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### Team entrepreneurial competence

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# Team entrepreneurial competence: multilevel effects on individual cognitive strategies

Team  
entrepreneurial  
competence

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## Abstract

**Purpose** – The purpose of this paper is to introduce the concept of team entrepreneurial competence, a team-level construct representing the level of shared abilities toward entrepreneurial activities within a new venture team. A multilevel model of the influence of team entrepreneurial competence and team entrepreneurial experience on the cognitive strategies of team members is developed and tested.

**Design/methodology/approach** – Using a sample of 47 early stage entrepreneurial teams (144 individuals), a set of hypotheses regarding the effect of team entrepreneurial competence on team member reliance on effectual and causal reasoning, together with the moderating effect of team entrepreneurial experience, are tested.

**Findings** – The results provide support for a positive multilevel association between team entrepreneurial competence and the reliance by team members on both causal and effectual reasoning strategies; members of teams with higher entrepreneurial competence and more entrepreneurial experience are more likely to engage in effectuation.

**Research limitations/implications** – Understanding how team-level predictors and moderators have a role in determining individual effectuation and causation strategies offers promise in advancing effectuation theory.

**Practical implications** – Teams develop entrepreneurial competencies that transcend those of individual team members; where teams have more collective entrepreneurial experience, the effect on the tendency of individuals to engage in effectual reasoning is enhanced, which can be beneficial in highly uncertain contexts.

**Originality/value** – The results of this study are a step forward for effectuation theory, as it demonstrates the role of team-level variables in explaining individual causal and effectual reasoning.

**Keywords** Entrepreneurial teams, Multilevel research, Effectuation and causation, Team entrepreneurial competence, Team entrepreneurial experience

**Paper type** Research paper



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## Introduction

Starting a new business as a team is different from doing it alone. While working alone is essentially dependent on individual capacity and one's personal ability to deal with contingencies, working as a team is dependent on team member capacities, coordinated direction and synchronization of effort (Kamm *et al.*, 1990; Harper, 2008; Klotz *et al.*, 2014).

Team members coordinate work, congregate efforts, share knowledge and information, and develop mutual competencies, effectively constituting a superordinate entity that transcends the individual members (Marks *et al.*, 2001).

Prior research on entrepreneurial teams has focused on the implications of compositional team characteristics (such as size, age, levels of experience and diversity) and the association of such characteristics with team and organizational outcomes (Watson *et al.*, 2003; Chandler *et al.*, 2005). Other streams of research have focused on operational and relational aspects of entrepreneurial teams. Examples include human capital (Baum and Silverman, 2004; Hmieleski *et al.*, 2012), social capital (Cope *et al.*, 2007), levels of trust and control (Middleton and Nowell, 2018), role and goal conflict (Ensley *et al.*, 2002) and financial resources (Cooper *et al.*, 1994; Gimeno *et al.*, 1997), among other topics.

The psycho-social characteristics of entrepreneurial teams are less well-understood. Here, we refer to variables that reflect the collective cognitions, attitudes, emotions, orientations or capabilities of teams. In this vein, Shepherd and Krueger (2002) have discussed team-level social cognitions related to the perceived desirability and feasibility of entrepreneurial action. Chen *et al.* (2017) explore how shared cognitions in teams can positively influence cohesion, restrain conflict and enhance team performance. Others consider collective identities of entrepreneurial teams (Powell and Baker, 2017), the extent to which teams demonstrate a more task- or relationship-oriented personality (Zhou *et al.*, 2015), and team entrepreneurial passion (Cardon *et al.*, 2017; Santos and Cardon, 2018).

The limited research in this area has tended to be more conceptual in nature, due perhaps to the measurement challenges involved in capturing a team-level perception, orientation or capability. Thus, Shepherd and Krueger (2002, p. 168) lament the “inadequacy of addressing collective decisions by simply summing the cognitions of team members [...]”. West (2007) notes that collective cognitions are “fundamentally different from individual cognition or from the aggregation of individual cognitions” (p. 78). This distinction has led to calls for further development of cognitive-based constructs as they apply to new venture teams (Klotz *et al.*, 2014) and how they relate to decision-making processes.

The current study addresses this call by introducing the concept of team entrepreneurial competence, which we define as the level of shared abilities toward entrepreneurial activities in an entrepreneurial team. When two or more people interact dynamically and create interdependent relations with the common goal of starting a new business, their individual capabilities can be heightened, refined, enhanced and reinforced as team competence. As such, prior work on the entrepreneurial competence of an individual (Morris *et al.*, 2013; Santos *et al.*, 2013) can be extended to the team or collective level.

