneurship Journal*, **1**, pp. 147–165.
- Amason, A.C., Shrader, R.C. and Tompson, G.H. (2006). Newness and novelty: relating top management team composition to new venture performance. *Journal of Business Venturing*, **21**, pp. 125–148.

- Barney, J.B., Busenitz, L.W., Fiet, J.O. and Moesel, D.D. (1996). New venture teams' assessment of learning assistance from venture capital firms. *Journal of Business Venturing*, **11**, pp. 257–272.
- Baron, R.A. (2007). Behavioral and cognitive factors in entrepreneurship: entrepreneurs as the active element in new venture creation. *Strategic Entrepreneurship Journal*, **1**, pp. 167–182.
- Baron, R.A. and Ensley, M.D. (2006). Opportunity recognition as the detection of meaningful patterns: evidence from comparisons of novice and experienced entrepreneurs. *Management Science*, **52**, pp. 1331–1344.
- Beckman, C.M. (2006). The influence of founding team company affiliations on firm behavior. *Academy of Management Journal*, **49**, pp. 741–758.
- Blatt, R. (2009). Tough love: how communal schemas and contracting practices build relational capital in entrepreneurial teams. *Academy of Management Review*, **34**, pp. 533–551.
- Boeker, W. and Karichalil, R. (2002). Entrepreneurial transitions: factors influencing founder departure. *Academy of Management Journal*, **45**, pp. 818–826.
- Boeker, W. and Wiltbank, R. (2005). New venture evolution and managerial capabilities. *Organization Science*, **16**, pp. 123–133.
- Bougon, M.G. (1992). Congregate cognitive maps: a unified dynamic theory of organization and strategy. *Journal of Management Studies*, **29**, pp. 369–387.
- Bradley, B.H., Postlethwaite, B.E., Klotz, A.C., Hamdani, M.R. and Brown, K.G. (2012). Reaping the benefits of task conflict in teams: the critical role of team psychological safety climate. *Journal of Applied Psychology*, **97**, pp. 151–158.
- Bruneel, J., Yli-Renko, H. and Clarysse, B. (2010). Learning from experience and learning from others: how congenital and interorganizational learning substitute for experiential learning in young firm internationalization. *Strategic Entrepreneurship Journal*, **4**, pp. 164–182.
- Bryant, P.T. (2012). Imprinting by design: the microfoundations of entrepreneurial adaption. *Entrepreneurship Theory and Practice*, **38**, pp. 1081–1102.
- Cannon-Bowers, J.A. and Salas, E. (2001). Reflections on shared cognition. *Journal of Organizational Behavior*, **22**, pp. 195–202.
- Cannon-Bowers, J.A., Salas, E. and Converse, S.A. (1993). Shared mental models in expert team decision making. In Castellani, N.J. Jr (ed.), *Current Issues in Individual and Group Decision Making*. Hillsdale, NJ: Erlbaum, pp. 221–246.
- Chaganti, R.R.S., Watts, A.D., Chaganti, R. and Zimmerman-Treichel, M. (2008). Ethnic-immigrants in founding teams: effects on prospector strategy and performance in new Internet ventures. *Journal of Business Venturing*, **23**, pp. 113–139.
- Chowdhury, S. (2005). Demographic diversity for building an effective entrepreneurial team: is it important? *Journal of Business Venturing*, **20**, pp. 727–746.
- Clarysse, B. and Moray, N. (2004). A process study of entrepreneurial team formation: the case of a research-based spin-off. *Journal of Business Venturing*, **19**, pp. 55–79.
- Cooke, N.J., Salas, E., Kiekel, P.A. and Bell, B. (2004). Advances in measuring team cognition. In Salas, E. and Fiore, S.M. (eds), *Team Cognition: Understanding the Factors that Drive Process and Performance*. Washington, DC: APA Books, pp. 83–106.
- Cooper, A.C., Woo, C.Y. and Dunkelberg, W.C. (1989). Entrepreneurship and the initial size of firms. *Journal of Business Venturing*, **4**, pp. 317–332.
- Crossan, M.M. and Apaydin, M. (2010). A multi-dimensional framework of organizational innovation: a systematic review of the literature. *Journal of Management Studies*, **47**, pp. 1154–1191.
- Daft, R.L. and Macintosh, N.B. (1981). A tentative exploration into the amount and equivocality of information processing in organizational work units. *Administrative Science Quarterly*, **26**, pp. 207–224.
