

Entrepreneurial cognition and socially situated approach: a systematic and bibliometric analysis

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Abstract

Research on entrepreneurial cognition (EC) has evolved in recent years, and the aim of this contribution is to offer a clear, systematic, and bibliometric review of EC as a field of study from a more dynamic perspective, building on Socially Situated Cognition theory (SSC). Based on a data set that covers 18 years of research, from 1998 to 2016, the present study analyzes all of the 151 papers available in the Web of Science Core Collection and 15 editorials, book chapters, and books directly referring to entrepreneurial cognition. Building on our results, we divided EC studies into two stages, namely the “emerging” (1998–2007) and the “mature” (2008–2016). In addition, with this study we suggest three main topics that should be investigated in future researches: entrepreneurial action should be considered endogenous in the entrepreneurship process and the studies in the field of embodied and distributed cognition should be expanded.

Keywords Entrepreneurial cognition · Systematic · Bibliometric · Cluster analysis · VOSviewer

Introduction

The literature on entrepreneurship is increasingly devoting attention to the importance of understanding how entrepreneurs think and the reasons that lead them to do the things they do (Mitchell et al. 2002; Randolph-Seng et al. 2015). Accordingly, significant emphasis has

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been placed on entrepreneurial cognition (EC), which represents the knowledge structures that entrepreneurs use to make assessments, judgments, or decisions involving opportunity evaluation, venture creation, and growth (Mitchell et al. 2002; Randolph-Seng et al. 2015). Researchers have demonstrated that EC influences opportunity identification (for example, Dew et al. 2015; Kemmerer et al. 2012; Renko et al. 2012) and it is particularly important when the development of innovative products is considered (Gemmell et al. 2012).

Over the years, different systematic reviews of EC research have been developed, such as Forbes (1999), Mitchell et al. (2007), Grégoire et al. (2011) and Randolph-Seng et al. (2015). Forbes (1999) divided the extant literature into two dimensions—individuals' cognitive processes and new ventures' development processes; Grégoire et al. (2011), instead, focused on papers that considered cognition-based elements, processes, and levels of analysis. In the same way, Mitchell et al. (2007) and Randolph-Seng et al. (2015) organized schools of thought under similar roots. Recently, Mitchell et al. (2011) underlined the need to shift theorizing from a static to a more dynamic conceptualization of EC (Grégoire et al. 2011; Randolph-Seng et al. 2015). In order to achieve this aim, the adoption of a Socially Situated Cognition (SSC) approach (Smith and Semin 2004) could be useful (Mitchell et al. 2011; Randolph-Seng et al. 2015).

Considering these premises, the purpose of our study is to answer the call to show how previous researches can be classified based on SSC themes: situated, embodied, action-oriented, and distributed (Randolph-Seng et al. 2015), answering the question: How could extant literature about EC be interpreted based on SSC? This re-examination is important because, whereas previous categorizations of the field (Grégoire et al. 2011; Mitchell et al. 2007) have shown how the field can be understood in terms of different theoretical approaches, this theory can help researchers see developments in important themes associated with human cognition and thinking (Randolph-Seng et al. 2015). Moreover, the four primary themes encompassed within the Socially Situated Cognition framework (Smith and Semin 2004) might serve as an ordering structure that can comprehend and connect different approaches to entrepreneurial cognition research (Randolph-Seng et al. 2015).

In order to offer a reliable literature review of entrepreneurial cognition adopting SSC, in the present study the collected data cover 18 years of research in the field of EC, from 1998 to 2016, enabling a comprehensive view of the phenomenon from its emergence to its most recent evolutions, adopting a bibliometric approach. Bibliometric studies have shown their usefulness in a broad range of fields such as general management (Marzi et al. 2017a, c; Podsakoff et al. 2008a, b), entrepreneurship (Landström et al. 2012), operations management (Hsieh and Chang 2009; Zhu et al. 2015), and innovation (Fagerberg et al. 2012a, b; Appio et al. 2016; Marzi et al. 2017b). Specifically, the bibliometric studies in the field of entrepreneurship (Ferreira et al. 2017; Teixeira 2011; Cornelius et al. 2006; Grégoire et al. 2011; Schildt, Zahra, and Sillanpää 2006) have mainly used bibliometric indicators that provide data on the volume and impact of research activities and productivity. Following these researches, our study aims to orient researchers who are new to EC research and to help them answer these fundamental questions: What are the main academic journals where most literature of EC has been published? How has EC evolved over the years? What are the main epistemological orientation and the research methods used in the field of EC?

As showed, there are many bibliometric studies in the field of entrepreneurship and some literature review in the field of EC but there is a lack of bibliometric review in the research area of EC. Considering that, our study differentiated from the previous studies because we applied both systematic literature review and bibliometric analysis. This methodological choice is a consequence of the awareness that the use of just a systematic

review could lead to bias on the part of researchers and often a lack of rigor (Zupic and Čater 2015). Bibliometric methods, conversely, employ a quantitative approach to the description, evaluation, and monitoring of published research and guarantee a reproducible review process and consequently an improvement in the quality of the review (Zupic and Čater 2015).

The paper is structured as follows. In section two we present a brief explanation of the evolution of cognitive research in entrepreneurship. After that, we present the process that we applied for data collection and the methodological notes regarding the bibliometric tool and the systematic technique used. In section four, we firstly present the papers' distribution among the journals, the field evolution, epistemological and research methods classification as results of bibliometric activity indicators. Afterward, the core of the current research is presented, showing the evolution of different streams within the field of EC adopting SSC. Finally, in the last section, conclusions and suggestions for future studies are presented.

The evolution of cognitive research in entrepreneurship

Cognitions are the processes by which sensory input is transformed, reduced, elaborated, stored, recovered, and used (Neisser 1967). The cognitive approach is characterized by the study of certain types of cognitions that, among other aspects, could help to explain entrepreneurial behavior, success in business, and the definition of entrepreneurs, and to distinguish them from other individuals. As a stream of research, the study of entrepreneurial cognition has shown an increasing number of topics, and over the years, many different ways to investigate this phenomenon have been considered (Mitchell et al. 2011). Early studies about EC were focused on investigating differences between entrepreneurs and nonentrepreneurs (Baron 2004). In doing so, researchers mostly applied static concepts from cognitive psychology such as biases and heuristics (for example, Bryant 2007), entrepreneurial scripts (for example, Corbett et al. 2007), entrepreneurial deep beliefs (for example, Krueger 2007), and many others. These studies were useful for establishing the basis of EC as a field of research, but the current literature suggests that EC should be studied by adopting a more dynamic approach (Grégoire et al. 2011; Mitchell et al. 2011; Randolph-Seng et al. 2015). Specifically, recent conceptualizations suggest that entrepreneurial cognition is socially situated (Cornelissen and Clarke 2010; Haynie et al. 2010; Mitchell et al. 2011; Randolph-Seng et al. 2015). A socially situated cognition approach to entrepreneurial cognition reflects how “social objects not only constitute the content of thought but also shape the process underlying thought and behavior” (Mitchell et al. 2011: 774). Four broad themes constitute a socially situated approach to entrepreneurial cognition (Mitchell et al. 2011; Smith and Semin 2004): it is “action-oriented,” so that it captures the positive or negative evaluations of, or motivations toward, an object or concept; it is “embodied,” which means that it grabs the interrelationship between the physical brain and body to capture how the body shapes the mind; moreover, EC is “situated,” because it captures the communicative context, relational context, and group context in which cognition and action occur; and finally EC is distributed, so that it grabs the variety that occurs in the distribution of cognition across social agents and the environment.

The cognitive approach in entrepreneurship has been very useful because it brings to light the importance of considering cognitive aspects and processes in entrepreneurship research; however, the implicit assumption is that the entrepreneur is making judgments.

Nevertheless, for a clear understanding of entrepreneurship we need to comprehend how entrepreneurs act after they have made a judgment and this is mainly important because “the difference between judgment and acting is that there is additional feedback and that feedback produces learning and correction in the action” (Frese 2009: 478).

Due to this evolution of EC as a field of research, the purpose of our review is not to advance a particular position but to reorganize current research around a more dynamic conceptualization of entrepreneurial cognition—adopting socially situated cognition research in general, and the themes in particular—in order to offer a more comprehensive framework.

Methodology

To perform an accurate analysis of EC as a field of research, both bibliometric analysis and systematic literature review techniques are used. Specifically, bibliometric analysis is based on the visualization of similarities (VOS) technique (Van Eck et al. 2006; Van Eck and Waltman 2010), and for the systematic literature review, we followed the procedure proposed by Tranfield et al. (2003). Thus, in line with existing research (López-Fernández et al. 2016; Kosmützky and Putty 2016; Voley and Mazarol 2015) we first performed a bibliometric analysis followed by a systematic literature review on the bibliometric results, accordingly, the entire process consisted of six steps.

The first step involved a comprehensive search of the Thomson Reuters Web of Science Core Collection database, which offers the most valuable and high-impact collection of data and is recognized as the most reliable database for bibliometric studies (Ding et al. 2016; Falagas et al. 2008; Gu 2004). In fact, the Web of Science Core Collection ensures that all the papers, books, and other materials are manually scanned and selected to guarantee the inclusion only of the most high-end and high-impact researches (Kullenberg and Kasperowski 2016; Leydesdorff et al. 2013). Moreover, as EC is an emerging field of study, we followed the methodological choice proposed by López-Fernández et al. (2016) to use only Web of Science Core Collection in order to present exclusively the most influential paper on the field.

The second step involved the selection of the research query. As the main scope of the present paper we deliberately limit our research to entrepreneurs with the term “*entrepren**” following the suggestion of Baron (1998) and Randolph-Seng et al. (2015), who highlight the significant difference between the mindset of owners or managers and that of entrepreneurs. Thus, the resulting query was TS= (*entrepren* AND cognition*), where the “TS” operator performed a full search of the selected terms in titles, abstracts, and keywords. Hence, the research was limited to “articles” in terms of document type in order to include only high-quality material that has undergone a double-blind peer-review process (Delgado García et al. 2015; Grégoire et al. 2011), obtaining a preliminary data set of 269 entries. Moreover, in order to ensure the inclusion of all relevant data, a cross-validation was made with Scopus and EBSCO Business Premier. After a preliminary scan, which consisted in reading all of the resulting data, we decided to also include editorials, books, and book chapters. This choice is justified by the fact that some seminal insights that inspired the development of future research were present in a small amount of non-peer-reviewed material (Randolph-Seng et al. 2015). Moreover, recent bibliometric studies (Ferreira et al. 2017; Appio et al. 2016) underline that one limit of bibliometric studies is not to consider book, seminal works and other published material that should be considered in order to obtain a more detailed description of the field of study. Because of that, we

dedicated two special subparagraphs to analyzing non-peer-reviewed material. Consequently, the extended data set was composed of 284 entries.

The third step was devoted defining the inclusion criteria for the documents for the present study, and then to the manual analysis and selection of each document. We decided to base our inclusion selection on the most generally accepted definition of EC proposed by Mitchell et al. 2002, as “*the knowledge structures that people use to make assessments, judgments, or decisions involving opportunity evaluation, venture creation, and growth*” (p. 97). This definition highlights two key elements of EC: the knowledge structure and the decision-making. For this reason, only studies focused on entrepreneurs and not managers were included and articles had to consider entrepreneurs’ knowledge structure and/or his/her decision-making process in order to evaluate opportunity, and create new venture or growth. Based on that definition the extended data set of 284 documents was again entirely carefully reread. This led us to exclude studies that did not focus on entrepreneurs, and consequently we eliminated articles that considered the entrepreneurial team’s cognition or sales people’s and managers’ entrepreneurial behavior. Moreover, we removed those studies that just mentioned entrepreneurial cognition but the main attention of the study was on other topics such as business models, regional variation, and transactive memory systems. At the end of the selection process we obtained a refined data set of 151 peer-reviewed papers, five editorials, four books, and six book chapters (please see Tables 2, 3, and Table 5 in the Appendix for the complete data set used in the present study).

After ensuring that the entire data set was composed only of documents suitable for the purpose of the present study, the fourth step consisted in critically reading the selected material in order to obtain a general and precise idea of EC as a field of study in the light of SSC.

