

Entrepreneurial Learning: Past Research and Future Challenges

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Entrepreneurial learning (EL) has emerged as an important concept at the interface of entrepreneurship and organizational learning. Although EL research has gained momentum in the past decade, the literature is diverse, highly individualistic and fragmented, hindering the development of EL as a promising research area. In this paper, a systematic analysis of the EL literature is first conducted in order to take stock of the theoretical and empirical development and identify research themes and developmental patterns of EL research. Second, three pairs of key learning types that deserve more attention in future research are discussed, namely individual and collective learning, exploratory and exploitative learning, and intuitive and sensing learning. These learning types correspond to three key challenges that are derived from the EL research gaps identified in the systematic literature analysis, and provide fruitful avenues for future research. Third, by exploring the three pairs of learning types, further insights are drawn from entrepreneurship and organizational learning to help to advance EL research, and also feed back to the entrepreneurship literature by discussing how these learning types can help to understand the challenges at the centre of debate in the entrepreneurship literature.

Introduction

Entrepreneurial learning (EL) has emerged as a promising area of research at the interface between learning and the entrepreneurial context (Harrison and Leitch 2005). Central to EL research are issues pertinent not only to *what* entrepreneurs should or do learn during the process of exploring and exploiting

an entrepreneurial opportunity in the creation of new ventures or management of existing firms, but more importantly, the specific processes of learning that take place (Cope 2005). Simply put, *how* learning takes place and *when* learning takes place are fundamental to the understanding of the entrepreneurial process. As Minniti and Bygrave (2001, p. 7) assert, ‘entrepreneurship is a process of learning, and a theory of entrepreneurship requires a theory of learning’.

Entrepreneurial learning research has flourished in the past decade, and demonstrates several characteristics. First, while EL is broadly positioned at the interface of entrepreneurship and organizational learning, existing studies have drawn from a wide range of theoretical insights, including experiential learning (e.g. Clarysse and Moray 2004; Cope 2003; Minniti and Bygrave 2001), organizational learning (e.g. Covin *et al.* 2006; Lant and Mezias 1990; Wang 2008), social cognitive theory (i.e. Erikson 2003),

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population ecology (i.e. Dencker *et al.* 2009) and configuration theory (i.e. Hughes *et al.* 2007), employing different methods to study different entrepreneurial contexts. While this may signal the vivacity of the field, it is important to take inventory of the work to date through a systematic literature review (SLR) and identify key research themes and developmental patterns to provide an overview of EL literature for further research to build on.

Second, accompanying the characteristic of diversity of EL research is its highly individualistic and fragmented nature, resulting in incongruence in many aspects of EL, such as its definitions. For example, although EL is often referred to as learning in the entrepreneurial process (Holcomb *et al.* 2009; Politis 2005; Ravasi and Turati 2005), its definitions span from ‘venture learning’ (Berglund *et al.* 2007, p. 178), ‘learning to recognise and act on opportunities, and interacting socially to initiate, organise and manage ventures’ (Rae 2005, p. 324), to ‘the variety of experiential and cognitive processes used to acquire, retain and use entrepreneurial knowledge’ (Young and Sexton 2003, p. 156). While we recognize that the diversity, individuality and inconsistency reflects individual researchers’ epistemological, ontological and methodological background, it is important to take stock of the EL literature and identify the key research gaps and challenges for future research.

Third, the rise of EL research has revitalized entrepreneurship research by focusing on the learning and developmental process of entrepreneurship (Deakins 1996), and who an entrepreneur may become through learning (Cope 2005; Rae 2000). As Cope (2005, p. 379) commented, ‘it is through learning that entrepreneurs develop and grow’. This responds to the failure of past entrepreneurial research on traits, which was unsuccessfully preoccupied with ‘who an entrepreneur is’ and precluded an entrepreneur’s ability to learn, develop and change (Gartner 1988). However, more research is needed to understand the role of learning in entrepreneurship (Blackburn and Kovalainen 2009), how EL can help to understand the key challenges in the entrepreneurship literature, and to cross-fertilize the entrepreneurship and organizational learning literatures.

This study aims to help to fill the three research gaps by focusing on three key objectives. First, we conduct a systematic analysis of the EL literature in business and management studies to take stock of the theoretical and empirical development and identify EL research themes and developmental patterns. In

particular, the SLR is based on pre-defined themes often used in traditional and SLRs to elicit developmental patterns in terms of publication distribution, theoretical perspectives, EL definitions, types of learning, entrepreneurial contexts, and methods and unit of analysis. We aim to provide an overview of the EL research and a foundation for future researchers to build on. As Low and MacMillan (1988) argue, a periodical review of a particular field is necessary for deriving maximum benefit from future research. Second, we discuss three pairs of learning types that deserve more attention in future research, namely individual and collective learning, exploratory and exploitative learning, and intuitive and sensing learning. These learning types correspond to the key EL research gaps identified in the SLR as well as the key challenges at the centre of debate in the entrepreneurship literature, providing fruitful avenues for future research. We follow the paths of Gibb Dyer (1994) and Cope (2005) and aim to identify key challenges that help to direct future EL research towards more fruitful research avenues. Third, through exploring the three pairs of learning types and the key challenges that correspond to the learning types, we draw further insights from entrepreneurship and organizational learning to advance EL research. We also feed back to the entrepreneurship literature by discussing how these learning types help to understand the key challenges in entrepreneurship. Therefore, this paper helps to further cross-fertilize the entrepreneurship and organizational learning literatures as well as advancing EL research. In sum, our main aim is to take stock of EL research to provide a foundation for future EL research to proliferate and prosper, while recognizing its current diversity and individuality.

Methods

We conducted a SLR of EL following the suggestions of Tranfield *et al.* (2003), Denyer and Tranfield (2008) and Macpherson and Jones (2010). SLRs have advantages over traditional, ad hoc literature reviews as they enhance: (1) the validity of a review by providing a clear set of steps that can be followed if the study were to be replicated (Denyer and Neely 2004; Thorpe *et al.* 2006); (2) the rigour of a review by providing systematically generated evidence supporting the arguments closely related to the research questions (Pittaway *et al.* 2004; Thorpe *et al.* 2006); and (3) the generalizability of the results by allowing the accumulated knowledge in the field to be

systematically synthesized and analysed. Despite these benefits, SLRs do also have some limitations. For example, the conceptual boundaries set to guide the SLR may be construed as rigid, as they do not allow room for any exceptions to be made to the inclusion or exclusion of articles. It could also be that the strict search terms set to identify relevant articles may well exclude an article that has a poorly written abstract, where keywords are missed out (Pittaway *et al.* 2004). Taking the above into account, we follow Lee (2009) and Rashman *et al.* (2009) and consider SLR as a ‘guiding tool’, which allows us to shape the review according to our research focus and objectives (see Figure 1), rather than an orthodox

methodology with a concrete set of rigid rules. Figure 1 shows a summary of the SLR process.

Conceptual boundaries

The SLR process started with the research objectives and setting conceptual boundaries (Denyer and Tranfield 2008) (see Figure 1). We started with a broad definition of EL as ‘learning in the entrepreneurial process’ (Holcomb *et al.* 2009; Politis 2005; Ravasi and Turati 2005). We defined the entrepreneurial process as ‘the process by which individuals – either on their own or inside organizations – pursue opportunities without regard to the resources they

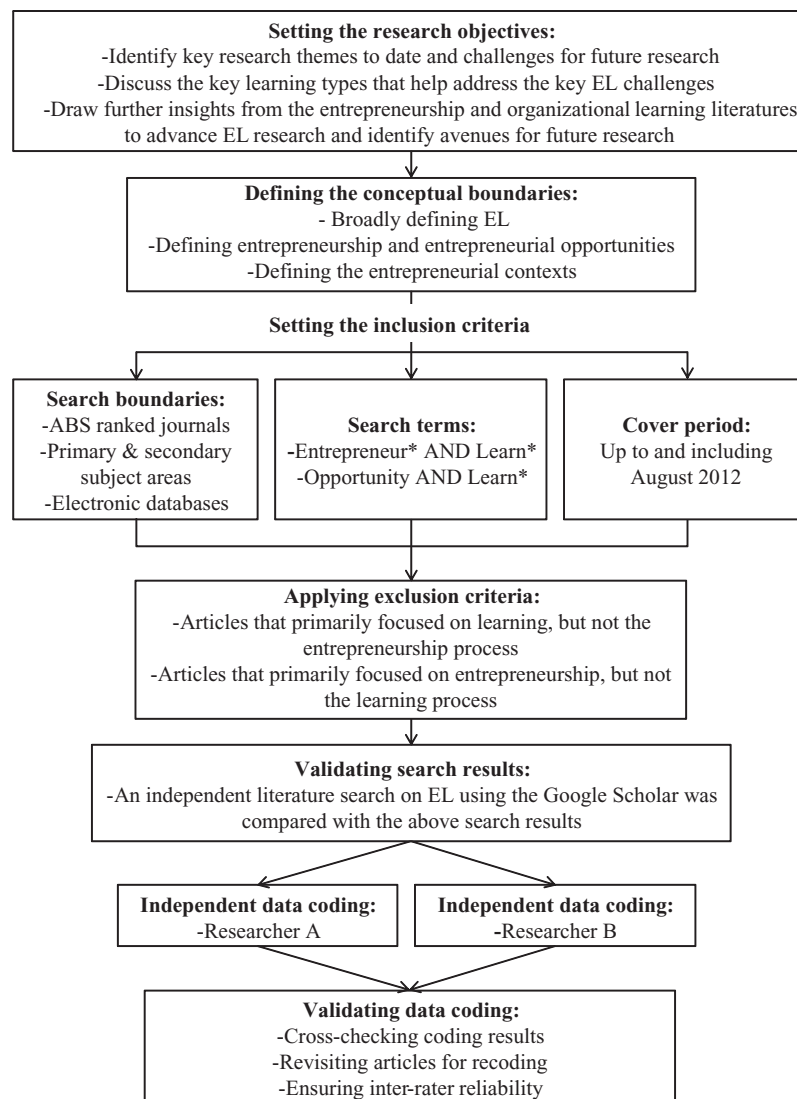


Figure 1. A summary of the SLR process

currently control' (Stevenson and Jarillo 1990, p. 23). 'Entrepreneurial opportunities' is one of the key concepts that define the scope and boundaries of entrepreneurship (Buenstorf 2007; Busenitz *et al.* 2003). Research has widely cited Eckhardt and Shane's (2003, p. 336) definition developed from Casson (1982) and Shane and Venkataraman (2000): 'entrepreneurial opportunities as situations in which new goods, services, raw materials, markets and organizing methods can be introduced through the formation of new means, ends, or means-ends relationships'. Similarly, Dutta and Crossan (2005, p. 426) define entrepreneurial opportunities as 'being a set of environmental conditions that lead to the introduction of one or more new products or services in the marketplace by an entrepreneur or by an entrepreneurial team through either an existing venture or a newly created one'.

Opportunity exploration (also discovery, recognition or development) and opportunity exploitation are widely recognized as the two generic, heterogeneous processes of entrepreneurship (Shane and Venkataraman 2000; Stevenson and Jarillo 1990). Specifically, opportunity exploration entails the search for information leading to the creation of new knowledge (Alvarez and Busenitz 2001), while opportunity exploitation requires a firm to commit resources in order to build efficient business systems for full-scale operations for producing, and gaining returns from, the new product arising from the opportunity (Choi and Shepherd 2004). It is individual or organizational attitude towards an entrepreneurial opportunity and their behavioural orientation in terms of exploring and exploiting an entrepreneurial opportunity that set an entrepreneur apart from a non-entrepreneur (such as a manager or a technician) and an entrepreneurial firm from a non-entrepreneurial firm (if we view 'entrepreneurial' as a spectrum ranging from entrepreneurial to non-entrepreneurial, rather than a bipolar construct). In particular, although a new venture creation stage generally involves the pursuit of an entrepreneurial opportunity, not all small firms once in full operation are entrepreneurial. For example, Chaston (2009) refers to two types of non-entrepreneurial small firms proposed by Storey and Sykes (1996): lifestyle firms that serve to provide their owner-managers with an income sufficient to finance their desired lifestyle (e.g. artists creating a craft business), and operationally constrained firms whose opportunities are limited by supply over demand, intense competition and low-skilled operations (e.g. small independent

convenient stores and takeaways). For conceptual clarification, only entrepreneurial firms (being small, medium or large; new or established) involved in the exploration and exploitation of an entrepreneurial opportunity are within the remit of this study.