The importance of conceptualizing individual-level constructs at a team level is tied to the potential implications of such team-level phenomena for how individual members think, feel, behave, act and solve problems. Exploring such relationships represents a step forward in understanding entrepreneurship from a multilevel perspective (Shepherd, 2011). Multi- or cross-level relationships are involved when higher-level constructs have an effect on lower-level variables (top-down contextual influences) and when lower-level properties emerge and influence higher-level variables (bottom-up effects) (Chan, 1998; Chen *et al.*, 2004).

Multilevel phenomena have been widely investigated in organizational theory (Crossan *et al.*, 1999) and are of growing interest within the entrepreneurship literature. Hence, Shepherd *et al.* (2010) demonstrate how the mindsets of individuals contribute to an entrepreneurial culture at the organizational level, while at the same time the organization influences individual-level entrepreneurial attitudes. With entrepreneurial teams, researchers have explored how dynamic learning processes in technology-based ventures begin with individuals, evolve to affect teams and finally are reflected in organizational behaviors and routines (El-Awad *et al.*, 2017), the effects of team membership on the transformational

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leadership qualities of individuals (Hensel and Visser, 2018), and the bottom-up effects of team personality level and diversity on venture growth (Zhou *et al.*, 2015).

The purpose of the current study concerns top-down influences, and specifically, the impact of team entrepreneurial competence on two individual-level cognitive reasoning strategies, effectuation and causation. Effectuation theory has emerged as a prominent perspective within the entrepreneurship discipline, generating considerable debate (Arend *et al.*, 2015; Garud and Gehman, 2016; Read *et al.*, 2016) and producing a growing body of empirical insights (Wiltbank *et al.*, 2006; Nelson, 2012). Yet, to date, research on effectuation has not considered the influence of entrepreneurial teams on the cognitive strategies of individuals. This study addresses this gap by examining the role of team level entrepreneurial competence, while also assessing the moderating role of team-level experience.

The research seeks to make two contributions to the literature. First, it expands conceptual and empirical work on entrepreneurial teams, by introducing entrepreneurial competence at the team level. This study integrates recent work on entrepreneurial teams (Breugst *et al.*, 2015; Cardon *et al.*, 2017; Middleton and Nowell, 2018), team entrepreneurial cognition (Shepherd and Krueger, 2002; West, 2007) and entrepreneurial competencies (Morris *et al.*, 2013) to further understand how entrepreneurial teams function. Additionally, while collective affect of new venture teams has been examined elsewhere (Cardon *et al.*, 2017; Santos and Cardon, 2018), this study further contributes to explore collective cognitions and breaks new ground in terms of how such properties can be empirically captured (West, 2007). Second, the study advances effectuation theory by introducing a multilevel perspective on the antecedents to effectual and causal reasoning (Perry *et al.*, 2012). Thus, the focus on team-level predictors and moderators of effectuation and causation provides unique insights beyond existing work, “enabling the field to advance quickly in the study of effectuation in specific and of the “made” view of entrepreneurship in general” (Read *et al.*, 2009, p. 574).

### **What is team entrepreneurial competence?**

An entrepreneurial team is defined as a “the group of individuals that is chiefly responsible for the strategic decision making and ongoing operations of a new venture” (Klotz *et al.*, 2014, p. 227). As many contemporary ventures are developed by a group of individuals rather than independent entrepreneurs by themselves (Harper, 2008; Schjoedt *et al.*, 2013), it is important to understand the influence of teams on the new venture creation process. Two or more people, as a team, constitute a unit characterized by a combination of resources and knowledge that is more than the summation of resources and knowledge held by individual members, and thus represents additional value to the firm (Timmons, 1994; Cooper and Daily, 1997). The interdependence of individuals and their dynamic interaction in a team create superordinate and shared phenomena that transcend individual-level inputs or performance (Morgeson and Hofmann, 1999).