This analysis allowed us to recognize a conceivable cutoff point in the literature. The cutoff point was found to be in 2007 when Mitchell et al. (2007) took the stock of EC as a field of study in an Entrepreneurship Theory and Practice (ETandP) special issue editorial dedicated to EC. In fact, in the editorial entitled “The Central Question in Entrepreneurial Cognition Research 2007” (Mitchell et al. 2007), the authors examined the advances in the EC research stream and underlined how this field of research had increased over the years, and subsequently from this publication, an advanced stage of EC began.

After that, two different types of bibliometric analysis were applied: bibliometric activity indicators (López-Fernández et al. 2016) and, having the single papers as units of analysis, bibliographic coupling. In detail, activity indicators provide data about the volume and impact of research, allowing one to observe the quantitative evolution of the literature. In this particular case, we analyze the papers’ distribution among the journals, the evolution of the field of study, the epistemological orientation and the research method adopted (De Bakker et al. 2005). From this analysis we understood that EC as a field of research could be divided into two distinct stages. The first one, which we defined as “emerging,” covers the years from 1998 to 2007 and refers to the early stages of EC as a field of study. The second one, which we called “mature,” refers to the years between 2008 and 2016 and represents the developed stage of EC.

Next, the fifth step consisted of the core bibliometric analysis, applying bibliographic coupling. We used VOSviewer 1.6.5 as the algorithm of aggregation of the papers with bibliographic coupling as the aggregation mechanism (Van Eck et al. 2006; Van Eck and Waltman 2010). Bibliographic coupling occurs when two works reference a common third work in their references; consequently, two documents are bibliographically coupled when they both cite one or more documents in common (Boyack and Klavans 2010). We decided to use bibliographic coupling due to its ability to answer the following questions: “What is

the intellectual structure of recent/emerging literature? And how does the intellectual structure of the research stream reflect the richness of the theoretical approaches?" (Zupic and Čater 2015: 62).

The mathematical process behind the routine begins with a construction of similarity matrix obtained by normalizing a co-occurrences matrix of items (Van Eck et al. 2006; Van Eck and Waltman 2010). Secondly, the script performs a set of routines to build a two-dimensional map in which the items 1 to n are positioned to such a degree that it represents the distance between any pair of items x and y , reflecting their similarity in term of cited references. In addition, a cluster density view is performed with additional mathematical steps. When the items' density is calculated, each cluster is associated with a color. This is done by computing a weighted average of the colors, where the weight of a color equals the item density for the corresponding cluster (Van Eck and Waltman 2010). Subsequently, every single point is mixed with a black background color; the more a color is shaded, the lower its density.

In doing so, VOS analysis offers a large set of information in one single graphical plot. Consequently, the map built by the text-mining routine is a plot in which the items' distance can be interpreted as an indication of the relatedness of the terms. In fact, the smaller the distance between the terms, the stronger the terms are related to each other (Van Eck et al. 2010). In addition, the cluster analysis highlights the knowledge base diversity in an aggregate way. In the case that the papers belong to the same cluster, it means they are strongly linked together as a group on the basis of their shared references; this indicates that a cluster represents a stream of research or a particular topic on a similarity basis. Finally, the brightness of a point represents the strength of link among the papers under analysis, showing their relative importance in the plot and in the field under study. However, for a profound mathematical explanation of the VOS technique and VOSviewer, please see Van Eck and Waltman (2007, 2009, 2010).

Finally, the sixth and last step involved the systematic literature review process (Tranfield et al. (2003) based on the results of VOS aggregation. In particular, using the results of clustering found by VOSviewer we systematically analyzed each paper inside such clusters, namely three clusters for youth and four clusters for growth period, in order to highlight their main areas of interest, the connection between each paper, and the connection between each cluster. Due to the aim of the article, to assess the content of each cluster, we developed an analytical framework based on socially situated cognition (Randolph-Seng et al. 2015) and used it to content-analyze the 151 papers. We developed a coding scheme (Myers 2013) based on the definition of the four themes of SSC. We explain our coding scheme in Table 1.

Additionally, in the last stage of the data processing we also systematically analyzed the excluded non-peer-reviewed material that had not undergone bibliographic coupling analysis. Thus, for both periods we added a paragraph where we analyzed such data, highlighting their connection and contribution to the development of EC as a field of study.

Results

In this section we first present the main results of the application of the activity indicators and the reason why we divided the analysis into two different periods: the "emerging" comprises the years from 1998 to 2007 and the "mature" refers to the years 2008 to 2016. After that, the outcomes of bibliographic coupling analysis will be examined.

Table 1 Coding scheme

Coding categories	Operationalization	Example themes
Action-oriented	The article captures the positive or negative evaluations of, or motivations toward an object or concept	Create opportunity Venture creation
Embodied	The article grabs the interrelationship between the physical brain and body to capture how the body shapes the mind	Genetic factor Emotion Identity
Situated	The article focuses the communicative context, relational context, and group context in which cognition and action occur	Situated alertness Heuristic Script
Distributed	The article captures the variety that occurs in the distribution of cognition across social agents and the environment	Cognitive team Organization and learning

As a preliminary snapshot for the examination of EC as a field, the analysis of the paper distribution among the years (see Fig. 1) shows that EC is a relatively recent field of study, with the first document dated 1998.

Next, we considered the papers' distribution among the journals. By analyzing Table 2 it is possible to find a high number of articles distributed in the three most important entrepreneurship journals, namely *Entrepreneurship Theory and Practice*, *Journal of Business Venturing* and *Strategic Entrepreneurship Journal*.

As we remark, EC as field of study, undergone to an intense evolution during the last years. This evolution has confirmed the existence of two research cycles. In fact, the first period covers the years between 1998 and 2007, and within it the scientific production is both limited (maximum of five articles per year) and irregular (with several years with no or very low production). The second period, which starts in 2007, has a steady growth trend, except for a sharp decline in 2010, with full recovery from 2011. This trend was probably due to the publication in 2007 of a special issue of the journal *Entrepreneurship*

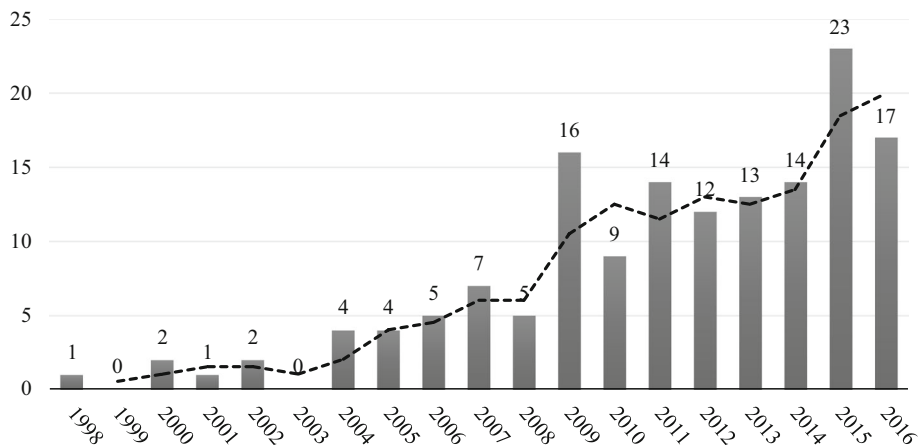
**Fig. 1** Paper distribution among the years

Table 2 Paper distribution among the journals

1998–2016	
Journal	N.P.
Entrepreneurship Theory and Practice	23
Journal of Business Venturing	21
Strategic Entrepreneurship Journal	13
International Entrepreneurship and Management Journal	10
International Small Business Journal	9
Journal of Small Business Management	7
Journal of Business Research	6
Entrepreneurship Research Journal	5
Entrepreneurship and Regional Development	3
International Journal of Management Reviews	3
Academy of Management Review	2
European Management Journal	2
Journal of Management Studies	2
Management Decision	2
International Business Review	2
Small Business Economics	2
Universitas Psychologica	2
Management Learning	2
Journal of Social Entrepreneurship	2
Others (1 paper)	33
Grand total	151

Theory and Practice entitled “*The central question in entrepreneurial cognition research 2007*,” where authors were required to prompt and facilitate the development of additional research questions central to the study of entrepreneurial cognition.

The existence of two research cycles, one more theoretical (emerging) and one more devoted to the theory testing (mature) has been confirmed by the epistemological and research methods analysis that we performed.

In fact, each article on our database was coded according to its epistemological orientation using De Bakker et al.’s (2005) classification scheme—namely, conceptual, exploratory, predictive, instrumental, normative, and descriptive. This process involved examining the keywords, the article title and a review of its abstract. As summarized in Table 3 and Fig. 2, in the “emerging” stage the majority of studies were theoretical—mainly conceptual papers (68 percent) and exploratory ones (25 percent). Just seven percent of the contributions were predictive. In the “mature” stage, the theoretical studies maintained supremacy but there was a great change: most of the contributions were explorative (63 percent) and only few papers were conceptual (28 percent) or predictive (6 percent). In this second stage, there also was a scant contribution from descriptive research (3 percent) which was totally absent from the first period. In both stages, prescriptive studies are missing. This epistemological distribution reflects the idea that at the beginning when a new research field developing, there is the necessity to establish a theoretical background. In our case, there was the need to establish the roots of EC and understand how cognitive perspective should be applied to entrepreneurship research. When a field is

Table 3 Papers' epistemological orientation overview

	Epistemological orientation			
	1998–2007		2008–2016	
<i>Theoretical</i>				
Conceptual	19	68%	34	28%
Exploratory	7	25%	79	64%
Predictive	2	7%	7	6%
<i>Prescriptive</i>				
Instrumental	0	0%	0	0%
Normative	0	0%	0	0%
<i>Descriptive</i>				
Descriptive	0	0%	3	2%
Total	28		123	

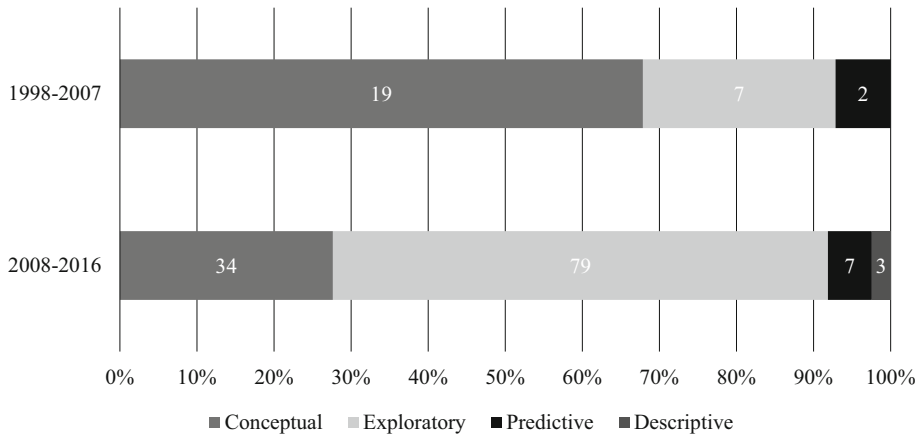


Fig. 2 Graphical representation of papers' epistemological orientation

more mature, the longing to overcome the theoretical statement emerges. This is what happened to EC starting from 2007; there was a deep need to test the conceptual frameworks studied in the period before and to verify if effectively what differentiated entrepreneurs from others is cognition.

Next, we considered the research methods used by the paper in our dataset. Thus, only the subgroup of papers belonging to theoretical exploratory and theoretical predictive are taken in consideration (De Bakker et al. 2005).

As shown in Table 4 and Fig. 3, quantitative methods prevailed in both periods, with 55 percent of quantitative papers in the “emerging” periods and 67 percent in the “mature”. Respectively they were divided in the survey (44 percent; 57 percent) and experiments (11 percent; 10 percent). Mixed sequential methods were mostly used in the first period (22 percent) instead of in the second (5 percent). Qualitative methods were applied on average in both periods; narrative methods were especially used, respectively, 11 percent in the “emerging” period and 13 percent in the “mature”. It is not surprising that in the first period there was a grounded theory contribution (11 percent) which was useful to establish the root of EC.