The literature has focused primarily on the following entrepreneurial contexts in which an entrepreneurial opportunity is explored and exploited: (a) opportunity exploration and exploitation in start-up entrepreneurship or new venture creation (SE). As new venture creation is central to entrepreneurship (Ireland *et al.* 2005), research has studied how an entrepreneurial opportunity is explored and exploited in the process of new venture creation; (b) opportunity exploration and exploitation in established firms (EE), including small and medium-sized businesses and large corporations. Since entrepreneurship is not necessarily constrained in the new venture creation stage, but may span the life cycle of the firm (Reuber and Fischer 1999), research has studied how an entrepreneurial opportunity is explored and exploited in established firms; and (c) opportunity exploration and exploitation in general entrepreneurship (GE), that is, without specifying whether this takes place in start-up or established firms. These three entrepreneurial contexts are defined as mutually exclusive to enable us to categorize EL articles in the 'Data collection and analysis' sub-section next.

Data collection and analysis

To build a comprehensive database of EL articles (Appendix 1), we applied the following inclusion criteria (see Appendix 2 for the detailed rationale). First, we set the search boundary within academic journal articles listed in the *Association of Business Schools (ABS) Academic Journal Quality Guide*, Version 4, by Subject Area (Kelly *et al.* 2010). Second, we focused on articles published in ABS ranked journals listed in the following categories of the business and management discipline: 'Entrepreneurship and Small Business Management' as the primary source of the literature search; and 'General Management', 'Strategic Management', 'Organization Studies', 'Innovation' and 'Management Development and Education' as the secondary literature sources, since these categories include journals that occasionally publish entrepreneurship research. To increase coverage of the journals that were searched and to ensure that all relevant articles were included

in the study, we also selected journals from additional Subject Areas listed in Appendix 2. Third, within these journals, we conducted searches using the electronic databases Business Source Complete, Science Direct, JSTOR and Wiley Online Library, covering the period up to and including August 2012. We searched the Title and Abstract fields using the primary Boolean search terms of ‘entrepreneur* AND learn*’, and the secondary search term of ‘opportunity AND learn*’ to identify all articles within the conceptual boundaries. These search terms are sufficiently inclusive to capture most relevant articles within the conceptual boundaries, and exclusive enough to eliminate less relevant articles. This process resulted in 158 articles. Among these articles, 83 articles contained the key search terms, but did not focus on or provide a meaningful discussion on learning in the entrepreneurial process, so were excluded from the analysis following the exclusion criteria listed in Appendix 2. The exclusion process resulted in a total of 75 academic journal articles (52 empirical and 23 conceptual articles) that were included in the final analysis. Fourth, to mitigate the potential risks of excluding key articles due to the rigidity of the SLR, we conducted an independent literature search in Google Scholar to triangulate the results of the main literature search. We searched for articles containing the exact phrase ‘entrepreneurial learning’ in Google Scholar up to and including August 2012; the search retrieved 3700 items. Comparing the top 75 items with the 75 papers included in the SLR, we found that 27 of the papers in the analysis were included in the top 75 Google search items: a 36% match. The remaining 48 items (from the top 75 items of the Google Scholar search) included working papers, non-peer-reviewed articles, articles in journals that did not fall within the search criteria, such as from economics and marketing, and articles that had fallen under the exclusion criteria (see Appendix 2), for instance, articles that focused on learning in the contexts of entrepreneurship education, teaching and training.

The following thematic codes commonly used in literature analyses were used to code the articles in Appendix 1: (1) Name(s) of the authors; (2) Year of publication; (3) Country of authors’ institution(s) at time of publication; (4) Journal title; (5) Theoretical perspective(s); (6) Definition of EL; (7) Entrepreneurial context (as previously defined); (8) Types of learning (or learning mechanisms or styles); (9) Methods; and (10) Unit of analysis. The articles were manually coded based on these pre-defined themes.

Manual coding was used because the articles required careful reading and identification of relevant areas related to the pre-defined themes. For example, the theoretical perspectives, EL definitions, entrepreneurial contexts and the unit of analysis were not explicitly stated in some articles (examples will be provided in the ‘Literature analysis’ section). Therefore, careful reading and expert judgement was required. To triangulate the coding, both authors independently read and coded based on these pre-defined themes and recorded data from each article. Any differences in the coding and recording were discussed between the authors, and the articles were re-visited until agreement was reached. This process ensured a high degree of inter-rater reliability. This approach to analysing the literature was to some extent similar to Pittaway *et al.* (2004), Rashman *et al.* (2009) and Lee (2009) in that our emphasis was to provide conceptual clarity, elucidate themes and patterns of past research and identify research gaps that deserve more attention.

Literature analysis: themes and trends

The analysis is based on a total of 75 articles (see Appendix 1). The analysis follows the thematic codes mentioned above, focusing on the key themes and trends in the literature. This leads to the identification of three key challenges of EL research, which in turn correspond to the key challenges within the entrepreneurship literature.

Publication distribution

This section reports three key findings from the analysis of the thematic codes 1–4 ((1) Name(s) of the authors; (2) Year of publication; (3) Country of authors’ institution(s) at time of publication; and (4) Journal title). First, there has been a sharp increase in scholarly interest in EL since 2000 (see Figure 2). The 2005 Special Issue of *Entrepreneurship Theory and Practice* (ET&P) is a key contributor to the growth, as seven of the articles in the analysis were from this issue. Second, the key publication outlets include the US-based ET&P (18 articles), and *Journal of Business Venturing* (JBV) (7 articles); and the UK-based *International Journal of Entrepreneurship Behaviour & Research* (IJEB&R) (7 articles), and *Journal of Small Business and Enterprise Development* (JSB&ED) (7 articles). The conceptual development by Minniti and Bygrave (2001) and the Special Issue on EL edited by Harrison and

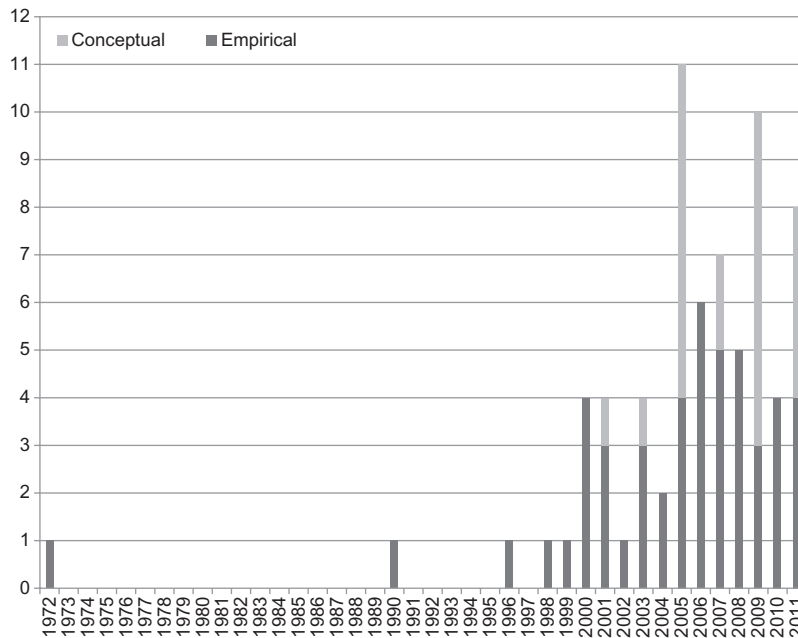


Figure 2. EL publication distribution (1972–2011)

Note: While the literature search included articles published up to and including August 2012, we have only included articles up to 2011 in this figure, so that we do not give an inaccurate representation of the articles published in 2012. NB Three empirical articles and one conceptual article were published between January and August 2012.

Leitch (2005) have been particularly influential in shaping EL research. Among 61 articles published after 2001, 23 reference Minniti and Bygrave (2001), while among 43 articles published after 2005, 14 reference Harrison and Leitch (2005). Third, it is evident that research collaboration (as indicated by co-authorship) has largely been within the same country or region, and very little collaboration exists between North American and European researchers, with few exceptions (e.g. Dencker *et al.* 2009; Gruber *et al.* 2008; Schildt *et al.* 2005). Although there is a small percentage of European-based authors published in *ET&P* (5 out of 18 articles) and *JBV* (4 out of 7 articles), the authors publishing in *JSB&ED* and *IJEB&R* are all European-based (with the only exception of Erikson 2003, who was affiliated with both Norway and the US). The overall analysis of publication distribution shows that EL research has gained momentum in the past decade, with the North American and European research in two camps in terms of publication outlets. We discuss this point further in the summary of this section.

Theoretical perspectives

Entrepreneurial learning research has drawn on a wide range of theoretical perspectives (see Appendix

1). Specifically, two theoretical perspectives play a dominant role. First, several articles build on experiential learning (i.e. Clarysse and Moray 2004; Cope 2003; Corbett 2005, 2007; Dimov 2007; Lamont 1972; Lévesque *et al.* 2009; Minniti and Bygrave 2001; Politis and Gabrielsson 2009). These studies have largely drawn on the work of Kolb (1976, 1984, 1985, 1999) and his colleagues (e.g. Kolb and Kolb 2001, 2005; Kolb *et al.* 1984, 1995). Second, several articles have drawn on theories of organizational learning, including exploratory and exploitative learning (March 1991), single- and double-loop learning (Argyris and Schön 1978), organizational learning (consisting of four constructs: knowledge acquisition, information distribution, information interpretation and organizational memory) (Huber 1991), absorptive capacity and external learning (Cohen and Levinthal 1990; Jones 2006; Zahra and George 2002), the fifth discipline of the learning organization (Senge 1990), higher-level or lower-level learning (Fiol and Lyles 1985), and organizational learning in terms of information processing and decision-making (Cyert and March 1963; Levitt and March 1988; March and Olsen 1975, 1976; March and Simon 1958) (see Appendix 1). Organizational learning theory has been applied to EL studies in a wide variety of ways, for example,

whether entrepreneurial firms use higher-order learning (Chaston *et al.* 2001), how the theory of organizational learning helps to conceptualize entrepreneurship (Lant and Mezias 1990), and how intentionality drives opportunity development from the organizational learning perspective (Dimov 2007). Several authors (e.g. Covin *et al.* 2006; Wang 2008; Zhao *et al.* 2011) study learning in corporate contexts and find that entrepreneurship research benefits from the application of organizational learning theory (Dutta and Crossan 2005). However, very little insight exists to advance the conceptualization of EL, especially how organizational learning processes in entrepreneurial firms differ from those in non-entrepreneurial firms. We discuss how EL can draw further insights from organizational learning theory in the next section.

Definitions of entrepreneurial learning

While 47 of the 75 articles used the term ‘entrepreneurial learning’ (see Appendix 1), the remaining 28 articles refer generally to learning in the entrepreneurial process and do not provide a definition of EL. Of the 47 articles that do use the term ‘entrepreneurial learning’, 11 articles define EL explicitly, 10 articles define EL implicitly, and the remaining 26 articles do not define EL either explicitly or implicitly. These definitions are incongruent and include ‘venture learning’ (Berglund *et al.* 2007), learning that ‘informs the entrepreneur’s quest for new opportunity’ (Franco and Haase 2009, p. 634), ‘how entrepreneurs accumulate and update knowledge’ (Minniti and Bygrave 2001, p. 8), ‘learning to work in entrepreneurial ways’ (Rae 2000, p. 151) and ‘learning experienced by entrepreneurs during the creation and development of a small enterprise, rather than a particular style or form of learning that could be described as “entrepreneurial”’ (Cope 2005, p. 374). The definitions reflect a wide range of focuses, such as learning by the venture team (Berglund *et al.* 2007), the learning processes involved in the development of a new venture (Ravasi and Turati 2005), learning experienced by entrepreneurs (Cope 2003; Cope and Watts 2000), what, how and why entrepreneurs learn (Parker 2006), recognizing and acting on opportunities (Rae 2006), and a process related to knowledge acquisition, assimilation and organization (Holcomb *et al.* 2009; Minniti and Bygrave 2001; Politis 2005). These definitions demonstrate the different frames of reference that researchers have applied to under-

standing EL. However, a closer examination of these definitions reveals that they are primarily related to what and how individual entrepreneurs learn, with the exception of very few papers studying team- or organizational-level learning or beyond. In other words, little is known about how collective learning takes place in entrepreneurial teams or firms. Overall, there is a general lack of consensus on what EL is, and EL at the organizational level is under-researched. We discuss individual and collective learning in the next section.