- DeChurch, L.A. and Mesmer-Magnus, J.R. (2010). The cognitive underpinnings of effective teamwork: a meta-analysis. *Journal of Applied Psychology*, **95**, p. 32–53.
- Denyer, D. and Tranfield, D. (2009). Producing a systematic review. In Buchanan, D. and Bryman, A. (eds), *The Sage Handbook of Organizational Research Methods*. Thousand Oaks, CA: Sage Publications, pp. 671–689.
- Dimov, D. (2007). From opportunity insight to opportunity intention: the importance of person–situation learning match. *Entrepreneurship Theory and Practice*, **31**, pp. 561–583.
- Dimov, D. (2011). Grappling with the unbearable elusiveness of entrepreneurial opportunities. *Entrepreneurship Theory and Practice*, **35**, pp. 57–81.
- Dimov, D. and De Clercq, D. (2006). Venture capital investment strategy and portfolio failure rate: a longitudinal study. *Entrepreneurship Theory and Practice*, **30**, pp. 207–223.
- Discua Cruz, A., Howorth, C. and Hamilton, E. (2013). Intrafamily entrepreneurship: the formation and membership of family entrepreneurial teams. *Entrepreneurship Theory and Practice*, **37**, pp. 17–46.
- Eisenhardt, K.M. (2013). Top management teams and the performance of entrepreneurial firms. *Small Business Economics*, **40**, pp. 805–816.
- Ensley, M.D. and Hmieleski, K.M. (2005). A comparative study of new venture top management team composition, dynamics and performance between university-based and independent start-ups. *Research Policy*, **34**, pp. 1091–1105.
- Ensley, M.D. and Pearce, C.L. (2001). Shared cognition in top management teams: implications for new venture

- performance. *Journal of Organizational Behavior*, **22**, pp. 145–160.
- Ensley, M.D., Pearson, A. and Pearce, C.L. (2003). Top management team process, shared leadership, and new venture performance: a theoretical model and research agenda. *Human Resource Management Review*, **13**, pp. 329–346.
- Espinosa, J.A., Lerch, J. and Kraut, R. (2004). Explicit vs. implicit coordination mechanisms and task dependencies: one size does not fit all. In Salas, E. and Fiore, S.M. (eds), *Team Cognition: Understanding the Factors that Drive Process and Performance*. Washington, DC: APA Books, pp. 107–129.
- Fern, M.J., Cardinal, L.B. and O'Neill, H.M. (2012). The genesis of strategy in new ventures: escaping the constraints of founder and team knowledge. *Strategic Management Journal*, **33**, pp. 427–447.
- Forbes, D.P. (1999). Cognitive approaches to new venture creation. *International Journal of Management Reviews*, **1**, pp. 415–439.
- Forbes, D.P., Borchert, P.S., Zellmer-Bruhn, M.E. and Sapienza, H.J. (2006). Entrepreneurial team formation: an exploration of new member addition. *Entrepreneurship Theory and Practice*, **30**, pp. 225–248.
- Foss, N.J., Klein, P.G., Kor, Y.Y. and Mahoney, J.T. (2008). Entrepreneurship, subjectivism, and the resource-based view: toward a new synthesis. *Strategic Entrepreneurship Journal*, **2**, pp. 73–94.
- Francis, D.H. and Sandberg, W.R. (2000). Friendship within entrepreneurial teams and its association with team and venture performance. *Entrepreneurship Theory and Practice*, **25**, pp. 5–26.
- Furr, N.R., Cavarretta, F. and Garg, S. (2012). Who changes course? The role of domain knowledge and novel framing in making technology changes. *Strategic Entrepreneurship Journal*, **6**, pp. 236–256.
- Gartner, W.B. (1985). A conceptual framework for describing the phenomenon of new venture creation. *Academy of Management Review*, **10**, pp. 696–706.
- van Ginkel, W. and van Knippenberg, D. (2008). Group information elaboration and group decision making: the role of shared task representations. *Organizational Behavior and Human Decision Processes*, **105**, pp. 82–97.
- Gist, M.E., Locke, E.A. and Taylor, M.S. (1987). Organizational behavior: group structure, process, and effectiveness. *Journal of Management*, **13**, pp. 237–257.