Table 4 Papers' research methods overview

Research methods	1998–2007		2008–2016	
	Count	Percentage	Count	Percentage
<i>Mixed methods</i>				
Sequential	2	22%	4	5%
Concurrent	0	0%	0	0%
<i>Qualitative</i>				
Case study	0	0%	11	13%
Grounded theory	1	11%	1	1%
Action research	0	0%	1	1%
Narrative	1	11%	11	13%
Phenomenal	0	0%	0	0%
<i>Quantitative</i>				
Survey	4	44%	49	57%
Experimental	1	11%	9	10%
Total applicable	9		86	
Not applicable (theoretical)	19		37	
Grand total	28		123	

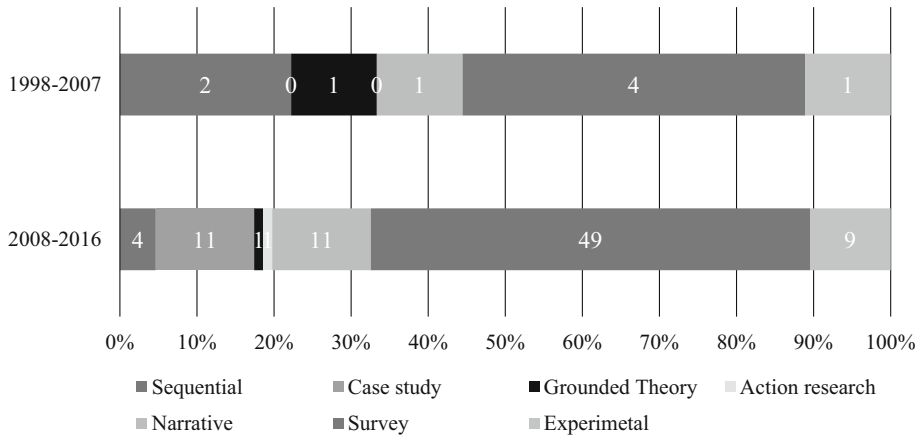


Fig. 3 Graphical representation of papers' research methods

Moving to the core of the present work, the use of bibliographic coupling to analyze the documents made it possible to obtain the definition of the research stream, namely clusters, present in the field of EC, and mostly to understand how they evolved from the “emerging” to the “mature” period. In Figs. 4 and 5, the cluster analysis is illustrated, and in order to optimize the figure visualization only the most cited articles are shown.

The emerging period, 1998–2007 (Fig. 4)

At the beginning of EC as a field of research, it was understood that it was necessary to define how the cognitive perspective should be applied to entrepreneurship research and to

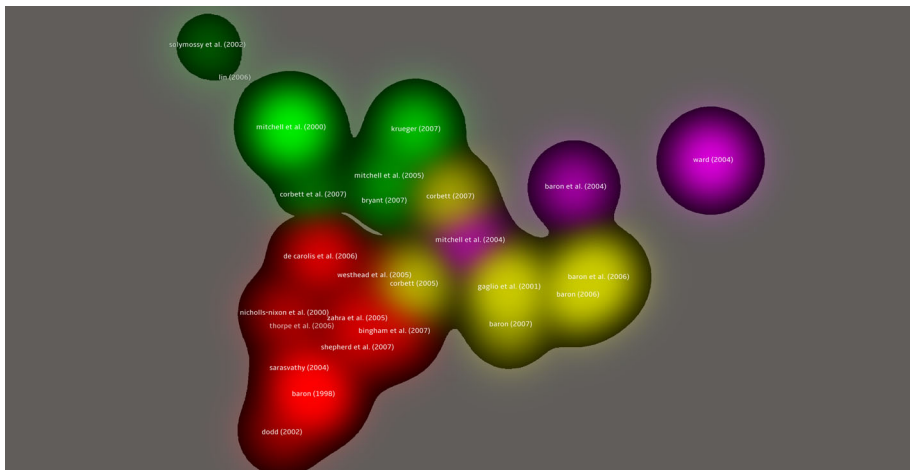


Fig. 4 Cluster analysis of the emerging stage (1998–2007)

investigate effectively whether what differentiates entrepreneurs from others is cognition (purple cluster). From the EC point of view, this means understanding how entrepreneurs think, reason, and behave within the context of new value creation as the focal objective of entrepreneurs’ activity (Mitchell et al. 2007). This explanation confirms that from the beginning EC research was implicitly based on elements of SSC. Indeed, in this period there were many studies that considered action orientation and usually investigated the relationship between knowledge structure and venture creation (for example, Nicholls-Nixon et al. 2000; Thorpe et al. 2006), namely between thinking and action. Moreover, studies belonging to the green and yellow clusters, called respectively “decision shortcuts” and “entrepreneurial alertness,” can be incorporated under the label of “situated cognition.” Indeed, the green cluster includes studies focused on decision shortcuts used by entrepreneurs in certain situations, such as at intercultural level (Mitchell et al. 2000) or in developing new products (Corbett et al. 2007), and more generally those during the entrepreneurial exploitation phase (Bryant 2007). In the same vein, the yellow cluster encompasses research that investigated entrepreneurial alertness (Baron 2006; Gaglio and Katz 2001) during the opportunity identification phase, namely the start of the entrepreneurial process.

Purple cluster—The roots of EC

In this cluster the importance of EC theory as a field of research is analyzed, both from a theoretical and a methodological point of view. The study by Mitchell et al. (2004) is located at the center of all clusters because it defines both distinctive and inclusive elements within the domain of EC theory. The authors applied the boundaries and exchange logic “to provide a helpful lens through which to understand the progress and legitimization of the EC domain” (Mitchell et al. 2004: 507). Moreover, they highlight the questions at the root of EC research and that distinguish this stream of research from others, such as: “*Why do some individuals and not others choose to become entrepreneurs?*” and “*How do entrepreneurs think and make strategic decisions?*” (for example, Baron 2004) or “*Do entrepreneurs think differently from other business people?*” (for

example, Mitchell et al. 2000, 2002, 2004: 509). In order to answer these questions, Baron and Ward (2004) provide some methods and measures drawn from cognitive science literature and claim that they may be useful to researchers in the field of EC. The authors proposed using reaction time, priming, measures of working memory, and measures of creative cognition to understand new insights into the minds of entrepreneurs (Baron and Ward 2004).

Finally, the study proposed by Ward (2004), positioned on the right-hand side of the figure, devotes attention to the relationship between cognitive constructs and entrepreneurial creativity, and therefore to the generation and exploitation of novel and useful ideas. The position of this paper indicates that it has a bibliography in common with two other studies, but rather its focus is on a specific process of entrepreneurship: creativity.

Green cluster—situated cognition—decision shortcuts

This cluster included studies that analyze decision shortcuts used by entrepreneurs, such as heuristics and deep belief, which means understanding how differently entrepreneurs use script and knowledge structure to non-entrepreneurs (Mitchell et al. 2007) in different contexts.

Scripts are processes of ordered mental steps pertinent to a particular action, activity, or field of interest (Read 1987). These cognitive aspects were mainly applied to study the different thinking between expert entrepreneurs and novices, especially at the intercultural level (Mitchell et al. 2000). Indeed, Mitchell et al. (2000) demonstrated that knowledge structures differentiate between entrepreneurs and non-entrepreneurs across countries. This is the consequence of entrepreneurs' shared scripts and experience regarding the conceptualization, development, and growth of new businesses (Mitchell et al. 2000). In the same vein, Corbett, Neck, and De Tienne (2007) explored the cognitive scripts used by entrepreneurs to terminate new product development and link it to the learning process. Their study demonstrates that some scripts appear to lead to more and better opportunities for learning (Corbett et al. 2007).

Another cognitive aspect comes into the picture to influence cognition: deep belief structures (Krueger 2007). "Beliefs play a pivotal role in what we perceive as relevant in new knowledge, how we process stimuli and information, and finally, how we store and structure the knowledge resulting from these steps" (Krueger 2007: 124). Krueger's study (2007) contributes to EC literature as it describes deep belief as the reason behind the entire entrepreneurship process. Belief is the first step in performing an action (Krueger 2007).

Moreover, one of the most important cognitive features that have been explored in the entrepreneurship field is heuristics, defined as a cognitive shortcut (Baron 2004; Mitchell et al. 2004). In this regard, Bryant (2007), on the right side of the cluster, explored the use of heuristics by entrepreneurs during the evaluation and exploitation phase. Bryant's findings suggest that entrepreneurs use heuristics frequently in relation to the evaluation of opportunities, but rely on a more rational style during the exploitation phase (Bryant 2007). Heuristics are often associated with the intuitive cognitive process (Bazerman and Neale 1986; Denes-Raj and Epstein 1994; Tversky and Kahneman 1983). It is not just a coincidence that the study by Mitchell et al. (2005) is located near Bryant's (2007).

While most of the studies included in this cluster—and, more generally, the works analyzed in this first stage—focused on the individual level, the study by Lin (2006) considers cognitive features as just one of the factors affecting entrepreneurial behaviors.

In addition to the different cognitive aspects, the relationship between organizations is another key factor that shapes entrepreneurial behavior. The different focus of this paper justified its position at a separate point of the green cluster.

Finally, the paper by Solymossy and Masters (2002), positioned on the left side and separated from the green cluster, examines entrepreneurial ethics from a cognitive perspective. In light of this, it may have been considered a separate stream of research. However, the paper belongs to the green cluster because it considers ethics as a deep belief that guides entrepreneurs' behaviors and as a characteristic that distinguishes entrepreneurs from nonentrepreneurs.

Red cluster—action-oriented cognition

Starting from the end of the nineties, many studies have confirmed that what distinguishes entrepreneurs from nonentrepreneurs is not ascribable to personal characteristics (Hatten 1997; Shaver and Scott 1991). For this reason, a different approach to understanding and investigating this research question was necessary. In 1998, Baron's paper entitled "Cognitive mechanisms in entrepreneurship: Why and when entrepreneurs think differently than other people" started from this consideration. As shown in Fig. 2, Baron's paper (1998) is the most cited work in the red cluster. This is not only due to the fact that it is the oldest paper to discuss EC thoroughly but also because Baron was one of the first authors to introduce the human cognition concept into the entrepreneurship literature. The author concluded that what differentiates entrepreneurs from other people is the way they think and their capacity to process information (Baron 1998). In 2004, Sarasvathy reinforced this theoretical approach, claiming that while classical theories about firms are not able to explain the entrepreneurship phenomenon, the cognitive approach does. Therefore, the author suggests that, in order to study entrepreneurship, an entrepreneur-centric vision based on a cognitive approach is needed, because it would allow the differences among firms' performances to be explained.

Moving to the core position of the red cluster, there emerge contributions that focus on the relationship between knowledge structure and venture creation, namely between thinking and action (Mitchell et al. 2007). Nicholls-Nixon et al. (2000) used the action approach to explore the relationship between strategic change and new venture creation. They found that strategic changes in new ventures are consequences of a process of trial and error learning "whereby the entrepreneur seeks to develop an understanding of the competitive situation and determine how to compete within that context" (Nicholls-Nixon et al. 2000: 494). Similarly to this paper, the contribution by Thorpe et al. (2006) used "enacted cognition" to explain entrepreneurial learning. The authors explained: "The entrepreneur is the agent whose knowledge, skills and learning capacity enact an activity, namely a business venture. In this 'enaction', the entrepreneur articulates meaning using established language and tools, acting from their own intimate personal knowledge" (Thorpe et al. 2006: 246). In the same vein, Shepherd et al. (2007) underline that EC and strategic action, opportunity recognition and venture creation, are the consequences not only of prior knowledge but also of gist mechanisms for the formation of opportunity belief.

The knowledge structure concept is also at the root of the contributions by Zahra et al. (2005) and Bingham et al. (2007) regarding internationalization as a new venture creation. The first contribution suggested that the cognitive perspective is useful for understanding the knowledge structure that guides and defines the internationalization decision. Starting

with this study, Bingham et al. (2007) combine quantitative and qualitative methods in order to demonstrate that heuristics are at the root of firm capabilities. In other words, entrepreneurs' experience creates heuristics, which over time become firm capabilities, allowing new ventures to be discovered and created (Bingham et al. 2007).

At the top level of the cluster are situated two contributions that underline the importance of adopting cognitive aspects jointly with the context in which entrepreneurs are called to operate, in order to create new ventures. The study by De Carolis and Saporito (2006) offers an entrepreneur behavior model in which both cognitive features and social capital have to be considered to study entrepreneurial venture creation. In the same way, Westhead et al. (2005) adopted a social-psychological approach to entrepreneurship (Carsrud and Johnson 1989), taking into account the context in which the individual is operating as well as his/her personal characteristics to explain the differences between novice, experienced, and portfolio entrepreneurs.