Types of learning

In this section, we analyse the learning mechanisms used in EL research. Experiential learning, in addition to being applied as a theoretical lens for EL, is widely referred to as a mechanism for learning in 32 out of 75 articles. Among the 32 articles, 14 draw from the work of Kolb (1984) (e.g. Cope 2005; Corbett 2005, 2007; Dimov 2007; Politis 2005) (see Appendix 1). Experiential learning in the remaining articles does not refer to Kolb and his colleagues’ work, but to ‘learning-by-doing’ (Balasubramanian 2011; Cope 2003), learning from past business experience (Lamont 1972), learning from positive and negative experiences (Minniti and Bygrave 2001), learning from past experience (Rerup 2005; Sardana and Scott-Kemmis 2010), and learning from participation and from the experience of others (i.e. vicarious learning) (Lévesque *et al.* 2009). In addition, several individual or organizational learning theories have been used to understand the entrepreneurial process: (1) March’s (1991) exploratory and exploitative learning (cited by 22 articles); (2) Argyris and Schön’s (1978) single-loop/adaptive and double-loop/generative learning (21 articles); (3) Huber’s (1991) organizational learning (22 articles); (4) Cohen and Levinthal’s (1990) absorptive capacity and external learning (16 articles) and Zahra and George’s (2002) reconceptualization of absorptive capacity (8 articles); (5) situated learning and communities of practice by Lave and Wenger (1991) and Wenger (1998) (8 articles and 5 articles respectively) and Brown and Duguid’s (1991) work in the same area (8 articles); (6) Senge’s (1990) the fifth discipline of the learning organization (16 articles); (7) Fiol and Lyles’s (1985) higher-level or lower-level learning (11 articles); and (8) organizational learning in terms of information processing and decision-making include the work by Cyert and March (1963) (10 articles), Levitt and March (1988) (9 articles),

March and Simon (1958) (3 articles), March and Olsen (1975) (2 articles), and March and Olsen (1976) (2 articles). There is a need to understand the respective roles and contributions of different types of learning in the advancement of EL research, which we discuss in the next section.

Entrepreneurial context

In this section, we report the analysis of EL research with particular reference to the ‘entrepreneurial context’, as defined in the ‘Methods’ section. First, 21 articles fall under the SE context (start-up entrepreneurship). Within this context, the research focus spans independent new start-ups (e.g. Honig 2001; Huovinen and Tihula 2008; Karataş-Özkan 2011; Nicholls-Nixon *et al.* 2000), university spin-offs (Clarysse and Moray 2004) and start-ups in incubators (Hughes *et al.* 2007). These articles focus primarily on individual learning in start-up entrepreneurship. Given the prominence of teams in the start-up process (Timmons and Spinelli 2006), there is a scarcity of research on learning in the process of forming a founding team (with very few exceptions, such as Karataş-Özkan 2011).

Second, 23 articles fall under the EE context (entrepreneurship in established firms) (Table 1). Among these articles, there is a relatively balanced focus on small, medium or large firms: for example, Cope (2003) study the effect of discontinuous events on learning outcomes in the context of small busi-

ness management and growth; Schildt *et al.* (2005) examine the antecedents of exploratory vs exploitative learning from external corporate ventures in large firms; and Lee and Williams (2007) focus on dispersed entrepreneurship in large multinational corporations. In particular, studies in the EE context have already started to explore how the learning process and the entrepreneurial process interact to have impact on firm performance (e.g. Covin *et al.* 2006; Hughes *et al.* 2007; Rhee *et al.* 2010; Wang 2008; Zhao *et al.* 2011). For example, it has been found that firms cannot sustain dual-dominant orientations of exploitative learning and entrepreneurial orientation (Hughes *et al.* 2007), a learning orientation must be in place in order to realize the effect of entrepreneurial orientation on firm performance (Wang 2008), and learning from strategic mistakes may be of particular value to conservative firms than to entrepreneurial firms (Covin *et al.* 2006).

Third, 30 out of 75 articles fall in the GE context (general entrepreneurship) without reference to start-up or established firms. These include: (a) four articles that focus primarily on the general process of opportunity exploration (discovery, recognition and development) (i.e. Corbett 2005, 2007; Dimov 2007; Lumpkin and Lichtenstein 2005; Politis 2005; Sanz-Velasco 2006); (b) four articles that deal with both exploration and exploitation despite more emphasis on exploration (i.e. Dutta and Crossan 2005; García-Cabrera and García-Soto 2009; Rerup 2005). For instance, Dutta and Crossan (2005) provide an

Table 1. Entrepreneurial context, methods and the unit of analysis

	Opportunity exploration and exploitation in start-up entrepreneurship (SE)				Opportunity exploration and exploitation in established firms (EE)				Opportunity exploration and exploitation in general entrepreneurship (GE)				Subtotal
	Qual..	Quan.	Mixed	Conceptual	Qual.	Quan.	Mixed	Conceptual	Qual.	Quan.	Mixed	Conceptual	
Individual	3 ^c	6 ^b	2	1	3	1 ^b	2	2	8	3		14 ^d	45
Project					1								1
Team	2 ^c												2
Organization	1	5	1		4	8 ^a	1	2	1	1		3 ^d	27
Dyad		1											1
Community								1					1
Unspecified												1	1
Subtotal 1	6	12	3	1	8	9	3	5	9	4	0	18	78^{b,c,d}
Subtotal 2		22					25				31		

^aThese include one paper using simulation methods (Lant and Mezias 1990).

^bHonig (2001) studies both nascent entrepreneurs and intrapreneurs within established firms; this paper is recorded in both the SE and the EE domains (therefore counted twice).

^cKarataş-Özkan (2011) studies both the micro-level analysis of entrepreneurs; and meso-relational-level analysis of entrepreneurial teams (therefore counted twice).

^dWesthead and Wright (2011) discuss both the entrepreneur and the firm (therefore counted twice).

insightful 4I framework for understanding different learning processes involved in opportunity discovery and exploitation, but their emphasis lies primarily in the exploration process at the level of individual entrepreneurs. The only article that explicitly deals with the different needs of opportunity discovery and exploitation is Rerup (2005), which compares the influence of entrepreneurs' prior experience on opportunity discovery and exploitation; (c) 17 articles that specifically emphasize how individual entrepreneurs learn to explore and exploit opportunities, although with no reference to any specific entrepreneurship context (e.g. Lévesque *et al.* 2009; Minniti and Bygrave 2001; Parker 2006; Rae and Carswell 2001; Thorpe *et al.* 2006; Young and Sexton 2003); and (d) four articles that do not specify any entrepreneurial context and one editorial for a journal special issue (Harrison and Leitch 2005). We discuss the need for understanding learning in opportunity exploration and exploitation in the next section.

Methods and the unit of analysis

In this section, we report on the methods and unit of analysis employed by the studies. The studies employ a wide range of methods, ranging from case studies and surveys to mixed methods studies (see Methods column in Appendix 1). When examining the methods and unit of analysis in connection with the entrepreneurial context (see Table 1), we found that, across the three entrepreneurial contexts, 43 out of 75 articles focus on 'individuals' or 'entrepreneurs' as the unit of analysis, and 27 focus on firm-level analysis. Among the 27 firm-level studies, there is a clear emphasis on quantitative analysis (13 articles) as opposed to qualitative analysis (6 articles), while methods used to study individual entrepreneurs are diverse. Articles studying entrepreneurial projects, teams, dyads and communities are few and far between. These include Lee and Williams' (2007) study on learning at the level of entrepreneurial communities in large multinational corporations, and Almeida *et al.*'s (2003) study on the role of firm size in learning of start-ups from external sources based on the dyad between start-ups and other start-ups and incumbents.

Summary of the key challenges for future research

In addition to the key themes and developmental patterns of EL research that we have summarized, we draw attention to three key challenges in EL research

that have emerged from the analysis of the literature. First, as discussed in the themes 'Theoretical perspectives', 'Types of learning' and 'Entrepreneurial context', while a large body of work explains what and how individual entrepreneurs learn, more research is needed to advance EL research at the team and organizational levels and beyond. Entrepreneurial learning research builds on a wide range of individual and organizational learning theory and practice. Consequently, it has inherited the long-standing problem in the organizational learning literature: how individual learning can be integrated in collective learning. This is a challenge, although it is widely recognized that organizational learning is not equal to the sum of learning of individuals (Cohen and Levinthal 1990). This challenge is highly relevant and to some extent exacerbated in entrepreneurship, because entrepreneurs are often motivated by individualistic drive and energy. While acknowledging the role of enterprising individuals in opportunity discovery and exploitation (Venkataraman 1997), the entrepreneurship literature recognizes that it is often an entrepreneurial team, rather than an individual, that drives the entrepreneurial process, even in the early stages of new venture creation (Kamm *et al.* 1990). Integrating individual entrepreneurial behaviours and actions within collective efforts at the team or organizational level is indeed a thorny issue (Zahra 1993). This poses a key challenge: how individual opportunity-seeking behaviour can be integrated with organizational advantage-seeking behaviour (Hitt *et al.* 2001). In the next section, we discuss the relationship of individual and collective learning, drawing on further insights from entrepreneurship and organizational learning, as well as how these learning types help to understand the key challenge.

Second, the analysis of 'Definitions of entrepreneurial learning', 'Types of learning' and 'Entrepreneurial context' highlights that, while EL scholars have called for a greater understanding of entrepreneurs' learning processes in the opportunity discovery and exploitation processes (Corbett 2005, 2007; Davidsson *et al.* 2001), there remains a paucity of studies on learning in this area, especially on the opportunity exploitation process. This EL research gap corresponds to another challenge in the entrepreneurship literature: while it is widely recognized that the processes of exploring and exploiting an opportunity are heterogeneous (Shane and Venkataraman 2000; Stevenson and Jarillo 1990), more research is needed to understand how to develop the skills and

resources required to explore and exploit opportunities. Entrepreneurs who create new ventures are not necessarily those who lead the new ventures through growth and prosperity. Opportunity exploration and exploitation require different sets of skills and resources (Choi and Shepherd 2004) and involve different types of learning (Wang and Rafiq 2009). Therefore, in the next section, we discuss the relationship of exploratory and exploitative learning, as well as their contribution to the opportunity exploration and exploitation processes.

Third, as discussed in ‘Theoretical perspectives’, ‘Types of learning’ and ‘Methods and the unit of analysis’, the diversity, individuality and inconsistency of EL research reflects researchers’ different ontological and epistemological positions, which in turn underpin another key challenge: how entrepreneurial opportunities come about – which is at the centre of debate in entrepreneurship research (Buenstorf 2007; Busenitz *et al.* 2003; Short *et al.* 2010). The extent to which a researcher believes that the physical world exists independently of our understanding or awareness of it (ontology) and that our knowledge of the physical world depends on our prior conceptions and experiences (epistemology) influence a researcher’s fundamental research philosophies and methodological approaches. Understanding the ontological, epistemological and methodological differences pertinent to researchers’ perceptions of where entrepreneurial opportunities are from and how entrepreneurs learn in exploring and exploiting opportunities is another key challenge. The North American and European methodological divide on EL research to some extent reflects such ontological and epistemological differences. Specifically, European researchers often emphasize the subjective nature of knowledge and adopt a qualitative approach to understanding the experiential nature of EL (e.g. Clarysse and Moray 2004; Cope 2003, 2005; Cope and Watts 2000; Deakins and Freel 1998; García-Cabrera and García-Soto 2009; Huovinen and Tihula 2008) and the socially constructed nature of EL (e.g. Lee and Jones 2008; Lee and Williams 2007; Rae 2000, 2005, 2006; Rae and Carswell 2001; Taylor and Thorpe 2004; Thorpe *et al.* 2006). Conversely, North American researchers often stress the objective nature of knowledge and adopt a quantitative approach to examining to what extent an existing learning theory plays a role in different entrepreneurial contexts (e.g. Almeida *et al.* 2003; Covin *et al.* 2006; Nicholls-Nixon *et al.* 2000). Motivated by the different approaches to under-

standing entrepreneurial opportunities and how entrepreneurs learn in opportunity exploration and exploitation, we discuss a third pair of learning types: intuitive learning (learning through discovering possibilities) and sensing learning (learning through understanding and analysing facts) in the next section.