- Godwin, L.N., Stevens, C.E. and Brenner, N.L. (2006). Forced to play by the rules? Theorizing how mixed-sex founding teams benefit women entrepreneurs in male-dominated contexts. *Entrepreneurship Theory and Practice*, **30**, pp. 623–642.
- Gorman, M. and Sahlman, W.A. (1989). What do venture capitalists do? *Journal of Business Venturing*, **4**, pp. 231–248.
- Grégoire, D.A., Corbett, A.C. and McMullen, J.S. (2011). The cognitive perspective in entrepreneurship: an agenda for future research. *Journal of Management Studies*, **48**, pp. 1443–1477.
- Grossman, E.B., Yli-Renko, H. and Janakiraman, R. (2012). Resource search, interpersonal similarity, and network tie valuation in nascent entrepreneurs' emerging networks. *Journal of Management*, **38**, pp. 1760–1787.
- Gruber, M., Macmillan, I.C. and Thompson, J.D. (2012). From minds to markets: how human capital endowments shape market opportunity identification of technology start-ups. *Journal of Management*, **38**, pp. 1421–1449.
- Guzzo, R.A. and Shea, G.P. (1992). Group performance and intergroup relations in organizations. *Handbook of Industrial and Organizational Psychology*, **3**, pp. 269–313.
- Hackman, J.R. (1987). The design of work teams. In Lorsch, J.W. (ed.), *Handbook of Organizational Behavior*. Englewood Cliffs, NJ: Prentice-Hall, pp. 315–342.
- Hackman, J.R. and Wageman, R. (2005). A theory of team coaching. *Academy of Management Review*, **30**, pp. 269–287.
- Harper, D.A. (2008). Towards a theory of entrepreneurial teams. *Journal of Business Venturing*, **23**, pp. 613–626.
- Jehn, K.A. (1997). A qualitative analysis of conflict types and dimensions in organizational groups. *Administrative Science Quarterly*, **44**, pp. 530–557.
- Kamm, J.B. and Nurick, A.J. (1993). The stages of team venture formation: a decision-making model. *Entrepreneurship Theory and Practice*, **17**, pp. 17–17.
- Kamm, J.B., Shuman, J.C., Seeger, J.A. and Nurick, A.J. (1990). Entrepreneurial teams in new venture creation: a research agenda. *Entrepreneurship: Theory and Practice*, **14**, pp. 7–17.
- Kaplan, S.N. and Strömberg, P.E. (2004). Characteristics, contracts, and actions: evidence from venture capitalist analyses. *Journal of Finance*, **59**, pp. 2177–2210.
- Karataş-Özkan, M. (2011). Understanding relational qualities of entrepreneurial learning: towards a multi-layered approach. *Entrepreneurship and Regional Development*, **23**, pp. 877–906.
- Klotz, A.C., Hmieleski, K.M., Bradley, B.H. and Busenitz, L.W. (2014). New venture teams a review of the literature and roadmap for future research. *Journal of Management*, **40**, pp. 226–255.
- Knockaert, M., Ucbasaran, D., Wright, M. and Clarysse, B. (2011). The relationship between knowledge transfer, top management team composition, and performance: the case of science-based entrepreneurial firms. *Entrepreneurship Theory and Practice*, **35**, pp. 777–803.
- Kontinen, T. and Ojala, A. (2011). Network ties in the international opportunity recognition of family SMEs. *International Business Review*, **20**, pp. 440–453.
- Kozlowski, S.W.J. and Ilgen, D.R. (2006). Enhancing the effectiveness of work groups and teams. *Psychological Science in the Public Interest*, **7**, pp. 77–124.

- Kozlowski, S.W.J. and Klein, K.J. (2000). A multilevel approach to theory and research in organizations: contextual, temporal, and emergent processes. In Klein, K.J. and Kozlowski, S.W.J. (eds), *Multilevel Theory, Research, and Methods in Organizations: Foundations, Extensions, and New Directions*. San Francisco, CA: Jossey-Bass, pp. 3–90.
- Leung, A., Zhang, J., Wong, P.K. and Foo, M.D. (2006). The use of networks in human resource acquisition for entrepreneurial firms: multiple ‘fit’ considerations. *Journal of Business Venturing*, **21**, pp. 664–686.
- Lewis, K. (2003). Measuring transactive memory systems in the field: scale development and validation. *Journal of Applied Psychology*, **88**, pp. 587–604.