At the bottom of the red cluster, there is the contribution by Dodd (2002), who analyzed metaphors that entrepreneurs use to give meaning to entrepreneurship experience. The study aims to create a cultural model of entrepreneurship, and cognition is just one of the aspects used to explain the entrepreneurial process.

Yellow cluster—situated cognition—entrepreneurial alertness

Opportunity identification could be considered one of the subprocesses that comprise the general process of venture creation. Indeed, as explained by Baron (2007), venture creation is the result of three processes: idea generation, opportunity recognition, and acquisition of essential resources. For each of them, there are cognitive antecedents and processes: respectively, concept and creativity, pattern recognition and alertness, and social skill and social networks. Moreover, this is one of the first papers to consider affect as an antecedent of the entrepreneurial process (Baron 2007). In particular, Gaglio and Katz (2001) provided a new translation of the concept of entrepreneurial alertness into its appropriate cognitive and psychological properties. The authors consider alertness as a distinctive set of perceptual and information-processing skills and give a detailed explanation of entrepreneurial alertness as a chronic schema (Gaglio and Katz 2001). Similarly, Baron (2006) recognizes that alertness is the core element of opportunity identification, but two further factors are important as well: knowledge searching and prior knowledge. This contribution suggests that the relationship between alertness, knowledge searching, and prior knowledge may be explained by the pattern recognition concept, which describes the cognitive process through which individuals identify meaningful patterns in complex arrays of events or trends.

The pattern recognition process was also used to explain the differences between experienced and greenhorn entrepreneurs (Baron and Ensley 2006). Specifically, Baron and Ensley (2006) focused on one cognitive framework: prototypes for business opportunity. Their findings demonstrated that the prototypes of “experienced entrepreneurs were more clearly defined, richer in content, and more concerned with factors and conditions related to actually starting and running a new venture than the prototypes of novice entrepreneurs” (Baron and Ensley 2006: 1331).

Finally, the contributions by Corbett (2005, 2007) highlight that opportunity identification is also the result of entrepreneurs' learning process. The findings of these studies suggest that knowledge asymmetries exist because of learning asymmetries. By acquiring information and transforming it in fundamentally different ways, the resulting product will

be different based on the knowledge that each of us can use to uncover opportunities (Corbett 2005, 2007).

Review of editorial, books and book chapters of emerging period

The editorial and book chapter analysis confirms the results of bibliographic coupling and content analysis of the papers in this emerging stage. Indeed, all these contributions are aimed at explaining the building blocks of EC as a field of research. Thanks to the editorial of Mitchell et al. (2002), we have the definition of EC that is well established in the field and that researchers still use. Five years later, the same authors traced the conceptual foundations and approaches as a background to this field of research (Mitchell et al. 2007). Over the years, the priorities were to understand how to apply the cognitive concepts to an entrepreneurship mindset (Katz and Shepherd 2003; Krueger 2003) and, more generally, how to set these notions within the larger context of entrepreneurship’s distinctive and inclusive situation (Mitchell et al. 2004) of opportunity evaluation, venture creation, and growth. This confirms the predominance of situated cognition and action orientation still in this stage of EC.

An interesting result of this analysis comes from the contribution by Witt (2003). This is one of the few contributions that is entirely dedicated to understanding how the cognitive approach could be useful in providing new insight into entrepreneurship from an organizational point of view, as the author applied a distributed cognition view.

The mature period, 2008–2016 (Fig. 5)

With respect to analyzing the “mature” period of EC, our bibliometric results confirm what Randolph-Seng et al. (2015) suggested about the integration of the four themes of SSC and the relationship with the existing approaches. Indeed, passing from the emerging to the mature period, the red cluster, namely action-oriented cognition, and the yellow one, which

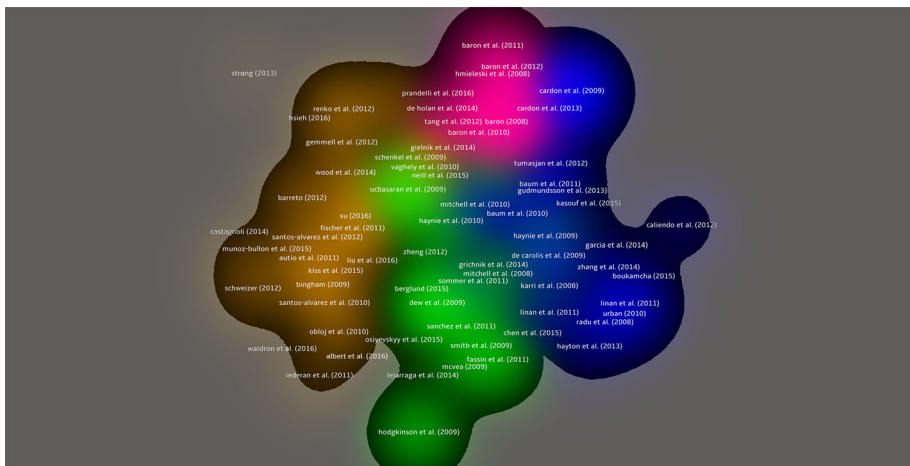


Fig. 5 Cluster analysis of the mature stage (2008–2016)

is situated cognition in terms of alertness, merged and created the orange cluster, which is the result of the combination between situated and action-oriented themes. Therefore, in this cluster we can find articles that consider simultaneously deliberate practice (action-oriented) in a specific context (situated) such as internationalization (for example, Castagnoli 2014; Santos-Álvarez and García-Merino 2010), from a more dynamic perspective (for example, Ortega Álvarez et al. 2015). In the same vein, the pink cluster, namely affect-centric, which was born in the growth period, is the result of the merger between embodied, action-oriented, and situated cognition. Otherwise, affect (embodied), as individual experience, influences the entrepreneurial cognition during the entrepreneurial process (situated) (Baron 2008) and in specific action that entrepreneurs have to deal with, for example product innovation and sales growth (Baron and Tang 2011). The green cluster, during the evolution from the youth to the growth period, transformed into the action-centric approach cluster. This is due to it including studies from both situated cognition, such as opportunity identification, and venture creation (for example, Marshall 2016; Robinson and Marino 2015), and the use of particular cognitive styles that are specifically linked to entrepreneurial action (action-oriented theme) (for example, Lejaraga and Martínez-Ros 2014; Malmström et al. 2015; Wright and Stigliani 2013). Finally, the blue cluster, called “situated cognition” using sociocognitive categories, embraces studies that consider the different sociocognitive categories (Mitchell et al. 2007). Indeed, from the analysis of this new cluster it emerged that situated cognition could be composed not only of the person (for example, De Carolis et al. 2009; Karri and Goel 2008; Li et al. 2013), his/her cognition (for example, Omorede et al. 2015; Yang 2015), and the context (Garrett and Holland 2015; Yang 2015), but also of his/her motivation (for example, Iederan et al. 2009; Urban 2010).

Orange cluster—action-oriented and situated cognition

EC theory declares that entrepreneurs’ cognitive capacities and expertise in processing information are central to opportunity identification (Mitchell et al. 2007). Indeed, articles that investigate the relationship between information processing and opportunity identification are at the center of Fig. 5. They belong to the orange cluster but at the same time their topic is fundamental to the other clusters. These studies show that active information search (Gielnik et al. 2014), the need for closure (Schenkel et al. 2009), and mindset discovery (Neill et al. 2015) affect information processing and consequently opportunity identification. Moreover, Vaghely and Julien (2010) explained that entrepreneurs’ information processing is a dynamic combination of algorithmic and heuristic cognitive mechanisms. Moving to analyzing the content of the orange cluster, it can be seen that many studies focused on how EC influences opportunity identification, underlining the need to consider both subjective perception and objective market condition (Dew et al. 2015; Kemmerer et al. 2012; Kiss and Barr 2015; Metzger and King 2015; Renko et al. 2012; Wood and Williams 2014). This is particularly important if the development of innovative products is considered (Gemmell et al. 2012) and social dynamics are involved (Fischer and Reuber 2011; Xu 2016). Nevertheless, some articles pay great attention to subjective and cognitive antecedents and processes and empirically test how they influence opportunity identification. For example, Wood et al. (2014), Wood and Williams 2014 and Williams and Wood (2015) demonstrate that rules-based thinking influences opportunity evaluation; moreover, parallel work experience (Hsieh 2016), entrepreneurial belief (Felin and Zenger 2009), and organizational (Drori et al. 2009) as well as personal scripts (Pryor

et al. 2016; Uygur and Kim 2016) are used for understanding entrepreneurial opportunity evaluation and interpretation (Barreto 2012).

In the middle of the orange cluster are grouped articles regarding international entrepreneurship, which is the process of recognizing and exploiting business opportunities in the international context (Santos-Álvarez and García-Merino 2010). In this context, EC in general (Castagnoli 2014) and specifically entrepreneurs' cognitive variables, such as alertness, causal logic, and prior experience (Santos-Álvarez and García-Merino 2010, 2012), are fundamental variables for collecting relevant information for international business development. Similarly, entrepreneurial orientation (for example, proactiveness, risk taking, and innovativeness) is an important determinant of nascent entrepreneurs' entry in foreign markets (Muñoz-Bullón et al. 2015). Adopting a cognitive approach, internationalization was investigated as an organizational dynamic capability (Álvarez et al. 2015) based on cognitive maps (Autio et al. 2011; Bingham 2009), which enables the creation of form and meaning for opportunity selection and, in so doing, provides a cognitive underpinning for coordinated behavior (Bingham 2009). In addition, Schweizer (2012) demonstrated that the internationalization process changes over time thanks to the learning process. That process may benefit from governance mechanisms composed of people with heterogeneous work experience and diverse knowledge (Wirtz 2011), and learning should also be the result of negative outcomes (Bingham and Kahl 2014).

It follows that different logics guide different internationalization decisions at different times; consequently, different forms of distance have to be considered (Williams and Grégoire 2015) and different motivations are at the root of this process, which influences the magnitude of the internationalization risk bias (Kiss et al. 2013).

Internationalization is a process that needs to consider situational factors. By definition, it deals with high uncertainty and scholars have found that different propensities to undertake uncertainty depend on cognition, involvement (Kuechle et al. 2016), and cultural factors (Liu and Almor 2016).

At the bottom of the orange cluster, there are studies that focused more on the relationship between EC and contextual factors and on their effects on the entrepreneurship process. Obloj et al. (2010) demonstrated that dominant logic is an intangible resource that guides firms in transition economies, where there is a lack of strong institutions and resources are limited. Moreover, institutional change influences entrepreneurial opportunity evaluation and entrepreneurs' cognitive structures (Iederan et al. 2011, 2013). Even the nature of the firm (for example, social entrepreneurship) affects organizational cognitive structure such as identity and power (Albert et al. 2016; Waldron et al. 2016).

Due to the aim of the article, the detailed study by Strong (2013) is positioned outside the orange cluster; he offers a new perspective of EC based on Hayek's (1945) oft-neglected cognitive theory, utilizing a sociopolitical approach.

Green cluster—action-oriented

At the heart of the green cluster is arranged the contribution by Sánchez et al. (2011) in which the authors highlight the contribution of cognitive psychology to the field of entrepreneurship for understanding entrepreneurial cognitive features, such as heuristics and an entrepreneurial cognitive style, defined as “the ways of processing information related to entrepreneurial behavior” (Sánchez et al. 2011: 434).

At the center of the green cluster are positioned studies that focus on cognitive features in relation to opportunity identification and venture creation. Cognitive aspects, such as

entrepreneurial experience (Atherton 2009; Smith et al. 2009; Westhead et al. 2009) and prototypical opportunity characteristics (Costa et al. 2016), together with the environment, are determinants of nascent ventures to engage in bootstrapping activity (Grichnik et al. 2014). Specifically, the intention of decision-makers (Sommer and Haug 2011) and the recognition of failure (Mitchell et al. 2008) impact the psychological commitment to engaging in a new business opportunity, and entrepreneurs tend to be more overconfident than others and this is positively correlated to both the decision to start a new venture (Marshall 2016; Robinson and Marino 2015) and the venture performance (Arend et al. 2016). Prior business ownership experience, in terms of failure and success, influences subsequent behavior and decisions (Ucbasaran et al. 2009) and this is true even in the team-level cognitive process (Zheng 2012). Moreover, metacognitive processes are useful for recognizing knowledge structure and heuristics, as they enable novel, uncertain (Haynie et al. 2010), and persistent (Mattingly et al. 2016) entrepreneurial decisions to be made.