Key learning types in entrepreneurial learning

We discuss three pairs of learning types, namely individual and collective learning, exploratory and exploitative learning, intuitive and sensing learning (see Figure 3). We choose to discuss these key learning types for three reasons – because they: (1) derive from the key research gaps based on the systematic literature analysis and correspond to the key challenges in the entrepreneurship literature; (2) help to draw insights from the entrepreneurship and organizational learning literatures and hence to further cross-fertilize the two literature bodies to advance EL research; and (3) feed back to the entrepreneurship literature by providing insights on how these learning styles help understanding of the key entrepreneurial problems. These learning types are not an exhaustive list of key learning types, but those that help to address the current EL research gaps and the key research challenges, thereby deserving more attention in future study. We next discuss each pair of learning types in detail before summarizing them in Table 2.

Individual and collective learning

In relation to the first challenge – how to integrate individual opportunity-seeking behaviour with

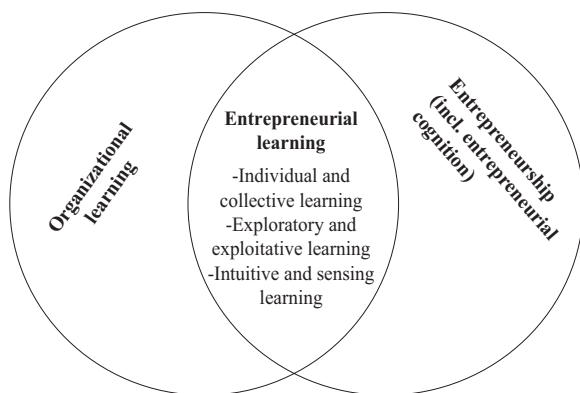


Figure 3. EL: boundaries and key learning types

Table 2. A summary of the key learning types

Key learning type	Definitions of learning type	Key challenge	Example links with entrepreneurship and learning literatures	Example future research questions
Individual learning	The process in which individuals acquire data, information, skill or knowledge.	How to integrate individual opportunity-seeking behaviour with organisational advantage-seeking behaviour (Hitt <i>et al.</i> 2001)	<ul style="list-style-type: none"> ■ Team learning, organizational learning (Nelson and Winter 1977), learning within regional milieus (Capello 1999) or unique social milieus (Easterby-Smith and Araujo 1999) 	<ul style="list-style-type: none"> ■ How does the entrepreneurial team composition affect individual and organizational learning?
Collective learning	'a social process of cumulative knowledge, based on a set of shared rules and procedures which allow individuals to coordinate their actions in search for problem solutions' (Capello 1999, p. 354)		<ul style="list-style-type: none"> ■ Social nature of learning: cumulative, interactive and public (Capello 1999); emphasis on the social context in which mutual learning takes place (March 1991) and social interactions are enabled (Easterby-Smith and Araujo 1999; Jones and Macpherson 2006) ■ Effective combination of know-what, know-how and know-who (Gibb 1993, 1997; Jones <i>et al.</i> 2010) ■ The processes of integrating and institutionalizing (Dutta and Crossan 2005) ■ The importance of a shared vision (Wang 2008); shared understanding of the collective activity (Easterby-Smith <i>et al.</i> 2000) ■ Developing collective cognitions consisting differentiation and integration (West 2007) ■ Effective organizational systems for knowledge sharing (Jones and Macpherson 2006), and the political will and skill to influence and institutionalize system changes (Macpherson and Jones 2008). 	<ul style="list-style-type: none"> ■ What organizational conditions simultaneously promote individual and collective learning in entrepreneurial firms? ■ How is a collective cognition formed through a learning process in an entrepreneurial team or firm? ■ How does learning occur within an entrepreneurial cluster, community or network? ■ How does learning help to shape an entrepreneurial cluster, community or network?
Exploratory learning	Focus on discovery through enactment and interpretation to generate enough variations that some will prove <i>ex post</i> to yield desirable results (variance-seeking learning that increases performance variance) (McGrath 2001)	How to develop skills and resources required for opportunity exploration and exploitation – two heterogeneous processes of entrepreneurship (Shane and Venkataraman 2000; Stevenson and Jarillo 1990)	<ul style="list-style-type: none"> ■ Difference between exploration and exploitation (March 1991) ■ Cognitive properties required for opportunity exploration and exploitation (Shane and Venkataraman 2000); cognitive heuristics and biases of entrepreneurs (Baron 1998); creativity-based cognitive approaches (Ward 2004) ■ Single-loop (adaptive) and double-loop (generative) learning (Argyris and Schön 1978); lower and higher-level learning (Fiol and Lyles 1985) ■ Unlearning (Hedberg 1981; Zahra <i>et al.</i> 2011) ■ Acquisitive learning through acquiring and assimilating external knowledge and experimental learning through internal transformation (Kreiser 2011) 	<ul style="list-style-type: none"> ■ How does the learning of entrepreneurs or entrepreneurial firms differ in the process of exploration and exploitation? ■ What and how do entrepreneurs or entrepreneurial firms unlearn? ■ What organizational contexts are more conducive to exploratory or exploitative learning?
Exploitative learning	Emphasis on directed search that is amenable to <i>ex ante</i> planning and control to limit variety achieved by honing in on and deepening initial insights as experience increases (mean-seeking learning that improves mean performance and decreases variance) (McGrath 2001)			<ul style="list-style-type: none"> ■ What cognitive processes do entrepreneurs go through in different learning contexts? ■ How do the cognitive processes of entrepreneurs differ in exploratory and exploitative learning?

Intuitive learning	Learning by knowing relationships of facts through discovering possibilities (abstract, conceptual thinking) (Felder and Silverman 1988)	How entrepreneurial opportunities come about – discovered or created (Buenstorf 2007; Eckhardt and Shane 2003; Short <i>et al.</i> 2010)	<ul style="list-style-type: none"> ■ Psychological types (Jung 1971; Myers and McCaulley 1985) ■ Individuals' cognitive (intuitive or analytical) processing styles (Corbett 2002) ■ The discovery approach to entrepreneurial opportunities following the positivist school of thought (Kirzner 1979) ■ The creation approach to entrepreneurial opportunities following the interpretive or social constructionist school of thought (Cope 2005; Gartner 1988; Rae 2000) ■ Opportunities as objective realities but their discovery may require a creative act by entrepreneurs (Shane 2003). ■ Effectuation approach to entrepreneurship (Sarasvathy <i>et al.</i> 2003) ■ Experiential learning (Kolb 1984, 1985) ■ Situated learning theory (Lave and Wenger 1991; Wenger 1998); the social theory of learning (Cope 2005; Rae 2005, 2006; Rae and Carswell 2001; Taylor and Thorpe 2004; Thorpe <i>et al.</i> 2006); social learning theory (Bandura 1977) ■ Vicarious learning (Lévesque <i>et al.</i> 2009) 	<ul style="list-style-type: none"> ■ What factors play a key role in each stage of the experiential learning cycle, especially the transformation of an entrepreneur's concrete experience to abstract conceptualization? ■ What and how do entrepreneurs or entrepreneurial firm learn from experience (successes and failures) of other entrepreneurs/entrepreneurial firms? ■ To what extent is the entrepreneurial decision-making process based on intuitive or analytical skills of the entrepreneur? ■ How do creative and analytical skills affect learning in the entrepreneurship process? ■ How do entrepreneurs or entrepreneurial firms search and acquire external information, and make sense of the information in the learning process?
Sensing learning	Learning by knowing facts or details based on external contacts through sights, sounds and physical sensations (concrete, analytical thinking) (Felder and Silverman 1988)			

organizational advantage-seeking behaviour (Hitt *et al.* 2001) – we discuss the respective roles of individual and collective learning as well as their relationship (see Table 2). Individual learning is the process in which individuals acquire data, information, skill or knowledge, whereas collective learning can be defined as a ‘social process of cumulative knowledge, based on a set of shared rules and procedures which allow individuals to coordinate their actions in search for problem solutions’ (Capello 1999, p. 354). Collective learning may take place at the team level, the organizational level (Nelson and Winter 1977), the regional level such as within regional innovation milieus (Capello 1999) or any other unique social milieus (Easterby-Smith and Araujo 1999). What differentiates collective learning from learning (or individual learning) is its social nature of learning; collective learning is cumulative, interactive and public, and acts as a vehicle for temporal and spatial knowledge transmission (Capello 1999). The social nature also indicates that collective learning is reliant on an effective combination of know-what and know-how as well as know-who (i.e. formal and informal contacts and networks that provide access to know-what and know-how) (Gibb 1993, 1997; Jones *et al.* 2010). March (1991, p. 73) also stresses the social context in which a mutual learning process takes place between an organization and the individuals in it: ‘organizations store knowledge in their procedures, norms, rules and forms. They accumulate such knowledge over time, learning from their members. At the same time, individuals in an organization are socialized to organizational beliefs’. Recent research concludes that entrepreneurs experience a high level of learning when there is a combination of high learning challenge (i.e. the distance between the entrepreneur’s prior knowledge and the role in the venture team) and a high level of learning support (i.e. team composition with strong prior knowledge providing a rich learning milieu) (Sardana and Scott-Kemmis 2010). This provides further evidence on the importance of social context in which entrepreneurs learn.

Integrating individual learning with collective learning is an especially challenging task for entrepreneurial firms, given the individualistic nature of entrepreneurs. The EL literature has started to address how collective learning takes place in organizations. For example, Dutta and Crossan (2005, p. 434) highlight two important processes of EL: integrating as ‘the process of developing shared understanding amongst individuals and the taking of

coordinated action through mutual adjustment’; and institutionalizing as ‘the process of ensuring that routinized actions occur’. These processes enable individual entrepreneurs to act as learning agents to evaluate what is possible within the organization, develop a coherent and collective action plan, and pool organizational resources to pursue identified opportunities (Crossan *et al.* 1999). Empirical evidence supports that entrepreneurial activities are more likely to bear fruit when individuals are committed to common organizational goals (Wang 2008). From a social constructionist perspective, organizations are sites of collective activity in which individuals are required to develop a shared understanding of that activity (Easterby-Smith *et al.* 2000), and it is through interaction within unique social milieus that learning occurs (Easterby-Smith and Araujo 1999). To facilitate effective social interactions among individuals, organizations need to have effective systems for knowledge sharing (Jones and Macpherson 2006), as well as the political will and skill to influence and institutionalize system changes that help to transform a divided organization to a practice-based community engaged in collective learning (Macpherson and Jones 2008). Karataş-Özkan (2011) found that new venture team members develop ‘a feel for the game’, understanding their own strengths and weaknesses and adjusting their roles in the new venture. Such practice is associated with increased EL at individual and team level (Karataş-Özkan 2011).

The recent development of corporate entrepreneurship places a considerable emphasis on how organizations can instil a culture and implement systems to align individual opportunity-seeking behaviour with organizational advantage-seeking behaviour (Hitt *et al.* 2001). The ability of organizations to align individuals’ interests, motivate them to search for opportunities, encourage them to cooperate in the creation of new resource combinations and to exploit them successfully is a critical discriminator between prosperous entrepreneurial firms and non-entrepreneurial firms (Chung and Gibbons 1997). Moreover, entrepreneurial cognition within the entrepreneurship literature highlights the need for collective cognitions, broadly defined as ‘the content of the combination of individual perspectives and the structural characteristics of that combination’ (West 2007, p. 84). The structure of the combination is critical for integrating individual perspectives. In particular, the structure must provide a unique goal that is clearly differentiated from other goals and promote a

consistent understanding of the goal among individual members; this dual characteristics of the structure of collective cognitions are referred to as differentiation and integration (West 2007). Collective cognitions are developed through ongoing comprehension of unfolding events by teams of interacting individuals (Weick and Roberts 1993). Further, Lee and Jones (2008), extending Nahapiet and Ghoshal's (1998) notion of cognitive social capital (i.e. social norms, values, attitudes and beliefs), bridges the gap between individual cognition and the distributed nature of organizing; they argue that entrepreneurs' perceptions of shared language, codes and narratives are critical for developing shared understanding and common values leading to efficient and effective social relations.

Despite the insights from entrepreneurship and organizational learning on the integration of individual and collective learning, several questions deserve more attention: for example, 'How does the entrepreneurial team composition affect individual and organizational learning?', 'What organizational conditions simultaneously promote individual and collective learning in entrepreneurial firms?', 'How is a collective cognition formed through a learning process in an entrepreneurial team or firm?' More research is also needed to understand how learning takes place in entrepreneurial clusters, communities and networks, and how learning helps to shape an entrepreneurial cluster, community or network.