- Marks, M.A., Mathieu, J.E. and Zaccaro, S.J. (2001). A temporally based framework and taxonomy of team processes. *Academy of Management Review*, **26**, pp. 356–376.
- Mathieu, J., Maynard, M.T., Rapp, T. and Gilson, L. (2008). Team effectiveness 1997–2007: a review of recent advancements and a glimpse into the future. *Journal of Management*, **34**, pp. 410–476.
- Mathieu, J.E., Heffner, T.S., Goodwin, G.F., Salas, E. and Cannon-Bowers, J.A. (2000). The influence of shared mental models on team process and performance. *Journal of Applied Psychology*, **85**, pp. 273–283.
- McGrath, J.E. (1964). *Social Psychology: A Brief Introduction*. New York, NY: Holt, Rinehart & Winston.
- McIntyre, R.M. and Salas, E. (1995). Measuring and managing for team performance: emerging principles from complex environments. In Guzzo, R.A., Salas, E. and Goldstein, I.L. (eds), *Team Effectiveness and Decision Making in Organizations*. San Francisco, CA: Jossey-Bass, pp. 9–45.
- Miller, C., Burke, L. and Glick, W. (1998). Cognitive diversity among upper-echelon executives: implications for strategic decision processes. *Strategic Management Journal*, **19**, pp. 39–58.
- Mischel, W. (1977). The interaction of person and situation. In Magnusson, D. and Endler, N.S. (eds), *Personality at the Crossroads: Current Issues in Interactional Psychology*. Hillsdale, NJ: Lawrence Erlbaum Associates, pp. 333–352.
- Mitchell, R.K., Busenitz, L., Lant, T., McDougall, P.P., Morse, E.A. and Smith, J.B. (2002). Toward a theory of entrepreneurial cognition: rethinking the people side of entrepreneurship research. *Entrepreneurship Theory and Practice*, **27**, pp. 93–104.
- Mitchell, R.K. et al. (2007). The central question in entrepreneurial cognition research 2007. *Entrepreneurship Theory and Practice*, **31**, pp. 1–27.
- Mohammed, S. and Dumville, B.C. (2001). Team mental models in a team knowledge framework: expanding theory and measurement across disciplinary boundaries. *Journal of Organizational Behavior*, **22**, pp. 89–106.
- Mosakowski, E. (1998). Entrepreneurial resources, organizational choices, and competitive outcomes. *Organization Science*, **9**, pp. 625–643.
- Parker, S.C. (2009). Can cognitive biases explain venture team homophily? *Strategic Entrepreneurship Journal*, **3**, pp. 67–83.
- Perry-Smith, J.E. and Coff, R.W. (2011). In the mood for entrepreneurial creativity? How optimal group affect differs for generating and selecting ideas for new ventures. *Strategic Entrepreneurship Journal*, **5**, pp. 247–268.
- Rentsch, J.R. and Klimoski, R.J. (2001). Why do ‘great minds’ think alike?: Antecedents of team member schema agreement. *Journal of Organizational Behavior*, **22**, pp. 107–120.
- Rentsch, J.R., Delise, L.A. and Hutchison, S. (2009). Cognitive similarity configurations in teams: in search of the team MindMeld. In Salas, E., Goodwin, G.F. and Burke, C.S. (eds), *Team Effectiveness in Complex Organizations: Cross-Disciplinary Perspectives and Approaches*. New York, NY: Taylor & Francis, pp. 241–266.
- Reynolds, P.D. and White, S.B. (1997). *The Entrepreneurial Process: Economic Growth, Men, Women, and Minorities*. Westport, CT: Quorum Books.
- Ruef, M., Aldrich, H.E. and Carter, N.M. (2003). The structure of founding teams: homophily, strong ties, and isolation among US entrepreneurs. *American Sociological Review*, **77**, pp. 195–222.
- Salas, E., Rosen, M.A., Burke, C.S. and Goodwin, G.F. (2009). The wisdom of collectives in organizations: An update of the teamwork competencies. In Salas, E., Goodwin, G.F. and Burke, C.S. (eds), *Team Effectiveness in Complex Organizations: Cross-Disciplinary Perspectives and Approaches*. New York, NY: Taylor & Francis, pp. 39–79.