Moving to the upper part of the green cluster, most of the contributions investigate the entrepreneurial cognitive style underlining the differences between entrepreneurs. For example, Dew et al. (2009) demonstrated that expert entrepreneurs make decisions using effectual logic, while novice entrepreneurs use a predictive frame. Malmström et al. (2015) showed that entrepreneurs' cognitive construction of business models distinguishes between high-profit and low-profit business models. In the same way, Murmann and Sardana (2013) explain that a cognitive style differentiates successful from unsuccessful entrepreneurs, in that the former are able to vary their decision styles based on the decision context. This confirms what Groves et al. (2011) suggest, that entrepreneurs possess a versatile style in a linear and nonlinear cognitive style and it is associated with educational background. Nevertheless, intuition, as a specific cognitive style, and heuristics, as the cognitive structure of the intuition process, have received recent and great attention in the entrepreneurship field (Baldacchino et al. 2015; Grégoire et al. 2015; Osiyevskyy and Dewald 2015); moreover, Brigham et al. (2010) demonstrated that the interaction between intuition and higher levels of formalization is significantly associated with firm growth. More generally, studies verify that cognitive style is associated with venture growth (Dutta and Thornhill 2014; Wright and Stigliani 2013), innovation (Lejarraga and Martinez-Ros 2014), and ethical decisions (Fassin et al. 2011; McVea 2009).

Finally, at the bottom of the green cluster, the article by Hodgkinson et al. (2009) underlines the necessity to overcome the distinction between the two cognitive styles, intuition and rationality, and explains entrepreneurial behavior through a more complex neuropsychological system.

Blue cluster—situated cognition

In this cluster are gathered contributions regarding the social cognitive categories of person, context, cognition, and motivation (Mitchell et al. 2007), which can be considered the main components of situated cognition. At the bottom of the cluster are positioned contributions concerning entrepreneurial motivation. Studies demonstrated that sociopsychological factors, such as locus of control, social cynicism, the traditionalism-modernity continuum, and the survival-self-actualization continuum, are significant predictors of entrepreneurial motivation (Turkina and Thai 2015) and entrepreneurial intention, and cognitive structures of expert entrepreneurs influence motivation and consequently venture creation (Urban 2010). Moreover, motivation is influenced by social value, that is, perceptions regarding general-society and closer-environment values (Linan et al. 2011a), and

national culture (Hayton and Cacciotti 2013; Linan et al. 2011b; Radu and Redien-Collot 2008). Entrepreneurial motivational factors have an effect on decision-making effectiveness but this relationship is mediated by cognitive complexity (Iederan et al. 2009).

On the right side of the cluster, contributions about cognitive aspects are discussed. Cognition includes all psychological processes by which sensory input is transformed, reduced, elaborated, stored, recovered, and used (Omoredede et al. 2015). Yang (2015) demonstrated that two aspects of EC—arrangement and willingness cognitions—have a strong relationship with strategic change momentum. García and Carlos (2014), García et al. (2014) and Chen et al. (2015) explain the relationship between expert scripts (García and Carlos 2014), cognitive adaptability (García et al. 2014; Haynie and Shepherd 2009), and creative cognitive style (Chen et al. 2015) and venture success. Moreover, the cognition processes are influenced by entrepreneurial expertise, which derives from formal entrepreneurship education (Zhang et al. 2014), training (Boukamcha 2015), and reflection (Lindh and Thorgren 2016).

In order to explain entrepreneurs' differences, many studies have investigated individual, personal factors (Karri and Goel 2008). For example, De Carolis et al. (2009) and Li et al. (2013) demonstrated that social capital affects the progress of new venture creation. In the same way, self-efficacy influences venture growth (Baum and Bird 2009; Baum et al. 2011) and opportunity recognition, especially in the early stage (Tumasjan and Braun 2012), leading to positive entrepreneurial results (Kasouf et al. 2015); similarly, two distinct types of images—images of vulnerability and images of capability—affect opportunity recognition (Mitchell and Shepherd 2010). Self-efficacy is also considered a moral awareness self-regulation mechanism and it influences entrepreneurs' ethical decisions (Bryant 2009). Moreover, cognitive biases, that is, overconfidence and optimism, influence both surviving and nonsurviving firms (Gudmundsson and Lechner 2013). At the top of the cluster, separated from the other papers, there are two contributions about a specific individual aspect of EC: passion. It is discussed both as a theoretical concept (Cardon et al. 2009) and a validate instrument to capture its intrinsic dimensions was tested (Cardon et al. 2013). It is not surprising that they are so close to the pink cluster, which includes contributions about entrepreneurial emotions.

Finally, contextual factors are critical for understanding entrepreneurs' behaviors. Indeed, cognition may also be a crucial determinant in dealing with dynamic and uncertain business environments; it affects entrepreneurial attention and evaluation (Garrett and Holland 2015), and actions and decisions during strategic change (Yang 2015). Indeed, a strategic entrepreneurship model is suggested because it offers a more holistic view of entrepreneurial activity by virtue of the relationship between individual cognition, firm, and environment (Westhead and Wright 2011).

Two contributions are positioned outside of the cluster; they have the bibliography in line with it but the content is outside the topic. Winkler (2014), through a sociocognitive lens, talks about which types of educational methods, approaches, and support systems best facilitate entrepreneurial learning. In the same way, Caliendo et al. (2012) are positioned outside the cluster because although they talk about some social cognitive variables (willingness to trust) in the everyday decision-making of entrepreneurs, managers, and employees, they adopt a more economic rather than organizational behavior point of view.

Pink cluster—embodied, action-oriented, and situated cognition—affect approach

In the pink cluster are collected contributions concerning affect and emotions. As Baron (2008), the most cited article of the cluster, explains: Affects play an important role in the entrepreneurship process, from opportunity recognition to resource acquisition. In line with this, researches demonstrated that dispositional positive affect is related to many beneficial outcomes, such as product innovation and sales growth (Baron and Tang 2011), innovation, and creativity in general (Baron and Tang 2011). At the same time, an increase in dispositional positive affect is associated with damaging effects, such as reduced task performance and higher impulsivity (Baron et al. 2012).

For this reason, an increasing number of researches have started focusing on understanding the importance of the capacity to regulate one's own emotions and optimism (Hmieleski and Baron 2008; Hmieleski et al. 2013). Indeed, self-control (Baron and Henry 2010) can be very beneficial to entrepreneurs' activities and perhaps to entrepreneurs' ecosystem (Nambisan and Baron 2013). While testing the alertness scale, Tang et al. (2012) demonstrated that positive affect, in contrast to a negative one, is significantly and positively correlated with alertness. Moreover, the emotional side of empathy could be an important antecedent for opportunity recognition and customer knowledge (Prandelli et al. 2016). To better understand EC and emotions it could be useful to use emerging technologies (De Holan 2013).

Review of editorials, books, and book chapters of mature period

The review of editorials, book chapters, and books of the mature stages confirms the need to adopt a more dynamic approach to EC by applying SSC (Clarke and Cornelissen 2011; Mitchell et al. 2011; Randolph-Seng et al. 2015). Moreover, in recent years, several books have been written in which are collected important contributions that have involuntarily combined the different themes of SSC, confirming that EC is dynamic in nature. For example, the book by Vermeulen and Curseurseu (2010) offers contributions to a better explanation of decision-making for strategic choice in the entrepreneurship context and considers different entrepreneurial strategies, for example innovation (situated cognition) and the effect that some embodied factors, such as emotions, can have on entrepreneurial strategic decision-making. In the same vein, the book by Mitchell et al. (2014) provides an important historical context for the state of the art in EC and offers a fascinating reflection by leading experts in the field. The book links conditions to important outcomes including behavior, learning, and growth. Moreover, it draws attention to how EC can be influenced by affect and languages (embodied cognition). Also, the book by Krueger and Day (2010) offers a contribution in terms of embodied cognition, suggesting the adoption of neuroscience because entrepreneurship can extract advantages from new instrumentation in the medical field for a better understanding of decision-making. In addition, Baum et al. (2014) have explored the psychology of entrepreneurs by considering different aspects that influence entrepreneurial success and call for a focus on action theory (Frese 2009) that should be useful for a better understanding of entrepreneurial performance.

Contributions and future research

Research on EC has evolved over the last eighteen years from 1998 to 2016, and this contribution wants to offer a clear, systematic and bibliometric review of EC as a field of study in a more dynamic perspective, building on the SSC (Randolph-Seng et al. 2015). Our research wants to contribute in four different ways.

First, our results concerning the bibliometric activity indicator have demonstrated that EC as a field of study can be divided into two periods, namely the “emerging” and “mature” periods. In fact, scanning the literature we found that there was a cutting-edge point in 2007 with Mitchell and colleagues’ paper. After that milestone research, the EC field started to evolve rapidly (see Fig. 1) and began a voyage to maturity as the cluster aggregation has shown. Moreover, this partition permits us a better and clearer presentation of the concept and evolution of EC. In addition, in order to investigate EC as a field of study, we decided to analyze the epistemological orientation and the research methods of the 151 papers involved in the study. What we found confirms that 2007 was a break point in the EC field because after this year, several empirical types of research started to test the previous theoretical hypotheses.

Second, the analysis of the bibliometric activity indicator can be useful for a wide set of individuals, namely students and academics (Texeira 2011). In fact, having a map of the conceptual structure of a discipline can be of great interest in order to develop an overview of a field of study, understand the relationships among paradigms, identify the essential works on each one of them, determine which are the most analyzed topics, and which are their conceptual basis (Texeira 2011; Casillas and Acedo 2007).

Third, applying bibliographic coupling and systematic review, it was possible to obtain a definition of the research stream, namely clusters, present in the field of EC and to mostly understand how they evolved from the “emerging” to the “mature” period. In particular, with this paper we represented the state of the art of EC, giving researchers a guide to schematize the knowledge structure of this field of study in light of SCC (Randolph-Seng et al. 2015). This re-examination is important because, whereas previous categorizations of the field (Mitchell et al. 2007) have shown how the field can be understood in terms of different theoretical approaches, this theory can help researchers see developments in important themes associated with human cognition and thinking (Randolph-Seng et al. 2015). Moreover, the four primary themes (situate, action-oriented, embodied and distributed cognition) encompassed within the socially situated cognition framework (Smith and Semin 2004) might serve as an ordering structure that can include and connect different approaches to entrepreneurial cognition research (Randolph-Seng et al. 2015). It means that approaches to investigating EC are dynamic in nature and SSC can be used for a better classification and understanding of these different perspectives. Indeed, our results showed that only recent entrepreneurial cognition research implicitly based on elements of socially situated cognition but the studies that were done at the start of the development of the field can also be read in a more dynamic way. Therefore, it is not right to say that the previous research into EC had a static approach (Randolph-Seng et al. 2015); instead it can be defined semi-as dynamic due to, as our analysis demonstrated, there also being in this first period a lot of studies implicitly based on elements of SSC. Indeed, in this period there were many studies that considered action orientation and usually investigated the relationship between knowledge structure and venture creation (for example, Nicholls-Nixon

et al. 2000; Thorpe et al. 2006), namely between thinking and action. Consequently, we can say that this analysis brings to the light that EC, as a field of research, has evolved from a emerging stage with a semi-dynamic approach, in which a single SSC theme can be identified and where there was a prevalence of situated cognition, to a mature stage where there was a pervasiveness of the merger between the four SSC themes, which gave life to the different dynamic approach of EC. Conceptualizing the EC in this view allows to better understand entrepreneurial behavior in a more changeable and dynamic way understanding how and why certain actions are taken, how and why the whole situation evolves as it does and how it influences entrepreneurial behavior accordingly. Hence, studying EC following a SSC lens allows to take into account not only the inner and mental resources of the entrepreneur but also the real situations that most entrepreneurs experience (Shepherd 2015).

Finally, from our results we can suggest three main topics that should be investigated in future researches: entrepreneurial action should be considered endogenous in the entrepreneurship process and the studies in the field of embodied and distributed cognition should be expanded.