Exploratory and exploitative learning

The second challenge is how to develop skills and resources required for opportunity exploration and exploitation as two heterogeneous processes of entrepreneurship (Shane and Venkataraman 2000; Stevenson and Jarillo 1990). In relation to this, we discuss the respective roles of, and the relationship between, exploratory and exploitative learning (see Table 2). According to McGrath (2001), exploratory learning emphasizes discovery through enactment and interpretation to generate enough variations that some will prove *ex post* to yield desirable results, while exploitative learning focuses on directed search that is amenable to *ex ante* planning and control to limit variety achieved by honing in on and deepening initial insights as experience increases. Exploratory learning (variance-seeking learning) increases performance variance, while exploitative learning (mean-seeking learning) improves mean performance and decreases variance (McGrath 2001).

Exploratory learning (also experimental learning) often results from the internal transformation through developing new knowledge (Kreiser 2011; Zhao *et al.* 2011) and could involve firms breaking away from a successful action pattern (i.e. deviance-error learning) (Bingham and Davis 2012). Exploitative learning (also acquisitive learning) often results from the acquisition and assimilation of existing knowledge that exists outside the firm (Kreiser 2011; Zhao *et al.* 2011), and is associated with trial-and-error learning (Bingham and Davis 2012). Exploratory and exploitative learning corresponds to the learning processes involved in exploration and exploitation, as March (1991, p. 71) describes: exploration involves 'search, variation, risk taking, experimentation, play, flexibility, [and] discovery', while exploitation entails 'refinement, choice, production, efficiency, selection, implementation, [and] execution'. Although exploratory and exploitative learning are both required to generate new ideas, select ideas and eventually implement a chosen idea in an entrepreneurial process, the existence of positive performance effects derive from the balanced application of exploration and exploitation (March 1991; Sirén *et al.* 2012).

The entrepreneurship and especially entrepreneurial cognition literature lends some insights, with a particular emphasis on opportunity exploration (discovery, recognition and evaluation). Opportunity discovery relies on the possession of prior knowledge required to recognize the opportunity and the cognitive properties required to value it (Shane and Venkataraman 2000). Compared with non-entrepreneurs, entrepreneurs are more likely to think and reason based on cognitive heuristics and biases (e.g. self-serving bias and counterfactual thinking) owing to the highly uncertain conditions that entrepreneurs tend to encounter (Baron 1998). Moreover, entrepreneurs are more likely to use creativity-based cognitive approaches (i.e. conceptual combination, analogical reasoning, abstraction and problem formulation) to generate novel ideas (Ward 2004). The high level of creativity is particularly fitting with the exploratory learning process. However, such cognitive style may cause frustration and burnout as the venture goes through the exploitation phase (Brigham and De Castro 2003), and hence becomes counter-productive in the exploitative learning process.

The demand of exploratory and exploitative learning on organizations is echoed in other organizational learning theories, such as Argyris and Schön's (1978) single-loop (adaptive) and double-loop

(generative) learning and Fiol and Lyles's (1985) higher- and lower-level learning. Adaptive and lower-level learning involves modifying actions according to the difference between expected and obtained outcomes (hence exploitative in nature), whereas generative and higher-level learning involves questioning the values, assumptions and policies that lead to the actions in the first place, and searching and discovering new solutions (hence exploratory in nature). The latter entails a higher level of unlearning (Hedberg 1981; Zahra *et al.* 2011), that is, deliberately learning not to do something. In particular, learning from failure is a function of distinctive learning processes that enable higher-level learning outcomes (Cope 2011). Although the two types of learning may occur in any organization, entrepreneurial firms are prone to a higher level of exploratory and generative learning (and hence unlearning) compared with non-entrepreneurial firms, since they often operate in a highly uncertain environment.

Overall, exploratory and exploitative learning are key learning types for understanding what and how entrepreneurs learn in the opportunity exploration and exploitation processes. However, despite the insights from the organizational learning and entrepreneurship literatures, many research questions require further investigation, for example, 'How does the learning of entrepreneurs or entrepreneurial firms differ in the processes of exploration and exploitation?', 'What and how do entrepreneurs or entrepreneurial firms unlearn?', 'What organizational contexts are more conducive to exploratory or exploitative learning?', 'What cognitive processes do entrepreneurs go through in different learning contexts?', and 'How do the cognitive processes of entrepreneurs differ in exploratory and exploitative learning?'

Intuitive and sensing learning

To discuss the third challenge of how entrepreneurial opportunities come about – discovery or creation (Buenstorf 2007; Eckhardt and Shane 2003; Short *et al.* 2010) – we discuss two relevant learning types: intuitive and sensing learning (see Table 2). The concepts of intuitive and sensing learning styles were initially developed by Jung (1971) in his psychological types, later operationalized by Myers and McCaulley (1985), and are currently used widely in education research. Sensing learning involves learning by knowing facts or details based on external contacts through sights, sounds and physical sensa-

tions, while intuitive learning involves learning by knowing relationships of facts through discovering possibilities (Felder and Silverman 1988). Sensing learners are considered concrete and practical thinkers, implying that they are more prone to discover and identify an opportunity that exists in the environment through understanding and analysing the relationships of market conditions. Conversely, intuitive learners are considered abstract thinkers, suggesting that they are more likely to create a new opportunity based on a high level of conceptual thinking and discovering possibilities. Intuitive learning is akin to what Bingham and Davis (2012, p. 613) describe as improvisational learning – 'a real-time learning process in which firms learn to solve unexpected problems or capturing surprising opportunities in the moment (Miner *et al.* 2001)'. Research has found that the more an individual's cognitive processing style tends toward 'intuitive' and away from 'analytical', the more opportunities an individual is likely to identify (Corbett 2002). These learning types are instrumental to the understanding of how entrepreneurial opportunities (Eckhardt and Shane 2003; Venkataraman 1997) come about – a key theme of the entrepreneurship research.

In a recent review, Short *et al.* (2010) conclude that little agreement exists about the definition, the nature and the role of opportunities (Buenstorf 2007; Eckhardt and Shane 2003; Short *et al.* 2010). One of the several conflicting views is whether entrepreneurial opportunities are discovered or created (Buenstorf 2007). The discovery approach is positioned in the positivist school of thought predominant among North American researchers, suggesting that opportunities exist in the environment independent of the entrepreneur. What differentiates entrepreneurs from non-entrepreneurs is 'entrepreneurial alertness' – the ability to see the gap where products or services do not exist (Kirzner 1979). In contrast, the creation approach, typically represented by the European research, is centred in the interpretivist or social constructionist school of thought, postulating that opportunities emerge as a result of the entrepreneur's perception, interpretation and understanding of the environment (Gartner *et al.* 2003). This stream of literature focuses on the developmental nature of entrepreneurial behaviour, that is, an entrepreneur's ability to learn, grow and change (Cope 2005; Gartner 1988; Rae 2000), such as in unfolding entrepreneurial events. To address the limitations of the two opposing approaches, Shane (2003) argues that opportunities may exist as objective realities, even

though their discovery may require a creative act by the entrepreneur (Shane 2003). Furthermore, effectual entrepreneurs can use their expertise to recognize, discover or create opportunities dependent on market conditions (Sarasvathy *et al.* 2003). This suggests that opportunity exploration may involve both intuitive and sensing learning.

A number of learning theories complement the understanding of intuitive and sensing learning. First, Cook *et al.* (2009) note that the sensing and intuitive learning types are similar to the concrete–abstract learning dimension of Kolb's (1984, 1985) experiential learning theory, which has been widely used in the EL research. The experiential learning cycle also helps to fill the gap of how concrete experience is transformed to abstract conceptualization (i.e. through reflective observation), which, through active experimentation modifies the next occurrence of concrete experience (Kolb 1984, 1985). However, how this full experiential learning cycle occurs among entrepreneurs or in entrepreneurial firms requires further research, as the majority of the experiential learning research has not fully addressed this issue, as pointed out in the literature analysis. Second, several other learning theories from the social constructivist perspective, such as the situated learning theory (Brown and Duguid 1991; Lave and Wenger 1991; Wenger 1998) and the social theory of learning (e.g. Lee and Williams 2007; Rae 2005, 2006; Rae and Carswell 2001; Taylor and Thorpe 2004; Thorpe *et al.* 2006) (see Appendix 1) help to explain the intricacies of sensing learning. These theories essentially argue that knowledge or learning is evident in situated activity or 'knowing' (Macpherson and Jones 2008). Learning is a process of social interaction (Fang *et al.* 2010) or co-participation, dependent on social, historical and cultural factors (Taylor and Thorpe 2004), and hence 'an integral and inseparable aspect of social practice' (Lave and Wenger 1991, p. 31). More specifically, social learning theory also suggests that learning occurs through close contact with other people and observation and imitation of role model behaviours (Bandura 1977). That is, learning can take place vicariously (Lévesque *et al.* 2009). Entrepreneurs' self-efficacy, managerial experience, business skills and education levels are all influenced by the socialization process (Jones and Tullous 2002), and hence affected by the social groups to which the entrepreneur is related (Cope 2005). Social processes in which entrepreneurs seek to repair relational damage caused by venture failure are associated with their

regression and gradual re-emergence, leading to social affirmation that may support rehabilitation (Cope 2011).

In sum, the roles of intuitive and sensing learning have not been fully addressed in the EL literature. This is an important research area, given that these learning types help to enhance understanding of the debate on how opportunities are discovered or created, and how the rational and the effectuation approaches to entrepreneurial behaviours can be explained. Future research may address questions such as 'What factors play a key role in each stage of the experiential learning cycle, especially the transformation of an entrepreneur's concrete experience to abstract conceptualization?', 'What and how do entrepreneurs or entrepreneurial firms learn from the experience (successes and failures) of other entrepreneurs or entrepreneurial firms?', 'To what extent is the entrepreneurial decision-making process based on intuitive or analytical skills of the entrepreneur?', 'How do creative and analytical skills affect learning in the entrepreneurship process?', and 'How do entrepreneurs or entrepreneurial firms search and acquire external information, and make sense of the information in the learning process?'

In sum, the three pairs of learning types (see Table 2) are fundamental to the understanding of entrepreneurial behaviours, namely individual opportunity-seeking and organizational advantage-seeking, opportunity exploration and exploitation, and the discovery or creation approaches to entrepreneurial opportunities. The respective roles of these learning types are dependent on the individual, team, organizational, social and environmental contexts in which EL takes place, as discussed. Literature suggests that firms may combine different types of learning over time in the form of learning sequences, which are in turn influenced by initial learning conditions (Bingham and Davis 2012).

Discussion: the state of entrepreneurial learning

Despite the scholarly call for building EL theory (Krueger 2003), the EL literature is fragmented and ad hoc in nature (Harrison and Leitch 2005). Macpherson (2009) echoes the concern of the highly individualistic approaches to EL. Our analysis of the EL literature clearly reveals the diverse philosophical, theoretical and methodological approaches used to study the learning process in the entrepreneurial

context. We summarize the key aspects covered in the literature to consolidate and delineate the domain of EL set out in the objectives.

The domain of EL research

First, EL relies not only on know-what and know-how, but also know-who. Know-what and know-how focus on information, knowledge and experience: for example, accumulating or updating knowledge (Minniti and Bygrave 2001), the development of new knowledge (Politis 2005), accumulating and organizing knowledge and information (Ravasi and Turati 2005), and acquiring new knowledge (Holcomb *et al.* 2009). Know-who provides formal and informal contacts and networks, and hence access to know-what and know-how (Gibb 1993, 1997; Jones *et al.* 2010). Accordingly, EL occurs when entrepreneurs make sense of the world around them and change it in some arresting manner (Starbuck 1983; Thorpe *et al.* 2006); when entrepreneurs interact socially to initiate, organize and manage ventures (Rae 2005); when entrepreneurs transform experience into action in a business setting (Lee and Jones 2008); and when entrepreneurs construct new meaning in the process of recognizing and acting on opportunities (Rae and Carswell 2001).

Second, the mechanisms (or the types of learning) by which learning takes place (i.e. *how* learning occurs) are primarily drawn from the individual and organizational learning literature. Individual learning styles include experiential learning specifically defined by Kolb (1984), as well as experiential learning as a broad learning process encapsulating learning-by-doing (Cope 2003), trial-and-error learning (Lant and Mezias 1990), learning from past experience (Lamont 1972; Minniti and Bygrave 2001; Rerup 2005), and learning from participation and the experience of others (i.e. vicarious learning) (Lévesque *et al.* 2009). Several influential organizational learning mechanisms include single-loop/adaptive and double-loop/generative learning (Argyris and Schön 1978), higher-level or lower-level learning (Fiol and Lyles 1985), and exploratory and exploitative learning (March 1991). Each type involves the development or modification of new or existing insights and behaviours.