Building on previous scholarly work on team creativity (Pirola-Merlo and Mann, 2004), team innovation (Drach-Zahavy and Somech, 2001), and more recently within entrepreneurship research, on team entrepreneurial passion (Cardon *et al.*, 2017), this study proposes the emergence of team entrepreneurial competence, as a collective propensity to establish a successful venture. Team-level constructs are defined according to a multilevel framework (Kozlowski and Klein, 2000), and are based on aggregation models, which postulate that lower-level data can be used to define a higher-level construct, with a collective and aggregated nature as a combination from the lower-level units (Chan, 1998). The aggregated constructs describe a shared team property, such as shared cognitions, experiences, attitudes, values or behaviors (Kozlowski and Klein, 2000). In the aggregation process, team emergence is a consequence of the bottom-up processes, which happen as the lower-level properties form a collective phenomenon (Chan, 1998). In this logic, team entrepreneurial competence, as a higher-level entity, represents the level of shared abilities

for entrepreneurial activities within an entrepreneurial team. Similar to other aggregation team-level variables such as collective efficacy (Mischel and Northcraft, 1997) or collective psychological ownership (Man and Farquharson, 2015), team entrepreneurial competence emerges from individuals within a team, and representing, therefore, a shared construct which is defined using a referent-shift consensus model (Chan, 1998). Specifically, team entrepreneurial competence emerges by asking individual team members to what extent the team, as a whole, has specific capabilities and skills related to creating successful ventures. As such, team entrepreneurial competence integrates the collective ability of the team beyond each individual team members' abilities or competencies.

Because team entrepreneurial competence emerges from individuals within a team, the features of individual-level entrepreneurial competence are expected to support the emergence of the team-level construct. As such, entrepreneurial competence at the individual and team levels is functionally and structurally equivalent. Being functionally similar means that they have equivalent functions. Thus, entrepreneurial competence enables either individuals or teams to successfully perform entrepreneurial activities. Being structurally equivalent means that individual and team entrepreneurial competence have a similar configuration. Specifically, the set of dimensions that were found to be part of individual-level entrepreneurial competencies (i.e. vision, resilience and resource leveraging) (Morris *et al.*, 2013; Santos *et al.*, 2013) are expected to be also part of the team-level entrepreneurial competencies. Therefore, we assume that, similarly to individual-level entrepreneurial competence, team entrepreneurial competence is characterized by the following dimensions: desire for independence, economic motivation, communication and persuasion capacity, capacity to develop the network, leadership capacity, vision, emotional intelligence, innovation capacity, resources mobilization capacity, resilience, entrepreneurial self-efficacy and creativity (Santos *et al.*, 2013).

### **Team entrepreneurial competence and individual cognitive strategies**

To the extent that entrepreneurial competence emerges as a valid construct at the team level, assessing its influence on individual team members becomes relevant. As a shared subjective sense of a team's entrepreneurial competence, this team-level variable could be expected to directly affect the behaviors and decision-making processes of individuals. Particularly important for entrepreneurs at the individual level are two unique cognitive reasoning strategies: effectuation and causation (Sarasvathy, 2001), which have been heavily emphasized in the literature (Karri and Goel, 2008; Chandler *et al.*, 2011; Fisher, 2012; Reymen *et al.*, 2015; Arend *et al.*, 2016). The issue becomes one of determining how team entrepreneurial competence influences the tendency of individual team members to engage in more causal or effectual reasoning mechanisms.

Sarasvathy (2001, p. 245) explains that "causation processes take a particular effect as given and focus on selecting between means to create that effect. Effectuation processes take a set of means as given and focus on selecting between possible effects that can be created with that set of means." Causation is consistent with perspectives regarding the value of planned strategies and the general idea that opportunities are recognized and their effects are predicted through business planning. In other words, causation follows a planned strategy approach, including deep assessment and analysis in such a way that the outcomes can be achieved by calculation or statistical inference (Sarasvathy, 2001, 2009). In contrast, effectuation is consistent with emergent and unpredictable strategies and occurs under uncertain conditions in such a way that planning is limited. Effectuation is congruent with non-predictive strategies and assumes that the uncertainty and changing circumstances make it impractical to develop statistical inferences and calculate the output of an action (Sarasvathy, 2001, 2009).

In work on the behavioral assumptions that lay behind effectuation (Karri and Goel, 2008; Sarasvathy and Dew, 2008), researchers have proposed that specific traits and

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attitudes of entrepreneurs, such as over-trust and self-efficacy, can determine why they are more prone to use effectual logic (Goel and Karri, 2006). Sarasvathy's (2001, 2009) research has focused on the roles of entrepreneurial expertise and individual performance, knowledge and skills in determining how entrepreneurs approach the discovery and exploitation of opportunities from a cognitive perspective. Yet, when the entrepreneur is part of a founding team, little is known about how team-level characteristics influence individual team member reliance on causal or effectual reasoning.