In the following paragraphs all these three research topics are debated.

SSC and action theory

Our analysis confirmed that most of the studies on EC are focused on situated or action-oriented cognition (Randolph-Seng et al. 2015). Often these perspectives come together; this is because in the field of entrepreneurship there has always been a need to better understand how different contextual factors influence the cognition and the action. As a consequence, from our results we understood that action is pervasive in entrepreneurship and it seems reductive to simply say that studies based on action-oriented cognition are substantial (Randolph-Seng et al. 2015). Instead, it would be more suitable to consider action as the starting point for theorizing in entrepreneurship (Frese 2007). More generally, we suggest that action is endogenous in the entrepreneurship process. Therefore, as Frese (2009) points out, the cognitive approach in entrepreneurship has been very useful because it brings to light the importance of considering cognitive judgments in entrepreneurship research; however, it is not clear how entrepreneurs act after judgments.

Action theory is a meta-theory that attempts to understand how people regulate their actions to achieve goals actively and how this is done both in routine and in novel situations (Frese 2007). This theory, in conjunction with all the themes of SSC, can be useful in the development of a more dynamic theory of entrepreneurship starting from the idea that “thinking is for doing” (Randolph-Seng et al. 2015). For example, taking into consideration situated cognition, which focuses on the context in which cognition and action occur, action theory can be useful for a better understanding of the entrepreneurial learning process and its effect on the entrepreneurial context. Indeed, for a clear understanding of entrepreneurship we need to comprehend how entrepreneurs act after they have made a judgment and this is important because “the difference between judgment and acting is that there is additional feedback and that feedback produces learning and correction in the action” (Frese 2009: 478). Action theory assumes that many people become more active with time, because they learn that an active approach increases the chances of learning, of controlling the environment, of reaching one’s goals, and of reaching positive

consequences. Active approaches make it possible to adjust the task to one's knowledge, skills, and aptitudes. Thus, the environment is made to fit the person better (Frese 2009).

In addition, action theory joined with embodied cognition can be useful in the development of the affect approach cluster; indeed emotional processes are directly linked to each part of the action sequence (Klinger 1985). People may regulate their emotions in order to develop better performance strategies; for example, when an entrepreneur has to present his or her products, he or she may actually attempt to make him- or herself anxious so that he or she prepares better for this important event (Frese 2007). This ability could be useful for entrepreneurs' activities because it helps negotiate the resources necessary for their business, thereby supporting entrepreneurial success (Shepherd 2009). In light of this, however, there is a need to gain a better understanding of the role that emotional intelligence plays in entrepreneurship and this concept can also elucidate how entrepreneurs may "control the heart" (Cardon et al. 2012: 3).

Further, entrepreneurial performance at work is often done within teams, so action theory could also be useful for a better understanding of distributed cognition. As for the individual level, there is a need for a group regulatory process (Frese 2009), because by forming a team, entrepreneurs can create a socially extended cognitive nexus whose action features are distinct from those of its members (Harper 2008).

Embodied cognition

Our results demonstrated that embodied cognition is an understudied theme of SSC. Only in the last few years there has been a slight growth in the interest in understanding how emotion influences entrepreneurial cognition (Baron and Tang 2011; Baron et al. 2012).

Embodied cognition considers both the biological realities of an individual's body and the way these realities develop through interaction with the individual's environmental content and context (Markman and Gentner 2001). One of the topics that could be useful to investigate thanks to embodied cognition is organizational identity (OI). Recently, Harquail and King (2010) contended that social cognitions and language use are "embodied" and, drawing on a substantial literature that emphasizes the biological basis of social and cognitive capacities (Lakoff and Johnson 1999), they suggested that this embodiment needs to be appreciated to unpack how people construct organizations' identities. This means focusing on people's "bodily-kinesthetic, visual-spatial, temporal-aural, and emotional experiences of their organizations" in order to figure out "what is central, distinctive, and enduring about an organization," resulting in putatively richer analyses involving more different types of information such as temporality, spatiality, rhythms, audio cues, odors, and visual and emotional displays (Harquail and King 2010: 1620). The authors underline that the idea of an embodied construal of OI neither refutes nor ignores other processes by which organizations may be defined, but rather emphasizes the active role of the individual's embodied knowledge to substantiate his or her definition of what is central, continuous, and distinctive about the organization (Harquail and King 2010).

It could be useful to adopt this approach in family business research as family and organizational identities tend to overlap, creating a mutually shared understanding of "who we are" and "what we do" in "our family's business" (Zellweger et al. 2013). This implies that the family and the firm should be harmonious in terms of goals, values, beliefs, norms, interaction styles, and time horizons (Ashforth 2001). It follows that controlling families

should display a heightened concern for a strong identity fit between family and organization (Zellweger et al. 2013).

Distributed cognition

Our study confirms that there is a paucity of studies on distributed cognition (Randolph-Seng et al. 2015). From our analysis, we know that prior business ownership experience, in terms of failure and success, influences the subsequent entrepreneurs' behavior and decisions (Ucbasaran et al. 2009) and this is true even in the team-level cognitive process (Zheng 2012). However, there is a need for a better understanding of how cognition is distributed across social (different people and stakeholders) and organizational (entrepreneurial team, family business, overall organization) actors. This is particularly true in these times of complexity and change, in which entrepreneurs' decisions are more influenced and are often the results of negotiation with different stakeholders (Randolph-Seng et al. 2015).

The examination of distributed cognition holds exciting possibilities for future entrepreneurship research; indeed it has remained unclear how individual-level cognitions lead to, or at least impact, organizational level activities and performance. In fact, the varying levels of analysis in entrepreneurship research and theory development remain a significant challenge (Brown et al. 2001). The concept of Entrepreneurial Team Collective Cognition presents an opportunity to better understand how the two levels are interrelated.

Conclusion and limitations

This paper addresses the need to offer more bibliometric research in the field of management in order to give reliability to previous EC literature reviews (for example, Forbes 1999; Grégoire et al. 2011; Mitchell et al. 2007). Specifically, this research answers the call for a re-examination of past research in the light of SSC. In doing so we ground on Zupic and Čater (2015) and utilized a more reliable method that offered a new interpretation for understanding the microfoundation of entrepreneurial cognition research (Randolph-Seng et al. 2015). Thank to this analysis, we highlight that EC is a dynamic field of study and that action orientation is pervasive in the entrepreneurial process.

That being said, some limitations of our analysis should be recognized. Besides the rigorous and well-accepted method used, only a selection of concepts presented in the articles examined could be discussed. The main limitation of the present paper is related to the fact that the nature of bibliometric analysis tend to simplify the complexity of a field of research in order to provide a simple and clear picture. However, we tried to overcome this issue by offering a systematic literature review of the paper inside each cluster. In doing so, we tried to reduce the simplification induced by the bibliometric analysis and we presented the connection between paper inside each cluster. Moreover, the use of a systematic literature review based on bibliometric data allowed us to see why certain paper belong to a cluster and how the cluster evolved during the years.

Thus, we choose to limit our data collection within Web of Science Core Collection inasmuch it offers the most valuable and high-impact collection of papers and is confirmed as the most reliable database for bibliometric studies (Ding et al. 2014; Falagas et al. 2008;

Gu 2004). Nevertheless, it could be useful to systematically compare way our results with other databases such as Scopus and EBSCO. Finally, our findings would be increased if we conducted systematic comparisons with other disciplines (Gregoire et al. 2011), notably with neighboring fields such as organizational behavior, organization theory, or strategic management. Due to our interest in the cognitive aspect of entrepreneurs' behaviors, further contributions from psychological and neuroscience disciplines could enrich our results.

Appendix

In the present appendix, we present all the papers included in the dataset. Please note that Table 5 refers to the period 1998–2007 and Table 6 refers to the period 2008–2016. In the third column, P.Y. refers to publication year.

Finally, Table 7 presents all the materials which are not peer-reviewed papers such as journals such as books, book chapters, and editorials.

Table 5 Paper included in the period 1998-2007

Author(s)	Title	Journal	P.Y.	Cluster
Bingham, Cb; Eisenhardt, Km; Furr, Nr	What makes a process a capability? Heuristics, strategy, and effective capture of opportunities	Strategic Entrepreneurship Journal	2007	Red
Shepherd, Da; McMullen, Js; Jennings, Pd	The formation of opportunity beliefs: overcoming ignorance and reducing doubt	Strategic Entrepreneurship Journal	2007	Red
Thorpe, R; Holt, R; Clarke, J; Gold, J	Immaturity—the constraining of entrepreneurship	International Small Business Journal	2006	Red
De Carolis, Dm; Saporito, P	Social capital, cognition, and entrepreneurial opportunities: a theoretical framework	Entrepreneurship Theory and Practice	2006	Red
Zahra, Sa; Korri, Js; Yu, Jf	Cognition and international entrepreneurship: implications for research on international opportunity recognition and exploitation	International Business Review	2005	Red
Westhead, P; Ucbasaran, D; Wright, M	Experience and cognition—do novice, serial and portfolio entrepreneurs differ?	International Small Business Journal	2005	Red
Sarasvathy, Sd	Making it happen: beyond theories of the firm to theories of firm design	Entrepreneurship-Theory and Practice	2004	Red
Dodd, Sd	Metaphors and meaning—a grounded cultural model of us entrepreneurship	Journal of Business Venturing	2002	Red
Nicholls-Nixon, Cl; Cooper, Ac; Woo, Cy	Strategic experimentation: understanding change and performance in new ventures	Journal of Business Venturing	2000	Red

Table 5 continued

Author(s)	Title	Journal	P.Y.	Cluster
Baron, Ra	Cognitive mechanisms in entrepreneurship: why and when entrepreneurs think differently than other people	Journal of Business Venturing	1998	Red
Corbett, Ac; Neck, Hm; Detienne, Dr	How corporate entrepreneurs learn from fledgling innovation initiatives: cognition and the development of a termination script	Entrepreneurship theory and practice	2007	Green
Bryant, P	Self-regulation and decision heuristics in entrepreneurial opportunity evaluation and exploitation	Management decision	2007	Green
Krueger, Nf	What lies beneath? The experiential essence of entrepreneurial thinking	Entrepreneurship Theory and Practice	2007	Green
Lin, Wb	A comparative study on the trends of entrepreneurial behaviors of enterprises in different strategies: application of the social cognition theory	Expert Systems with Applications	2006	Green
Mitchell, Jr; Friga, Pn; Mitchell, Rk	Untangling the intuition mess: intuition as a construct in entrepreneurship research	Entrepreneurship Theory and Practice	2005	Green
Solymossy, E; Masters, Jk	Ethics through an entrepreneurial lens: theory and observation	Journal of Business Ethics	2002	Green
Mitchell, Rk; Smith, Jb; Seawright, Kw; Morse, Ea	Cross-cultural cognitions and the venture creation decision	Academy of Management Journal	2000	Green
Baron, Ra	Behavioral and cognitive factors in entrepreneurship: entrepreneurs as the active element in new venture creation	Strategic Entrepreneurship Journal	2007	Yellow
Corbett, Ac	Learning asymmetries and the discovery of entrepreneurial opportunities	Journal of Business Venturing	2007	Yellow
Baron, Ra; Ensley, Md	Opportunity recognition as the detection of meaningful patterns: evidence from comparisons of novice and experienced entrepreneurs	Management Science	2006	Yellow
Baron, Ra	Opportunity recognition as pattern recognition: how entrepreneurs "connect the dots" to identify new business opportunities	Academy of Management Perspectives	2006	Yellow
Corbett, Ac	Experiential learning within the process of opportunity identification and exploitation	Entrepreneurship Theory and Practice	2005	Yellow
Gaglio, Cm; Katz, Ja	The psychological basis of opportunity identification: entrepreneurial alertness	Small Business Economics	2001	Yellow
Mitchell, Rk; Busenitz, L; Lant, T; Mcdougall, Pp; Morse, Ea; Smith, Jb	The distinctive and inclusive domain of entrepreneurial cognition research	Entrepreneurship-Theory and Practice	2004	Purple

Table 5 continued

Author(s)	Title	Journal	P.Y.	Cluster
Baron, Ra; Ward, Tb	Expanding entrepreneurial cognition's toolbox: potential contributions from the field of cognitive science	Entrepreneurship-Theory and Practice	2004	Purple
Ward, Tb	Cognition, creativity, and entrepreneurship	Journal of Business Venturing	2004	Purple