Third, the processes of EL are intertwined in the processes of exploring and exploiting an entrepreneurial opportunity. For example, EL is defined as 'what informs the entrepreneur's quest for new opportunities' (Franco and Haase 2009). Depending

on the individual, team, organizational, social or environmental contexts, EL processes may be present in different forms. For example, EL may entail learning by an independent entrepreneur, an entrepreneurial team and firm; or learning by an individual, team or firm to behave or work in an entrepreneurial way (Rae 2000). Moreover, EL may involve a dynamic process characterized by ongoing knowledge acquisition, organization, development and creation (also see Minniti and Bygrave 2001); this could be a continuous learning process made of multiple learning epochs (Voudouris *et al.* 2011), a sporadic process where learning occurs from moments in which an individual is situated (Rae 2011), or due to critical events (see Cope and Watts 2000). Moreover, EL is referred to as a lived experience involving a cumulative series of interdependent events (Morris *et al.* 2012). Pittaway and Thorpe (2012) point out that Jason Cope contributed significantly to the theorizing of the lived experience of entrepreneurs through understanding discontinuous events, and such events could well be venture failure (Cope 2011).

Fourth, the outcome of EL generally involves the development of new insights and behaviours or the modification of existing insights and behaviours, which may be embedded in multifaceted entrepreneurial activities. For example, EL is often associated with the implementation of an opportunity leading to the creation and development of a new venture (Berglund *et al.* 2007; Cope 2005; Hughes *et al.* 2007; Nicholls-Nixon *et al.* 2000), a spin-off from an existing organization (Clarysse and Moray 2004; Lamont 1972), a renewal of an existing organization (Corbett *et al.* 2007; Covin *et al.* 2006) or even exiting an entrepreneurial venture that has learning effects enhancing the entrepreneur's accumulated knowledge base (Breslin 2008). The array of contents, mechanisms, processes and outcomes depict the domain of EL research within a growing body of literature.

The role of EL in the organizational learning and entrepreneurship literatures

Based on the literature analysis, we have identified and discussed three pairs of key learning types, which correspond to three key challenges that emerged from the literature analysis: (a) individual and collective learning that helps to integrate individual opportunity-seeking behaviour with organizational advantage-seeking behaviour; (b) exploratory

and exploitative learning that helps to resolve the paradox of opportunity exploration and exploitation as two heterogeneous entrepreneurial processes; and (c) intuitive and sensing learning that helps to understand how entrepreneurial opportunities come about. We have also identified some fruitful avenues for future research to help to move EL research forward. As discussed, these learning types can draw insights from, and also feed back to, the organizational learning and entrepreneurship literatures. In particular, although EL has become a promising research area attracting an increasing number of scholarly publications, there is a high level of interest in applying experiential and organizational learning theories in the entrepreneurship process rather than building new EL theory as revealed in the analysis. As a result, the boundary of exchange between EL and organizational learning remains largely unspecified. In other words, little is known about how the learning processes or mechanisms of entrepreneurs or entrepreneurial firms differ from non-entrepreneurs and non-entrepreneurial firms. Through the key EL learning types, we highlight that entrepreneurial firms are more likely to face the challenge of integrating individual learning with collective learning, given the individualistic nature of entrepreneurs. Given that collective learning is social and interactive by nature (Capello 1999), entrepreneurial firms are considered as sites of collective activity in which individuals interact socially (Jones and Macpherson 2006) to develop a shared understanding of that activity (Easterby-Smith *et al.* 2000). We also stress that, compared with their non-entrepreneurial counterparts, entrepreneurial firms are more likely to use creativity-based, variance-seeking learning (i.e. exploratory learning) (McGrath 2001) as well as unlearning (Hedberg 1981), since they often operate in a dynamic environment. Therefore, entrepreneurs are likely to possess a high level of cognitive heuristics and biases, such as counterfactual thinking (Baron 1998), especially in the opportunity exploration process. Finally, intuitive learners are more likely to create a new opportunity based on a high level of conceptual thinking, while sensing learners are more prone to discover an opportunity by scanning the environment and analysing the relationships of market conditions. These learning types help to explain how entrepreneurial opportunities come about; following Shane (2003) and Sarasvathy *et al.* 's (2003) arguments on the combination or an effectuation process of opportunities as objective realities and as the creative discovery of entrepreneurs, intui-

tive and sensing learning complement each other in the opportunity exploration and exploitation process.

However, EL has risen to the fundamental paradigmatic shift of entrepreneurship from a static, trait-based approach to a dynamic, learning-based approach. The three pairs of learning types help to understand some of the challenges, namely the problem of integrating individuals' opportunity-seeking behaviour with the firm's advantage-seeking behaviour (Hitt *et al.* 2001), the paradoxical demands between opportunity exploration and exploitation, and the discovery or creation approaches to entrepreneurial opportunities. The learning types we discussed help to cross-fertilize the literatures of entrepreneurship and organizational learning. The advancement of EL may contribute to a further paradigmatic shift of entrepreneurship towards becoming a more 'interdisciplinary' arena, which is supported by Steyaert (2005) and Schindehutte and Morris (2009).

Entrepreneurial learning research so far has focused on applying existing theories in the entrepreneurial context. Future research may place more emphasis on theory building in certain under-researched areas, for example, how the three different pairs of learning types come into play in different entrepreneurial contexts. This requires more qualitative, phenomenon-driven research, which is especially effective in addressing 'how' and 'why' in unexplored or under-explored research areas with little viable theory and empirical evidence (Eisenhardt and Graebner 2007). Greater research collaboration between North America and Europe is needed to facilitate knowledge exchange and cross-fertilization of EL research. This comes with the caveat that there will be challenges to overcome between the two research camps as they both come from different philosophical stances. Possible ways to cross-fertilize North American and European research on EL include using mixed methods to mitigate the limitations of using quantitative or qualitative methods alone, or research collaboration where researchers interact and socialize to build on the strengths of their philosophical and methodological differences. However, it is argued that researchers' different philosophical beliefs and preferred research approaches may be incommensurable. Therefore, it is challenging for a researcher working within one philosophical and methodological approach to work within another one. Alternatively, cross-fertilization could also be achieved by encouraging theory

developed in one research camp (i.e. European) based on qualitative, phenomenon-driven research to be tested by researchers in another (i.e. North American) using quantitative research.

Conclusion

Entrepreneurial learning has become an important research area at the interface of entrepreneurship and organizational learning. This paper has identified a critical mass of EL research. However, the EL literature is highly individualistic and fragmented, calling for both theoretical and empirical development. Based on a systematic analysis of the literature, we identified key EL research themes and developmental patterns. Moreover, we identified three key EL research gaps and discussed three pairs of learning styles that deserve more attention in future research, namely individual and collective learning, exploratory and exploitative learning, and intuitive and sensing learning. The three pairs of learning styles correspond to three key challenges in the entrepreneurship literature, namely the need for integrating individual opportunity-seeking behaviour with organizational advantage-seeking behaviour; the need for developing skills and resources required for opportunity exploration and exploitation; and the need for understanding how entrepreneurial opportunities come about. Therefore, the three pairs of learning styles help to advance EL research and also feed back to the entrepreneurship literature.

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Appendix 1. A summary of EL publications

Authors	Year	Country	Journal	Theoretical perspectives	Definition of EL	Entrepreneurial context	Types of learning	Methods	Unit of analysis
Almeida, Dokko and Rosenkopf ^(3,10)	2003	US, US, US	<i>Research Policy</i>	Strategic management and organizational theory	None given	SE	External learning and absorptive capacity	A quantitative study based on patent data from 71 start-ups and 119 incumbents	The dyad between start-ups and other start-ups or incumbents
Balasubramanian ^(6,3,9)	2011	US	<i>Management Science</i>	Strategic management, in particular, dynamic capabilities	None given	SE	Learning from experience	A quantitative study of 183,020 plant-year observations on 47,915 new plants belonging to 39,279 firms drawn from a longitudinal data at the US Census Bureau	Firm
Berglund, Hellström and Sjölander ^(6,2)	2007	Sweden/Norway, Norway, Sweden	<i>Venture Capital: an International Journal of Entrepreneurial Finance</i>	Two modes of learning: hypothesis-testing and hermeneutic learning	*EL is explicitly defined as 'venture learning, i.e. learning by the whole venture team' (Footnote 1, p.178)	GE (entrepreneur)	Hypothesis testing (Harper 1996) and hermeneutic learning (Lavoie 1990)	n/a	Individual
Bingham and Davis ^(1,4,6,9,10,16)	2012	US, US	<i>Academy of Management Journal</i>	Organizational theory and strategy	None given	EE (small firms)	Direct learning (experimental, trial-and-error, improvisational, deviance-error learning); indirect learning (vicarious learning and learning from external advice)	A mixed methods of quantitative and qualitative study of 9 entrepreneurial firms in Finland, the US and Singapore	Firm
Boussovara and Deakins	1999	UK, UK	<i>International Journal of Entrepreneurial Behaviour & Research (IJEB&R)</i>	Marketing, learning, and entrepreneurship	*None given	EE (small firms)	Individual and organizational learning	A qualitative study based on interviews within four case studies of entrepreneurial firms	Firm
Chaston, Badger and Sadler-Smith ^(1,6,12,13,14)	2001	UK, UK, UK	<i>Journal of Small Business Management</i>	Organizational learning and strategic management	None given	EE (small firms)	Double-loop learning	A quantitative study based on a survey of 179 UK small firms	Firm

Appendix 1. Continued

Authors	Year	Country	Journal	Theoretical perspectives	Definition of EL	Entrepreneurial context	Types of learning	Methods	Unit of analysis
Clarysse and Moray	2004	Belgium, Belgium	<i>Journal of Business Venturing (JBV)</i>	Experiential learning	None given	SE	Learning by doing, individual learning, collective team learning	A qualitative study of a longitudinal case study of a high-tech start-up using participant observation and interviews	Team
Cope ^(1,5,6,14)	2003	UK	<i>Management Learning</i>	Experiential learning	*None given	EE (small firms)	Experiential learning (or learning-by-doing); higher-level (double-loop, generative) learning and lower-level (single-loop, adaptive) learning	A qualitative study based on case studies of six practicing entrepreneurs; data were collected through interviews	Individual
Cope ^(b,1,5,6,7,8,14)	2005	UK	<i>Entrepreneurship Theory and Practice (ET&P)</i> , (Special Issue)	A dynamic learning perspective of entrepreneurship	*EL is explicitly defined as 'learning experienced by entrepreneurs during the creation and development of a small enterprise, rather than a particular style or form of learning that could be described as "entrepreneurial"' (Footnote 1, p.374)	GE (entrepreneur)	Experiential learning, routinized learning	n/a	Individual
Cope ^(b,1,14)	2011	UK	<i>JBV</i>	Entrepreneurial learning theory, social psychology perspective, entrepreneurship	*EL is implicitly defined as 'a negotiated and relational process' (Hamilton 2004; Pittaway and Rose 2006; Thorpe <i>et al.</i> 2006)	GE (entrepreneur)	Learning from failure; learning as a lived experience	A qualitative study of 9 entrepreneurs	Individual
Cope and Watts ^(1,6)	2000	UK, UK	<i>IJEB&R</i>	Individual learning	*None given	GE (entrepreneur)	Experiential learning, and three levels of individual learning (Burgoyne and Hodgson 1983), analogous to single-loop, situation-specific single-loop, and double-loop learning or 'learning how to learn'	A qualitative study based on longitudinal case studies of six small business owners/practicing entrepreneurs; data was collected through unstructured interviews	Individual