Team entrepreneurial competence, as a collective ability, should similarly impact the tendency of an individual team member to use effectual and causal reasoning strategies. Because the shared understanding of a team's entrepreneurial competence transcends individual-level perceptions of competence, it should influence how team members choose to deal with uncertainty. The relevance of causal or effectual approaches for achieving venture success will tend to vary depending on the levels of unpredictability and uncertainty surrounding the entrepreneurial journey (Gabrielsson and Politis, 2011; Shirokova *et al.*, 2017; d'Andria *et al.*, 2018). Prior research suggests that both effectuation and causation are relevant for entrepreneurship, but their relative importance are linked to the requirements and demands throughout the different stages of the venture creation process, and to individual-level characteristics. For example, a longitudinal study of the venture creation process by nascent entrepreneurs found evidence of a reliance on both causation and effectuation, depending on where the individual was in the process (Ilonen *et al.*, 2018). Ortega *et al.* (2017) demonstrate that, when developing new products, causal reasoning was relied upon when exploiting incremental improvements to existing products, while effectual reasoning was employed in projects involving higher levels of innovativeness and uncertainty. Berends *et al.* (2014) identify a pattern in small manufacturing firms where effectual logic was employed early in the innovation process, with causal logic relied upon later in the process. Reymen *et al.* (2017) discover that effectual logic was dominant when generating a viable value proposition for a specific customer segment, while causal logic was more prominent when defining other business model components in relation to the value proposition and customer segment. The background of individuals is also relevant (Neumeier and McKenna, 2016), as science-based entrepreneurs show a higher tendency toward causal approaches and non-science founders tend to use a more flexible effectual approach (Villani *et al.*, 2018). Overall, significant prior research supports the notion that, rather than relying upon one or the other logic exclusively, "ventures combine effectual and causal logics in key decisions along the development process and the emphasis in the use of logics shifts over time" (Reymen *et al.*, 2015, p. 353).

Building on this prior research and the premise that team-level variables influence individual behaviors and decision-making strategies, this paper proposes that team entrepreneurial competence has a positive association with both the use of effectuation and causation strategies by individual team members. More specifically, as an integrative construct, team entrepreneurial competence is comprised of particular dimensions that are associated with a reliance on effectual reasoning. Especially relevant in this regard are the following dimensions: innovation capacity, resource mobilization capacity, networking capacity, creativity and self-efficacy. If an individual perceives that his or her team has a high capacity to innovate and a strong ability to leverage resources and networks in creative ways, and is confident in the team's ability to engage in entrepreneurial behaviors, he/she will feel more comfortable with effectual approaches (Chandler *et al.*, 2011; Fisher, 2012). Based on their sense of the team and its capabilities, the individual should have more confidence in his/her abilities to experiment and learn, capitalize on resources not under his/her control to affect outcomes and creatively exploit contingencies (Sarasvathy, 2001). Beyond one's sense of their own capabilities, believing the team can enhance the efforts of a member with these types of collective capabilities while also serving as a source of

encouragement and reinforcement will increase the likelihood of the individual engaging in effectual reasoning. Thus, in circumstances and with tasks where effectual reasoning tends to be especially relevant, individuals in teams with high entrepreneurial competence will be more favorably disposed toward a reliance upon this type of reasoning. Based on this discussion, the following hypothesis is proposed:

- H1.* There is a positive association between team entrepreneurial competence and the reliance by individual team members on effectual reasoning.

Causation-based logic takes a particular effect as guaranteed and focuses on selecting between available means to create that effect (Sarasvathy, 2001). One engages in systematic information gathering and analysis within certain bounds, with a sense that the future is controllable. Individuals have to stay the course in order to accomplish planned goals and systematic outcomes. Specific dimensions of team entrepreneurial competence would seem consistent with this type of reasoning. Where the team is perceived to be strong in terms of vision regarding a defined future, causal reasoning would seem likely, as effectuation is more associated with an unknowable future (Fisher, 2012). Similarly, team resiliency in staying the planned course in the midst of uncertainty, together with emotional intelligence to deal with adversity and stress, would also support the individual approaching the venture from a more causal perspective (Chandler *et al.*, 2011). As causal thinking suggests that specified results will follow from adhering to a plan, a strong team economic motivation might also be expected to encourage such thinking (Sarasvathy, 2001). Further, stronger team-level social skills can reinforce the team member's comfort with the need to generate critical resources, persuade others, and rally support for the goals and strategic actions contained within the plan. Thus, teams that perceive their entrepreneurial competence as high are more likely to favor the use of causal logic in the circumstances that require this type of reasoning. The integrative nature of team entrepreneurial competence and the diverse set of competencies that it comprises create the capacity to foster a reliance on causal reasoning in circumstances perceived to be more controllable. Based on this discussion, the following hypothesis is proposed:

- H2.* There is a positive association between team entrepreneurial competence and the reliance by individual team members on causal reasoning.