Table 6 Paper included in the period 2008-2016

Author(s)	Title	Journal	P.Y.	Cluster
Hsieh, Rm; Kelley, Dj	The role of cognition and information access in the recognition of innovative opportunities	Journal of Small Business Management	2016	Orange
Waldron, Tl; Fisher, G; Pfarrer, M	How social entrepreneurs facilitate the adoption of new industry practices	Journal of Management Studies	2016	Orange
Uygun, U; Kim, Sm	Evolution of entrepreneurial judgment with venture-specific experience	Strategic Entrepreneurship Journal	2016	Orange
Pryor, C; Webb, Jw; Ireland, Rd; Ketchen, Dj	Toward an integration of the behavioral and cognitive influences on the entrepreneurship process	Strategic Entrepreneurship Journal	2016	Orange
Kuechle, G; Bouloureshef, B; Carr, Sd	Prediction- and control-based strategies in entrepreneurship: the role of information	Strategic Entrepreneurship Journal	2016	Orange
Hsieh, C	Do the self-employed more likely emerge from sequential or parallel work experience in business-related functions?	Entrepreneurship Theory and Practice	2016	Orange
Liu, Yp; Almor, T	How culture influences the way entrepreneurs deal with uncertainty in inter-organizational relationships: the case of returnee versus local entrepreneurs in china	International Business Review	2016	Orange
Xu, Y	Entrepreneurial social capital, cognitive orientation and new venture innovation	Management Research Review	2016	Orange
Neill, S; Metcalf, L; York, Jl	Seeing what others miss: a study of women entrepreneurs in high-growth startups	Entrepreneurship Research Journal	2015	Orange
Metzger, Ml; King, Js	Extending constructivist perspectives on opportunity production through an incorporation of effectual logics	Entrepreneurship Research Journal	2015	Orange
Osiyevskyy, O; Dewald, J	Inducements, impediments, and immediacy: exploring the cognitive drivers of small business managers' intentions to adopt business model change	Journal of Small Business Management	2015	Orange
Alvarez, Amo; Merino, Mtg; Alvarez, Mvs	Information: the source of entrepreneurial activity	Social Science Information	2015	Orange

Table 6 continued

Author(s)	Title	Journal	P.Y.	Cluster
Munoz-Bullon, F; Sanchez-Bueno, Mj; Vos-Saz, A	Nascent entrepreneurs' personality attributes and the international dimension of new ventures	International Entrepreneurship and Management Journal	2015	Orange
Kiss, An; Barr, Ps	New venture strategic adaptation: the interplay of belief structures and industry context	Strategic Management Journal	2015	Orange
Williams, Dw; Wood, Ms	Rule-based reasoning for understanding opportunity evaluation	Academy of Management Perspectives	2015	Orange
Dew, N; Grichnik, D; Mayer-Haug, K; Read, S; Brinckmann, J	Situated entrepreneurial cognition	International Journal of Management Reviews	2015	Orange
Williams, Dw; Gregoire, Da	Seeking commonalities or avoiding differences? Re-conceptualizing distance and its effects on internationalization decisions	Journal of International Business Studies	2015	Orange
Castagnoli, A	Across borders and beyond boundaries: how the Olivetti company became a multinational	Business History	2014	Orange
Bingham, Cb; Kahl, S	Anticipatory learning	Strategic Entrepreneurship Journal	2014	Orange
Wood, Ms; Williams, Dw	Opportunity evaluation as rule-based decision making	Journal of Management Studies	2014	Orange
Gielnik, Mm; Kramer, Ac; Kappel, B; Frese, M	Antecedents of business opportunity identification and innovation: investigating the interplay of information processing and information acquisition	Applied Psychology- An International Review	2014	Orange
Middleton, Kw; Donnellon, A	Personalizing entrepreneurial learning: a pedagogy for facilitating the know why	Entrepreneurship Research Journal	2014	Orange
Wood, Ms; Mckelvie, A; Haynie, Jm	Making it personal: opportunity individuation and the shaping of opportunity beliefs	Journal of Business Venturing	2014	Orange
Strong, M	Some implications of Hayek's cognitive theory	Critical Review	2013	Orange
Kiss, An; Williams, Dw; Houghton, Sm	Risk bias and the link between motivation and new venture post-entry international growth	International Business Review	2013	Orange
Iederan, Oc; Curseu, Pl; Vermeulen, Pam; Geurts, Jla	Antecedents of strategic orientations in Romanian SMEs: an institutional framing perspective	Journal for East European Management Studies	2013	Orange

Table 6 continued

Author(s)	Title	Journal	P.Y.	Cluster
Santos-Alvarez, Mv; Garcia-Merino, Mt	Information interests and exporting: the spanish natural stone industry	Journal of Management and Organization	2012	Orange
Gemmell, Rm; Boland, Rj; Kolb, Da	The socio-cognitive dynamics of entrepreneurial ideation	Entrepreneurship Theory and Practice	2012	Orange
Kemmerer, B; Walter, J; Kellermanns, Fw; Narayanan, Vk	A judgment-analysis perspective on entrepreneurs' resource evaluations	Journal of Business Research	2012	Orange
Schweizer, R	The internationalization process of SMEs: a muddling-through process	Journal of Business Research	2012	Orange
Barreto, I	Solving the entrepreneurial puzzle: the role of entrepreneurial interpretation in opportunity formation and related processes	Journal of Management Studies	2012	Orange
Renko, M; Shrader, Rc; Simon, M	Perception of entrepreneurial opportunity: a general framework	Management Decision	2012	Orange
Wirtz, P	The cognitive dimension of corporate governance in fast growing entrepreneurial firms	European Management Journal	2011	Orange
Iederan, Oc; Curseu, Pl; Vermeulen, Pam; Geurts, Jla	Cognitive representations of institutional change similarities and dissimilarities in the cognitive schema of entrepreneurs	Journal of Organizational Change Management	2011	Orange
Autio, E; George, G; Alexy, O	International entrepreneurship and capability development-qualitative evidence and future research directions	Entrepreneurship Theory and Practice	2011	Orange
Fischer, E; Reuber, Ar	Social interaction via new social media: (how) can interactions on twitter affect effectual thinking and behavior?	Journal of Business Venturing	2011	Orange
Santos-Alvarez, V; Garcia-Merino, T	The role of the entrepreneur in identifying international expansion as a strategic opportunity	International Journal of Information Management	2010	Orange
Obloj, T; Obloj, K; Pratt, Mg	Dominant logic and entrepreneurial firms' performance in a transition economy	Entrepreneurship Theory and Practice	2010	Orange
Vaghely, Ip; Julien, Pa	Are opportunities recognized or constructed? An information perspective on entrepreneurial opportunity identification	Journal of Business Venturing	2010	Orange
Bingham, Cb	Oscillating improvisation: how entrepreneurial firms create success in foreign market entries over time	Strategic Entrepreneurship Journal	2009	Orange
Felin, T; Zenger, Tr	Entrepreneurs as theorists: on the origins of collective beliefs and novel strategies	Strategic Entrepreneurship Journal	2009	Orange

Table 6 continued

Author(s)	Title	Journal	P.Y.	Cluster
Drori, I; Honig, B; Sheaffer, Z	The life cycle of an internet firm: scripts, legitimacy, and identity	Entrepreneurship Theory and Practice	2009	Orange
Schenkel, Mt; Matthews, Ch; Ford, Mw	Making rational use of 'irrationality'? Exploring the role of need for cognitive closure in nascent entrepreneurial activity	Entrepreneurship and Regional Development	2009	Orange
Mattingly, Es; Kushev, Tn; Ahuja, Mk; Ma, Dl	Switch or persevere? The effects of experience and metacognition on persistence decisions	International Entrepreneurship and Management Journal	2016	Green
Aragon-Mendoza, J; del Val, MP; Roig-Dobón, S	The influence of institutions development in venture creation decision: a cognitive view	Journal of Business Research	2016	Green
Arend, Rj; Cao, X; Grego-Nagel, A; Im, J; Yang, Xm; Canavati, S	Looking upstream and downstream in entrepreneurial cognition: replicating and extending the Busenitz and Barney (1997) study	Journal of Small Business Management	2016	Green
Marshall, Dr	From employment to entrepreneurship and back: a legitimate boundaryless view or a bias-embedded mindset?	International Small Business Journal	2016	Green
Costa, Sf; Ehrenhard, Ml; Caetano, A; Santos, Sc	The role of different opportunities in the activation and use of the business opportunity prototype	Creativity and Innovation Management	2016	Green
Malmstrom, M; Johansson, J; Wincent, J	Cognitive constructions of low-profit and high-profit business models: a repertory grid study of serial entrepreneurs	Entrepreneurship Theory and Practice	2015	Green
Gregoire, Da; Cornelissen, J; Dimov, D; Van Burg, E	The mind in the middle: taking stock of affect and cognition research in entrepreneurship	International Journal of Management Reviews	2015	Green
Baldacchino, L; Ucbasaran, D; Cabantous, L; Lockett, A	Entrepreneurship research on intuition: a critical analysis and research agenda	International Journal of Management Reviews	2015	Green
Chen, Mh; Chang, Yy; Lo, Yh	Creativity cognitive style, conflict, and career success for creative entrepreneurs	Journal of Business Research	2015	Green
Robinson, At; Marino, Ld	Overconfidence and risk perceptions: do they really matter for venture creation decisions?	International Entrepreneurship and Management Journal	2015	Green
Berglund, H	Between cognition and discourse: phenomenology and the study of entrepreneurship	International Journal of Entrepreneurial Behaviour and Research	2015	Green
Yang, L	Empirical study on the relationship between entrepreneurial cognitions and strategic change momentum the moderating effect of organizational knowledge structures	Management Decision	2015	Green

Table 6 continued

Author(s)	Title	Journal	P.Y.	Cluster
Dutta, Dk; Thornhill, S	Venture cognitive logics, entrepreneurial cognitive style, and growth intentions: a conceptual model and an exploratory field study	Entrepreneurship Research Journal	2014	Green
Grichnik, D; Brinckmann, J; Singh, L; Manigart, S	Beyond environmental scarcity: human and social capital as driving forces of bootstrapping activities	Journal of Business Venturing	2014	Green
Lejarraga, J; Martinez-Ros, E	Size, RandD productivity and decision styles	Small Business Economics	2014	Green
Garcia, Jcs; Boada-Grau, J; Prizmic-Kuzmica, Aj; Hernandez-Sanchez, B	Psychometric properties and the factor structure of the Spanish version of the cognitive adaptability scale (mac)	Universitas Psychologica	2014	Green
Garcia, Jcs	Cognitive scripts and entrepreneurial success	Universitas Psychologica	2014	Green
De Holan, Pm	It's all in your head: why we need neuroentrepreneurship	Journal of Management Inquiry	2014	Green
Murmann, Jp; Sardana, D	Successful entrepreneurs minimize risk	Australian Journal Of Management	2013	Green
Seawright, Kw; Smith, Ih; Mitchell, Rk; Mcclendon, R	Exploring entrepreneurial cognition in franchisees: a knowledge-structure approach	Entrepreneurship Theory and Practice	2013	Green
Wright, M; Stigliani, I	Entrepreneurship and growth	International Small Business Journal	2013	Green
Zheng, Yf	Unlocking founding team prior shared experience: a transactive memory system perspective	Journal of Business Venturing	2012	Green
Westhead, P; Wright, M	David Storey's optimism and chance perspective: a case of the emperor's new clothes?	International Small Business Journal	2011	Green
Sanchez, Jc; Carballo, T; Gutierrez, A	The entrepreneur from a cognitive approach	Psicothema	2011	Green
Groves, K; Vance, C; Choi, D	Examining entrepreneurial cognition: an occupational analysis of balanced linear and nonlinear thinking and entrepreneurship success	Journal of Small Business Management	2011	Green
Fassin, Y; Van Rossem, A; Buelens, M	Small-business owner-managers' perceptions of business ethics and CSR-related concepts	Journal of Business Ethics	2011	Green
Haynie, Jm; Shepherd, D; Mosakowski, E; Earley, Pc	A situated metacognitive model of the entrepreneurial mindset	Journal of Business Venturing	2010	Green
Brigham, Kh; Mitchell, Rk; De Castro, Jo	Cognitive misfit and firm growth in technology-oriented SMEs	International Journal of Technology Management	2010	Green