Corbett ^(7,15)	2005	US	<i>ET&P</i> (Special Issue)	Experiential learning	*None given	GE (primarily identification/recognition)	Experiential learning	n/a	Individual
Corbett ^(6,3,7)	2007	US	<i>JBV</i>	Experiential learning	None given	GE (discovery)	Experiential learning	A quantitative study based on a mailed survey of 380 individuals belonging to Colorado-based businesses	Individual
Corbett, Neck and DeTienne ^(a,b)	2007	US, US, US	<i>ET&P</i>	Entrepreneurial cognition (and organizational learning)	*None given	EE (large firms)	Organizational learning (learning from failures)	A qualitative study based on 11 firms with radical innovation programs tracked longitudinally over 3 years; 246 interviews conducted	Individual
Covin, Green and Slevin ^(5,6)	2006	US, US, US	<i>ET&P</i>	Organizational learning as one of the two components of firm strategizing	None given	EE (medium/large firms)	Organizational learning from strategic failures	A quantitative study based on a postal survey of medium-to-large strategic business units of 110 US manufacturing firms	Firm
Deakins and Freel ⁽⁷⁾	1998	UK, UK	<i>The Learning Organization</i>	Organizational learning	*None given	EE (small/medium firms)	Experiential learning, external learning, learning by doing; routines adaptation (internal search), and trial and error (external search); collective learning	A qualitative study based on four case studies of interviews with entrepreneurs	Firm
Dencker, Gruber and Shah ^(3,6,9,10,16)	2009	US, Switzerland, US	<i>Organization Science</i>	Population ecology	None given	SE	Path dependent; adapting routines (experiential learning)	A mixed methods study based on 15 in-depth qualitative interview and 436 surveys with firms	Firm
Dimov ^(b, 6,7)	2007	US	<i>ET&P</i>	Experiential learning and intuiting and interpreting from the 4I framework	*None given	GE (development – we liken to exploration)	Experiential learning; intuiting and interpreting involved in individual learning; convergent and divergent learning styles	A quantitative study based on an online experiment on 95 MBA and executive MBA students	Individual
Dutta and Crossan ^(1,5,6,8,9,10)	2005	Canada, Canada	<i>ET&P</i> (Special Issue)	Organizational learning	*None given	GE (recognition and development/exploitation)	Organizational learning (intuiting, interpreting, integrating and institutionalizing)	n/a	Individual

Appendix 1. Continued

Authors	Year	Country	Journal	Theoretical perspectives	Definition of EL	Entrepreneurial context	Types of learning	Methods	Unit of analysis
Erikson	2003	Norway/US	<i>Journal of Small Business and Enterprise Development (JSB&ED)</i>	Social cognitive theory	*None given	SE	Experiential learning	n/a	individual
Fang, Tsai and Lin ^(1,6,11,16)	2010	Taiwan, Taiwan, Taiwan	<i>International Small Business Journal</i>	The knowledge-based view of the firm	*EL is implicitly defined as 'inherently socially and cognitively interactive learning processes, through which knowledge is generated, articulated and distributed.' (p.92)	SE	Interorganizational learning	A quantitative study of 101 entrepreneurial firms in business incubators	Firm
Franco and Haase ^(6,3,5,7,14)	2009	Portugal, Germany	<i>JSB&ED</i>	To propose a conceptual model of EL as a never-ending, dynamic learning cycle	*EL is implicitly defined as 'learning is what informs the entrepreneur's quest for new opportunities.' (p.634)	GE (entrepreneur)	Individual, group, organizational	n/a	Individual
García-Cabrera and García-Soto ⁽⁷⁾	2009	Spain, Spain	<i>Journal of Entrepreneurship</i>	Cognitive approach	None given	GE (recognition and development/exploitation)	Experiential learning	A qualitative study based on a case study of a single firm	Firm
Gruber, MacMillan and Thompson ^(4,10,13)	2008	Switzerland, US, US	<i>Management Science</i>	Learning and innovation theory and resource-based theory	None given	SE	Experiential learning and exploratory learning	A quantitative study based on surveys with 142 firms and secondary data on performance	Firm
Harrison and Leitch ^(6,12,3,10,14,15)	2005	UK, UK	<i>ET&P (Special Issue)</i>	Organizational learning	*None given	GE (editorial for special issue)	Organizational learning	n/a	n/a

Holcomb, Ireland, Holmes and Hitt ^(a,b,7)	2009	US, US, US, US	<i>ET&P</i>	Entrepreneurial learning and cognitive theory	*EL is explicitly defined as 'the process by which people acquire new knowledge from direct experience and from observing the behaviors, actions and consequences of others; assimilate new knowledge using heuristics to confront discrepancies that are common with information acquired in uncertain contexts; and organize assimilated knowledge by linking it with preexisting structures' (p.172)	GE (entrepreneur)	Experiential and vicarious learning	n/a	Individual
Honig ^(9,11)	2001	Israel	<i>ET&P</i>	Organizational learning	None given	SE EE (unspecified)	Strategic (organizational) learning consisting of discovery, knowledge diffusion and informed action	A quantitative study of 283 individuals in Sweden; interviews were used to screen the sample, before the postal survey	Individual
Hughes, Hughes and Morgan ⁽¹⁰⁾	2007	UK, UK, UK	<i>British Journal of Management</i>	Configuration theory	None given	SE	Exploitative learning	A quantitative study of 211 emerging high-tech firms in the UK; data were collected through a mailed survey	Firm
Huovinen and Tihula ^(6,7)	2008	Finland, Finland	<i>IJEB&R</i>	Experiential learning and cognition	*EL is explicitly defined as 'a continuous process leading to the development of knowledge required for starting and managing a firm (Politis 2005)' (p.155)	SE	Experiential learning; knowledge transformation	A qualitative study based on a case study of one portfolio entrepreneur through interviews and written descriptions of his career	Individual
Jones and Macpherson ^(2,3,6,10,16)	2006	UK, UK	<i>Long Range Planning</i>	Organizational learning (41 framework)	*None given	EE (unspecified)	Inter-organizational learning	A qualitative study based on three case studies of independent SMEs	Firm
Karatas-Özkan ^(a,b)	2011	UK	<i>Entrepreneurship & Regional Development</i>	A process-relational perspective of entrepreneurship; social constructionist	*None given	SE	Relational learning	A qualitative study based on a single case study of a venture team consisting of 5 nascent entrepreneurs	Individual and team
Kreiser ^(a, 3,6,10,14,16)	2011	US	<i>ET&P</i>	Dynamic capabilities	None given	GE (unspecified)	Acquisitive learning, experimental learning	n/a	Firm

Appendix 1. Continued

Authors	Year	Country	Journal	Theoretical perspectives	Definition of EL	Entrepreneurial context	Types of learning	Methods	Unit of analysis
Lamont	1972	US	<i>Journal of Small Business Management</i>	Experiential learning	*None given	SE	Experiential learning	A quantitative study based on financial analyses of 24 technology-based spin-offs	Individual
Lant and Mezas ^(1,4,9,12,13)	1990	US, US	<i>Strategic Management Journal</i>	Organizational learning theory was used to conceptualize entrepreneurship	None given	EE (unspecified)	Experiential learning at the organizational level	A simulation study of 16 firm types	Firm
Lee and Jones ⁽⁷⁾	2008	UK, UK	<i>International Small Business Journal</i>	Social capital and communication theory	*None given	SE	Experiential and transforming experience into action	A mixed methods study based on interviews with 6 entrepreneurs	Individual
Lee and Williams ^(2,8,10,15)	2007	UK, The Netherlands	<i>Journal of World Business</i>	Social community/ Communities of practice	None given	EE (MNCs)	Learning-in-working	n/a	Entrepreneurial community
Lévesque, Minniti and Shepherd ^(4b, 3,6,9)	2009	Canada, US, US	<i>ET&P</i>	Experiential, vicarious learning, and decision theory	*None given	GE (entrepreneur)	Experiential and vicarious learning	n/a	Individual
Lumpkin and Lichtenstein ^(1,2,3,4,5,6,10,14)	2005	US, US	<i>ET&P</i> (Special Issue)	Organizational learning	*None given	GE (recognition)	Organizational learning	n/a	Firm
Miller ^(6,9,10)	2012	US	<i>Strategic Entrepreneurship Journal</i>	Institutional theory, organizational theory	*EL is explicitly defined as 'the learning engaged in by entrepreneurs during their pre-formation organizing activities that becomes embedded and implemented in the structures and practices of the ventures they found.' (p.62).	GE (unspecified)	Superstitious learning	A quantitative analysis of 2,560 US hedge fund management companies across 178,426 observed monthly spells	Firm
Minniti and Bygrave	2001	US, US	<i>ET&P</i>	Experiential learning and economics	*EL is implicitly referred to as 'how entrepreneurs accumulate and update knowledge' (p.8)	GE (entrepreneur)	Experiential learning	n/a	Individual

Morris, Kuratko, Schindehutte and Spivack ^(b)	2011	US, US, US	<i>ET&P</i>	Affective events theory	None given	GE (entrepreneur)	Experiential learning; learning as a lived experience	n/a	Individual
Mulder, Lans, Versteegen, Biemans and Meijer	2007	The Netherlands, The Netherlands, The Netherlands	<i>Journal of Workplace Learning</i>	None given	*None given	EE (small firms)	No explicit type of learning given (a number of EL activities stated)	A mixed methods study based on interviews and competence assessments with ten small business owners	Individual
Newbert	2005	US	<i>Journal of Small Business Management</i>	Dynamic capabilities	None given	SE	Trial and error learning (from prior new firm formation experience)	A quantitative study based on a survey of 327 entrepreneurs	Individual
Nicholls-Nixon, Cooper and Woo ⁽¹⁾	2000	Canada, US, US	<i>JBV</i>	Strategy and managerial cognition	None given	SE	Trial and error learning	A quantitative study based on a questionnaire to 454 firms	Firm
Parker ^(b)	2006	UK	<i>JBV</i>	Economics and experiential learning	*EL is implicitly referred to as '... what entrepreneurs learn about, how they learn, and why they learn.' (p.3)	GE (entrepreneur)	Exploitation of new information	A quantitative study based on face-to-face questionnaire interviews of 716 self-employed Britons	Individual
Petkova ^(a,b,4,10)	2009	US	<i>International Entrepreneurship and Management Journal</i>	Entrepreneurship, organizational learning, psychology	*None given	GE (entrepreneur)	Learning from performance errors (experiential)	n/a	Individual
Pittaway and Thorpe ^(a,b,15,6,7,8)	2012	US, UK	<i>Entrepreneurship & Regional Development</i>	EL	*None given	GE (unspecified)	Cope's EL framework consisting of reflective learning, situated learning, self-imposed or external transformative learning, double-loop learning, proactive or reactive learning, etc.	n/a	Individual
Politis ^(5,7,10,16)	2005	Sweden	<i>ET&P (Special Issue)</i>	Experiential learning	*EL is implicitly defined as 'the process of EL does not necessarily follow a predetermined sequence of steps according to Kolb's (1984) four-stage learning cycle, but rather can be conceived as a complex process where entrepreneurs transform experience into knowledge in disparate ways.' (p.408)	GE (entrepreneur)	Experiential learning	n/a	Individual

Appendix 1. Continued

Authors	Year	Country	Journal	Theoretical perspectives	Definition of EL	Entrepreneurial context	Types of learning	Methods	Unit of analysis
Politis ^(b)	2008	Sweden	<i>JSB&ED</i>	None given	*None given	SE	Experiential learning; Trial and error learning	A quantitative study based on 231 entrepreneurs surveyed by mail	Individual
Politis and Gabrielsson ^(b,1,4,5,7)	2009	Sweden, Sweden	<i>IJEB&R</i>	Experiential learning	*None given	SE	Experiential learning	A quantitative study based on 231 entrepreneurs surveyed by mail	Individual
Rae ⁽⁷⁾	2000	UK	<i>IJEB&R</i>	Personal theory (practical theory)	*EL is implicitly defined as 'When learning is applied to the concept of entrepreneurship, it is concerned with learning how to recognize and act on opportunities, how to organize and manage ventures, and so on. EL is taken to mean learning to work in entrepreneurial ways.' (p. 151)	GE (entrepreneur)	Learning as a sense-making process	A qualitative study based on life story interviews of 13 entrepreneurs	Individual
Rae ^(b,7,15)	2005	UK	<i>JSB&ED</i>	Social theory of learning	*EL is explicitly defined as 'learning to recognize and act on opportunities, and interacting socially to initiate, organize and manage ventures' (p.324)	GE (entrepreneur)	Contextual learning	A qualitative study based on multiple life story interviews with 3 entrepreneurs over 2 years	Individual
Rae ^(a,b,7,15)	2006	UK	<i>Technology Analysis & Strategic Management</i>	Social theory of learning	*EL is explicitly defined as 'learning to recognize and act on opportunities, through initiating, organizing and managing ventures in social and behavioral ways.' (p.40)	SE	Experiential learning, work-based learning	A qualitative study based on 10 case studies of entrepreneurs	Individual
Rae and Carswell ⁽⁷⁾	2001	UK, UK	<i>JSB&ED</i>	Social constructionist	*EL is explicitly defined as 'how people construct new meaning in the process of recognizing and acting on opportunities, and of organizing and managing ventures.' (p. 150)	GE (entrepreneur)	Experiential learning	A qualitative study based on 13 in-depth semi-structured life story interviews with entrepreneurs	Individual