- Sardana, D. and Scott-Kemmis, D. (2010). Who learns what? – A study based on entrepreneurs from biotechnology new ventures. *Journal of Small Business Management*, **48**, pp. 441–468.
- Schjoedt, L., Monsen, E., Pearson, A., Barnett, T. and Chrisman, J.J. (2013). New venture and family business teams: understanding team formation, composition, behaviors, and performance. *Entrepreneurship Theory and Practice*, **37**, pp. 1–15.
- Shalley, C.E. and Perry-Smith, J.E. (2008). The emergence of team creative cognition: the role of diverse outside ties, sociocognitive network centrality, and team evolution. *Strategic Entrepreneurship Journal*, **2**, pp. 23–41.
- Shane, S. (2003). *The Individual–Opportunity Nexus Approach to Entrepreneurship*. Aldershot: Edward Elgar.
- Souitaris, V. and Maestro, B. (2010). Polychronicity in top management teams: the impact on strategic decision processes and performance of new technology ventures. *Strategic Management Journal*, **31**, pp. 652–678.

- Staw, B.M. (1991). Dressing up like an organization: when psychological theories can explain organizational action. *Journal of Management*, **17**, pp. 805–819.
- Stout, R.J., Cannon-Bowers, J.A., Salas, E. and Milanovich, D.M. (1999). Planning, shared mental models, and coordinated performance: an empirical link is established. *Human Factors: The Journal of the Human Factors and Ergonomics Society*, **41**, pp. 61–71.
- Timmons, J.A. (1990). *New Venture Creation: Entrepreneurship in the 1990s*. Homewood, IL: Irwin.
- Transfield, D., Denyer, D. and Smart, P. (2003). Towards a methodology for developing evidence-informed management knowledge by means of systematic review. *British Journal of Management*, **14**, pp. 207–222.
- Tushman, M.L. and Nadler, D.A. (1978). Information processing as an integrating concept in organizational design. *Academy of Management Review*, **3**, pp. 613–624.
- Ucbasaran, D., Lockett, A., Wright, M. and Westhead, P. (2003). Entrepreneurial founder teams: factors associated with member entry and exit. *Entrepreneurship Theory and Practice*, **28**, pp. 107–128.
- Vanaelst, I., Clarysse, B., Wright, M., Lockett, A., Moray, N. and S'jegers, R. (2006). Entrepreneurial team development in academic spinouts: an examination of team heterogeneity. *Entrepreneurship Theory and Practice*, **30**, pp. 249–271.
- Vissa, B. and Chacar, A.S. (2009). Leveraging ties: the contingent value of entrepreneurial teams' external advice networks on Indian software venture performance. *Strategic Management Journal*, **30**, pp. 1179–1191.
- Vyakarnam, S., Jacobs, R.C. and Handelberg, J. (1997). Formation and development of entrepreneurial teams in rapid growth businesses. Working Paper, BDO Stoy Hayward Centre for Growing Businesses at Nottingham Trent University.
- Wang, C.L. and Chugh, H. (2014). Entrepreneurial learning: past research and future challenges. *International Journal of Management Reviews*, **16**, pp. 24–61.
- Weick, K.E. (1991). The nontraditional quality of organizational learning. *Organization Science*, **2**, pp. 116–124.
- Weick, K.E. and Roberts, K.H. (1993). Collective mind in organizations: heedful interrelating on flight decks. *Administrative Science Quarterly*, **56**, pp. 357–381.
- West, III, G.P. (2007). Collective cognition: when entrepreneurial teams, not individuals, make decisions. *Entrepreneurship Theory and Practice*, **31**, pp. 77–102.
- Wittembaum, G.M., Stasser, G. and Merry, C.J. (1996). Tacit coordination in anticipation of small group task completion. *Journal of Experimental Social Psychology*, **32**, pp. 129–152.
- Zheng, Y. (2012). Unlocking founding team prior shared experience: a transactive memory system perspective. *Journal of Business Venturing*, **27**, pp. 577–591.
- Zheng, Y. and Mai, Y. (2013). A contextualized transactive memory system view on how founding teams respond to surprises: evidence from China. *Strategic Entrepreneurship Journal*, **7**, pp. 197–213.
- Zolin, R., Kuckertz, A. and Kautonen, T. (2011). Human resource flexibility and strong ties in entrepreneurial teams. *Journal of Business Research*, **64**, pp. 1097–1103.