Table 6 continued

Author(s)	Title	Journal	P.Y.	Cluster
Westhead, P; Ucbasaran, D; Wright, M	Information search and opportunity identification the importance of prior business ownership experience	International Small Business Journal	2009	Green
Mcvea, Jf	A field study of entrepreneurial decision-making and moral imagination	Journal of Business Venturing	2009	Green
Atherton, A	Rational actors, knowledgeable agents extending pecking order considerations of new venture financing to incorporate founder experience, knowledge and networks	International Small Business Journal	2009	Green
Smith, Jb; Mitchell, Jr; Mitchell, Rk	Entrepreneurial scripts and the new transaction commitment mindset: extending the expert information processing theory approach to entrepreneurial cognition research	Entrepreneurship Theory and Practice	2009	Green
Dew, N; Read, S; Sarasvathy, Sd; Wiltbank, R	Effectual versus predictive logics in entrepreneurial decision-making: differences between experts and novices	Journal of Business Venturing	2009	Green
Hodgkinson, Gp; Sadler-Smith, E; Burke, La; Claxton, G; Sparrow, Pr	Intuition in organizations: implications for strategic management	Long Range Planning	2009	Green
Haynie, M; Shepherd, Da	A measure of adaptive cognition for entrepreneurship research	Entrepreneurship Theory and Practice	2009	Green
Ucbasaran, D; Westhead, P; Wright, M	The extent and nature of opportunity identification by experienced entrepreneurs	Journal of Business Venturing	2009	Green
Mitchell, Rk; Mitchell, Jr; Smith, Jb	Inside opportunity formation: enterprise failure, cognition, and the creation of opportunities	Strategic Entrepreneurship Journal	2008	Green
Karri, R; Goel, S	Effectuation and over-trust: response to Sarasvathy and Dew	Entrepreneurship Theory and Practice	2008	Green
Lindh, I; Thorgren, S	Critical event recognition: an extended view of reflective learning	Management Learning	2016	Blue
Aragon-Mendoza, J; Raposo, M; Roig-Dobon, S	Gender matters in venture creation decision	Journal of Business Research	2016	Blue
Cacciotti, G; Hayton, Jc; Mitchell, Jr; Giazitzoglu, A	A reconceptualization of fear of failure in entrepreneurship	Journal of Business Venturing	2016	Blue
Omoredede, A; Thorgren, S; Wincent, J	Entrepreneurship psychology: a review	International Entrepreneurship and Management Journal	2015	Blue

Table 6 continued

Author(s)	Title	Journal	P.Y.	Cluster
Muzychenko, O; Liesch, Pw	International opportunity identification in the internationalisation of the firm	Journal of World Business	2015	Blue
Garrett, Rp; Holland, Dv	Environmental effects on the cognitions of corporate and independent entrepreneurs	Small Business Economics	2015	Blue
Yousafzai, Sy; Saeed, S; Muffatto, M	Institutional theory and contextual embeddedness of women's entrepreneurial leadership: evidence from 92 countries	Journal of Small Business Management	2015	Blue
Kasouf, Cj; Morrish, Sc; Miles, Mp	The moderating role of explanatory style between experience and entrepreneurial self-efficacy	International Entrepreneurship and Management Journal	2015	Blue
Turkina, E; Thai, Mtt	Socio-psychological determinants of opportunity entrepreneurship	International Entrepreneurship and Management Journal	2015	Blue
Boukamcha, F	Impact of training on entrepreneurial intention: an interactive cognitive perspective	European Business Review	2015	Blue
Zhang, Y; Duysters, G; Cloddt, M	The role of entrepreneurship education as a predictor of university students' entrepreneurial intention	International Entrepreneurship and Management Journal	2014	Blue
Winkler, C	Toward a dynamic understanding of entrepreneurship education research across the campus—social cognition and action research	Entrepreneurship Research Journal	2014	Blue
Hayton, Jc; Cacciotti, G	Is there an entrepreneurial culture? A review of empirical research	Entrepreneurship and Regional Development	2013	Blue
Li, Yq; Wang, Xh; Wang, Ll; Bai, X	How does entrepreneurs' social capital hinder new business development? A relational embeddedness perspective	Journal of Business Research	2013	Blue
Ye, YH	The effect of temporal distance on Chinese undergraduates' entrepreneurial decision making	Social Behavior and Personality: An International Journal	2013	Blue
Gudmundsson, Sv; Lechner, C	Cognitive biases, organization, and entrepreneurial firm survival	European Management Journal	2013	Blue
Cardon, Ms; Gregoire, Da; Stevens, Ce; Patel, Pc	Measuring entrepreneurial passion: conceptual foundations and scale validation	Journal of Business Venturing	2013	Blue
Tumasjan, A; Braun, R	In the eye of the beholder: how regulatory focus and self-efficacy interact in influencing opportunity recognition	Journal of Business Venturing	2012	Blue
Caliendo, M; Fossen, F; Kritikos, A	Trust, positive reciprocity, and negative reciprocity: do these traits impact entrepreneurial dynamics?	Journal of Economic Psychology	2012	Blue

Table 6 continued

Author(s)	Title	Journal	P.Y.	Cluster
Hayton, Jc; Cholakova, M	The role of affect in the creation and intentional pursuit of entrepreneurial ideas	Entrepreneurship Theory and Practice	2012	Blue
Linan, F; Santos, Fj; Fernandez, J	The influence of perceptions on potential entrepreneurs	International Entrepreneurship and Management Journal	2011	Blue
Baum, Jr; Bird, Bj; Singh, S	The practical intelligence of entrepreneurs: antecedents and a link with new venture growth	Personnel Psychology	2011	Blue
Sommer, L; Haug, M	Intention as a cognitive antecedent to international entrepreneurship- understanding the moderating roles of knowledge and experience	International Entrepreneurship and Management Journal	2011	Blue
Linan, F; Urbano, D; Guerrero, M	Regional variations in entrepreneurial cognitions: start-up intentions of university students in Spain	Entrepreneurship and Regional Development	2011	Blue
Baum, Jr; Bird, Bj	The successful intelligence of high-growth entrepreneurs: links to new venture growth	Organization Science	2010	Blue
Urban, B	Cognitions and motivations for new venture creation decisions: linking expert scripts to self-efficacy, a south african study	International Journal of Human Resource Management	2010	Blue
Mitchell, Jr; Shepherd, Da	To thine own self be true: images of self, images of opportunity, and entrepreneurial action	Journal of Business Venturing	2010	Blue
Bryant, P	Self-regulation and moral awareness among entrepreneurs	Journal of Business Venturing	2009	Blue
Cardon, Ms; Wincent, J; Singh, J; Drnovsek, M	The nature and experience of entrepreneurial passion	Academy of Management Review	2009	Blue
De Carolis, Dm; Litzky, Be; Eddleston, Ka	Why networks enhance the progress of new venture creation: the influence of social capital and cognition	Entrepreneurship Theory and Practice	2009	Blue
Iederan, Oc; Curseu, Pl; Vermeulen, P	Effective decision-making: the role of cognitive complexity in strategic decisions	Studia Psychologica	2009	Blue
Radu, M; Redien-Collot, R	The social representation of entrepreneurs in the French press—desirable and feasible models?	International Small Business Journal	2008	Blue
Prandelli, E; Pasquini, M; Verona, G	In user's shoes: an experimental design on the role of perspective taking in discovering entrepreneurial opportunities	Journal of Business Venturing	2016	Pink
Nambisan, S; Baron, Ra	Entrepreneurship in innovation ecosystems: entrepreneurs' self-regulatory processes and their implications for new venture success	Entrepreneurship Theory and Practice	2013	Pink

Table 6 continued

Author(s)	Title	Journal	P.Y.	Cluster
Hmieleski, Km; Corbett, Ac; Baron, Ra	Entrepreneurs' improvisational behavior and firm performance: a study of dispositional and environmental moderators	Strategic Entrepreneurship Journal	2013	Pink
Baron, Ra; Hmieleski, Km; Henry, Ra	Entrepreneurs' dispositional positive affect: the potential benefits—and potential costs—of being “up”	Journal of Business Venturing	2012	Pink
Tang, Jt; Kacmar, Km; Busenitz, L	Entrepreneurial alertness in the pursuit of new opportunities	Journal of Business Venturing	2012	Pink
Baron, Ra; Tang, Jt; Hmieleski, Km	The downside of being ‘up’: entrepreneurs' dispositional positive affect and firm performance	Strategic Entrepreneurship Journal	2011	Pink
Baron, Ra; Tang, Jt	The role of entrepreneurs in firm-level innovation: joint effects of positive affect, creativity, and environmental dynamism	Journal of Business Venturing	2011	Pink
Baron, Ra; Henry, Ra	How entrepreneurs acquire the capacity to excel: insights from research on expert performance	Strategic Entrepreneurship Journal	2010	Pink
Hmieleski, Km; Baron, Ra	Regulatory focus and new venture performance: a study of entrepreneurial opportunity exploitation under conditions of risk versus uncertainty	Strategic Entrepreneurship Journal	2008	Pink
Baron, Ra	The role of affect in the entrepreneurial process	Academy of Management Review	2008	Pink

Table 7 Not peer-reviewed publications included in the dataset

Author(s)	Title	Type	Journal/book	P.Y.	Period
Brännback, M; Carsrud, Al	Understanding entrepreneurial cognitions through the lenses of context	Book chapter	A Research Agenda for Entrepreneurship and Context	2016	Growth
Randolph-Seng, B; Mitchell, Rk; Vahidnia, HK Mitchell, Jr; Chen, S; Statzer, J	The microfoundations of entrepreneurial cognition research: toward an integrative approach	Book chapter	Foundations and Trends® in Entrepreneurship	2015	Growth
Baum, Jr; Frese, M; Baron, Ra	The psychology of entrepreneurship	Book	–	2014	Growth
Mitchell, Jr; Mitchell, Rk; Randolph-Seng, B	Handbook of entrepreneurial cognition	Book	–	2014	Growth
Clarke, J; Cornelissen, J	Language, Communication, and Socially Situated Cognition in Entrepreneurship	Editorial	Academy of Management Review	2011	Growth

Table 7 continued

Author(s)	Title	Type	Journal/book	P.Y.	Period
Mitchell, RK; Randolph-Seng, B; Mitchell, JB	Socially Situated Cognition: Imagining New Opportunities for Entrepreneurship Research	Editorial	Academy of Management Review	2011	Growth
Krueger, Nf; Day, M	Looking forward, looking backward: From entrepreneurial cognition to neuroentrepreneurship	Book chapter	Handbook of entrepreneurship Research	2010	Growth
Vermeulen, Pam; Curseu, Pl	Entrepreneurial strategic decision-making: a cognitive perspective	Book	–	2010	Growth
Wadson, N	Cognitive Aspects of Entrepreneurship: Decision-Making and Attitudes to Risk	Book chapter	The Oxford Handbook of Entrepreneurship	2009	Growth
Mitchell, Rk; Busenitz, L; Bird, B; Gaglio, Cm; McMullen, Js; Morse, Ea; Smith, Jb	The Central Question in Entrepreneurial Cognition Research 2007	Editorial	Entrepreneurship- Theory and Practice	2007	Youth
Mitchell, Rk; Busenitz, L; Lant, T; Mcdougall, Pp; Morse, Ea; Smith, Jb	The Distinctive and Inclusive Domain of Entrepreneurial Cognition Research	Editorial	Entrepreneurship- Theory and Practice	2004	Youth
Katz, J; Corbett, AC	Cognitive Approaches to Entrepreneurship Research (Advances in Entrepreneurship, Firm Emergence and Growth, Volume 6)	Book	–	2003	Youth
Krueger, Nf	The cognitive psychology of entrepreneurship	Book chapter	In Handbook of Entrepreneurship Research	2003	Youth
Witt, U	Cognition, entrepreneurial conceptions and the theory of the firm	Book chapter	Cognitive Developments in Economics	2003	Youth
Mitchell, Rk; Busenitz, L; Lant, T; Mcdougall, Pp; Morse, Ea; Smith, Jb	Toward a theory of entrepreneurial cognition: Rethinking the people side of entrepreneurship research	Editorial	Entrepreneurship Theory and Practice	2002	Youth

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