Ravasi and Turati ^(6,3,4,5)	2005	Italy, Italy	<i>JBV</i>	Entrepreneurial cognition (and organizational learning)	*EL is implicitly defined as 'The learning process that occur as entrepreneurs accumulate and organize knowledge and information within (i.e. Van de Ven and Polley, 1992; McGrath 1995) and across developmental efforts (Mimiti & Bygrave 2001)' (p. 139)	EE (small firms)	Exploratory and generative learning	A qualitative study of two developmental projects aimed at exploring new business opportunities within the same organization; data was collected through semi-structured interviews	Project
Rerup ^(4,10)	2005	Canada	<i>Scandinavian Journal of Management Technology</i>	Behavioural learning and economics	None given	GE (discovery and exploitation)	Experiential learning	n/a	Individual
Rhee, Park and Lee ^(1,6)	2010	South Korea, UK, UK		Organizational learning (learning orientation)	None given	EE (small/medium firms)	Learning orientation	A quantitative study of 333 technology-based SMEs in South Korea	Firm
Sanz-Velasco	2006	Sweden	<i>IJEB&R</i>	Entrepreneurship and organizational learning	*None given	GE (discovery and development)	Learning from prior knowledge	A qualitative study based on 20 interviews with start-up founders and managing directors	Individual
Sardana and Scott-Kemmis ^(6,b,1,6,8,14)	2010	Australia, Australia	<i>Journal of Small Business Management</i>	None given	*EL is explicitly defined as 'the process by which entrepreneurs develop skill and competency through experience and vicarious experience.' (p. 442).	SE	Aggregate (experiential) learning	A quantitative study of 32 entrepreneurs (including 7 from Indian and 25 from Australia)	Individual
Schildt, Maula and Keil ^(3,4,10,16)	2005	Finland, Finland, Canada	<i>ET&P (Special Issue)</i>	Organizational learning	None given	EE (large firms)	Explorative and exploitative learning; inter-organizational learning	A quantitative study of 110 largest public US corporations, using published secondary data	Firm
Shepherd and Kuratko	2009	US, US	<i>Business Horizons</i>	None given	*None given	EE (unspecified)	Learning from failure	n/a	Individual
Shepherd, Covin and Kuratko ^(2,10)	2009	US, US, US	<i>JBV</i>	Complement social cognitive theory with psychological theories on grief and coping	None given	EE (unspecified)	Learning from failure	n/a	Individual
Sirén, Kohtamäki and Kuckertz ^(3,4,6,9,10,16)	2012	Finland, UK, Germany	<i>Strategic Entrepreneurship Journal</i>	Strategic entrepreneurship	None given	EE (micro/small/medium/large firms)	Strategic learning	A quantitative study of 210 software firms in Finland	Firm

Appendix 1. Continued

Authors	Year	Country	Journal	Theoretical perspectives	Definition of EL	Entrepreneurial context	Types of learning	Methods	Unit of analysis
Stokes and Blackburn	2002	UK, UK	<i>JSB&ED</i>	None given	None given	EE (small firms)	Experiential learning	A mixed methods study based on 20 interviews with advisors, a postal survey of 387 owner-managers and 20 interviews with owners-managers	Individual
Sullivan ^(7,14)	2000	UK	<i>IJEB&R</i>	Experiential learning and organizational learning	*None given	SE	Experiential learning; organizational learning (double-loop learning)	A mixed methods study; no details given	Individual
Sundbo ^(1,14)	1996	Denmark	<i>Technovation</i>	Resource-based view	None given	EE (unspecified)	Organizational learning	A qualitative study based on case studies of 21 Danish service firms and 7 manufacturing firms; in total 96 interviews plus a survey	Firm
Taylor and Thorpe ^(7,8)	2004	UK, UK	<i>JSB&ED</i>	Social constructionist and activity theory	*None given	EE (small firms)	Learning through co-participation (socially constructed)	A qualitative study based on 6 case studies using semi-structured interviews and the critical incident technique with entrepreneurs	Individual
Thorpe, Gold, Holt and Clarke ^(2,8)	2006	UK, UK, UK, UK	<i>International Small Business Journal</i>	Constructionist theory of learning; cognition	*EL is implicitly defined as 'the ability to take the routines by which people typically make sense of their world (Starbuck 1983) and to change them in some arresting manner.' (p. 237)	GE (entrepreneur)	Socially embedded learning	A qualitative study using an e-postcard methodology to conduct email interviews on 44 entrepreneurs	Individual
Voudouris, Dimitrators and Salavou ^(6,1,5,6,10,14)	2010	Greece, Greece, Greece	<i>International Small Business Journal</i>	Entrepreneurship	*EL is explicitly defined as 'a continuous process leading to the development of knowledge required for starting and managing a venture (Politis 2005).' (p.239)	SE	Individual and team learning	A longitudinal, qualitative case study of a Greek ICT firm	Firm

Wang ^(a,1,5,6,10,14)	2008	UK	<i>ET&P</i>	Organizational learning theory was used to conceptualize entrepreneurship	None given	EE (medium-to-large firms)	Organizational learning orientation, adaptive and generative learning	A quantitative study of 213 medium-to-large UK firms based on a mailed survey	Firm
26Wang and Rafiq ^(a,1,3,6,7,10,14)	2009	UK, UK	<i>European Journal of Innovation Management</i>	Organizational learning	*None given	EE (unspecified)	Convergent, divergent; individual, organizational; generative, adaptive	n/a	Firm
Westhead and Wright	2011	UK, UK	<i>International Small Business Journal</i>	Entrepreneurship	*EL is implicitly defined as 'the process by which people acquire, assimilate, and organize newly-formed knowledge with pre-existing structures' (Holcomb <i>et al.</i> 2009, p. 168)	GE (unspecified)	Learning from past business/entrepreneurial experience (experiential learning)	n/a	Individual, Firm
Young and Sexton ^(2,8,10,14)	2003	US, US	<i>Journal of Entrepreneurship</i>	None given	*EL is explicitly defined as 'the variety of experiential and cognitive processes used to acquire, retain and use entrepreneurial knowledge.' (p. 156)	GE (entrepreneur)	Self-directed, double-loop learning	A qualitative study based on interviews with 10 entrepreneurs	Individual
Zahra, Abdelgawad and Tsang ^(1,6)	2011	US, Spain, US	<i>Journal of Management Inquiry</i>	Organizational learning	None given	EE (MNCs)	Learning, unlearning, metalearning or learning to learn	n/a	Firm
Zhao, Li, Lee and Chen ^(a,1,3,5,6,10,14,16)	2011	China, China, US, China	<i>ET&P</i>	Organizational learning	None given	EE (small/medium/large)	Experimental learning, acquisitive learning	A quantitative study of 607 Chinese manufacturing firms	Firm

Notes to Appendix 1: *Articles that explicitly use the term 'entrepreneurial learning'.

^aArticles that cite Harrison and Leitch (2005); 14 out of 43 articles published after 2005.

^bArticles that cite Mimiti and Bygrave (2001); 23 out of 61 articles published after 2001. ¹Articles that cite Argyris and Schön (1978) (21 articles), ²articles that cite Brown and Duguid (1991) (8 articles), ³articles that cite Cohen and Levinthal (1990) (16 articles), ⁴articles that cite Cyert and March (1963) (10 articles), ⁵articles that cite Fiol and Lyles (1985) (11 articles), ⁶articles that cite Huber (1991) (22 articles), ⁷articles that cite Kolb (1984) (20 articles), ⁸articles that cite Lave and Wenger (1991) (8 articles), ⁹articles that cite Levitt and March (1988) (9 articles), ¹⁰articles that cite March (1991) (22 articles), ¹¹articles that cite March and Olsen (1975) (2 articles), ¹²articles that cite March and Olsen (1976) (2 articles), ¹³articles that cite March and Simon (1958) (3 articles), ¹⁴articles that cite Senge (1990) (16 articles), ¹⁵articles that cite Wenger (1998) (5 articles), and ¹⁶articles that cite Zahra and George (2002) (8 articles).

Appendix 2. The rationale for the inclusion and exclusion criteria

The rationale for the inclusion criteria is as follows. First, we set the search boundary within academic journal articles. Books such as Harrison and Leitch (2008) were excluded because they were a collection of research articles that are also published as journal articles. Additionally, the prevalent use of electronic journal databases has considerably improved the accessibility, dissemination and impact of journal articles compared with books and chapters. Working papers were also excluded because of the insufficient peer review process.

Second, we included academic journal articles listed in the *ABS Academic Journal Quality Guide*, Version 4, by Subject Area (Kelly *et al.* 2010). The ABS Guide was used because it: (a) indicates a level of quality for the journals included; (b) provides a useful method of limiting the review which could otherwise be overwhelming (Pittaway *et al.* 2004; Thorpe *et al.* 2006); and (c) covers the social sciences thereby including the key disciplines, fields and sub-fields within which business and management research is published (Kelly *et al.* 2010). While the ABS Guide helps to define the search boundary, a potential drawback is that any relevant articles published in non ABS-listed journals would not have been included in the literature search. To mitigate this potential risk, we used Google Scholar to triangulate the search (NB See 'Methods' section).

Third, we focused the search in the business and management discipline only, to generate articles that were most relevant to EL in the business and management context. While other disciplines, such as psychology and sociology may have also published articles on learning, the possibility of identifying the most relevant articles on EL in these disciplines is small, given the focus of those journals. Therefore, to limit the search to articles that were most relevant to EL in the business and management, of the 22 categories (a total of 821 journals) listed in the ABS guide we selected 'Entrepreneurship and Small Business Management' as the primary source of the literature search. As the secondary literature sources, we selected 'General Management', 'Strategic Management', 'Organization Studies', 'Innovation' and 'Management Development and Education', as these categories also include journals that occasionally publish entrepreneurship research. To increase coverage of the journals that were searched and to ensure

that the most relevant articles were included in the study, we also selected journals from additional Subject Areas. These included the *Journal of International Business Studies* and *Journal of World Business* from the International Business and Area Studies category; the *Journal of Business Research* from the Marketing category; *Management Science* and *Omega: The International Journal of Management Science* from the Operations Research and Management Science category; and *Research Policy* and *Industrial and Corporate Change* from the Social Science category.

Fourth, within all the above categories of journals, we conducted searches using the electronic databases Business Source Complete, Science Direct, JSTOR and Wiley Online Library, covering the period up to and including August 2012. We searched the Title and Abstract fields using the primary Boolean search terms of 'entrepreneur* AND learn*', and the secondary search term of 'opportunity AND learn*' to identify all articles within the conceptual boundaries. These search terms were sufficiently inclusive to capture articles within the conceptual boundaries, and exclusive enough to eliminate less relevant articles. This resulted in 158 articles.

Our exclusion criteria were applied to ensure that each article clearly fell in the conceptual boundaries we set. In particular, we excluded:

- (a) 26 articles that focused primarily on entrepreneurship, but had little connection to learning (e.g. Gartner *et al.* (2006) was excluded, because it provided only a general review of entrepreneurship without any substantive discussion on EL, although it contained the search terms within the search boundaries);
- (b) 13 articles that focused primarily on learning, but not in an entrepreneurial context (e.g. Moray and Clarysse (2005) dealt with how a public research organization learns, rather than EL);
- (c) 13 articles that focused primarily on learning in the contexts of entrepreneurship education, teaching and training (e.g. Pittaway and Cope (2007) studied how students learn in classrooms, rather than learning in the real-life entrepreneurial context);
- (d) 6 articles that focused primarily on the process of innovation or new product development rather than entrepreneurship (e.g. Abetti 1997);
- (e) 5 articles that focused on the internationalization process (e.g. De Clercq *et al.* 2005);

- (f) 4 articles that focused on technological learning rather than learning in the entrepreneurship process (e.g. Carayannis 1998);
- (g) 3 articles that focused on how investors learn (e.g. De Clercq and Sapienza 2005);
- (h) 3 articles that focused on self-employment, and the management of a small business (e.g. Deakins *et al.* 2002);
- (i) 3 articles that focused on cognition rather than learning (e.g. Baron 2007);
- (j) 2 articles that focused on the methodology to study EL (e.g. Johansson 2004);
- (k) 1 article that touched on both entrepreneurship and learning as part of a review, but provided no substantive discussion on either area (i.e. Hakala 2011).
- (l) 1 article that focused on organizational change (i.e. Kharbanda and Jain 1997);
- (m) 1 article that focused on the social order of the firm (i.e. Downing 2005);
- (n) 1 article that focused on a practitioner-based approach (i.e. Brush 2008);
- (o) 1 article that focused on an economic model (i.e. Cressy 1992).