In summary, *H1* and *H2* suggest that different dimensions of team entrepreneurial competence can combine to positively influence a reliance by individuals on both effectual and causal reasoning strategies depending upon circumstances.

### **The role of team entrepreneurial experience**

Entrepreneurship is a "lived experience" impacting the emergence of both the entrepreneur and the venture. The individual experience is a critical contextual factor that affects learning, emotions and decision making as a venture unfolds (Morris *et al.*, 2012). As such, having prior start-up experience can serve as an especially critical source of knowledge and learning during the entrepreneurial journey. Prior entrepreneurial experience is arguably a proxy for entrepreneurial expertise, as it provides the tacit and experiential knowledge that is useful for decision making (Gabrielsson and Politis, 2011).

Expertise tends to be associated with a preference for different cognitive logics. For instance, Dew *et al.* (2009) demonstrate that expert entrepreneurs are more apt to frame decisions using effectual logic, where they identify more potential markets, focus on building the venture as a whole, pay less attention to predictive information, make do with resources at hand and invest only what they can afford to lose, and stitch together networks of partnerships. Alternatively, novices tend to rely on a predictive frame and follow textbook procedures in arriving at decisions. Similarly, Politis (2008) finds that, when comparing habitual and novice entrepreneurs, the former demonstrated better abilities to

cope with the liability of newness, stronger preferences for effectuation and more favorable attitudes toward failure. Gabriellsson and Politis (2011) provide evidence that prior start-up experience moderates the relationship between career motives and effectual decision-making logic for spiral-minded (vs transitory) entrepreneurs.

Altogether, the evidence suggests that effectual reasoning is more common among so-called expert entrepreneurs or those with substantive entrepreneurial experience (Sarasvathy, 2001, 2009; Read and Sarasvathy, 2005). Expertise gives the entrepreneur a richer sense of what is or is not controllable and predictable, a better understanding of the roles of flexibility and experimentation, and superior preparation regarding how to deal with contingencies (Dew *et al.*, 2009).

Less apparent is how experience at the team level influences the use of effectuation and causation by individual team members. Effectuation theory has not explored how team-level phenomena can affect behavioral decision-making strategies of individuals. However, consistent with work at the individual level, the team's previous entrepreneurial experience, defined as the summation of the entrepreneurial experience of the individual team members, can be expected to influence the relationship between team entrepreneurial competence and individual reasoning strategies. Specifically, where the team has high levels of entrepreneurial competence and entrepreneurial experience, team members will be more apt to rely on effectual reasoning approaches, as they are better able to see how to use their means to imagine possible future outcomes. Expertise amplifies the role of competencies in fostering a willingness to experiment, leverage available resources and adapt to circumstances as things emerge. Based on the above arguments, the following hypothesis is proposed:

- H3.* Team previous entrepreneurial experience moderates the relationship between team entrepreneurial competence and the use of effectuation by individual team members, such that in teams with high team entrepreneurial competence and previous entrepreneurial experience, individual team members will be more likely to rely on effectual reasoning.

Causation is as relevant for entrepreneurship as effectuation (Reymen *et al.*, 2015). Again, both cognitive reasoning strategies are useful during the entrepreneurial journey, depending on the circumstances, context and conditions (Gabriellsson and Politis, 2011; Brettel *et al.*, 2012; Reymen *et al.*, 2015). Yet, experience by itself would not appear to play a significant role in fostering a reliance on causal reasoning (Sarasvathy, 2001, 2009; Dew *et al.*, 2009). If anything, expertise makes it clearer that outcomes are not controllable nor is the future predictable, and that one must do what one can with the means at hand. Those who have already pursued entrepreneurial journeys better understand the emergent nature of entrepreneurship. Alternatively, the novice entrepreneur, and by extension the novice entrepreneurial team, will gravitate toward a belief in predictive outcomes, objective opportunities, systematic information gathering and analysis, and planning logic. Therefore, while entrepreneurial experience affects cognitive reasoning (Politis, 2008; Dew *et al.*, 2009), team entrepreneurial experience will not have a significant effect on the relationship between team entrepreneurial competence and team member reliance on causal logic.

Figure 1 captures the conceptual linkage between team entrepreneurial competence and individual-level cognitive reasoning approaches, together with the moderating effect of the team's previous entrepreneurial experience.

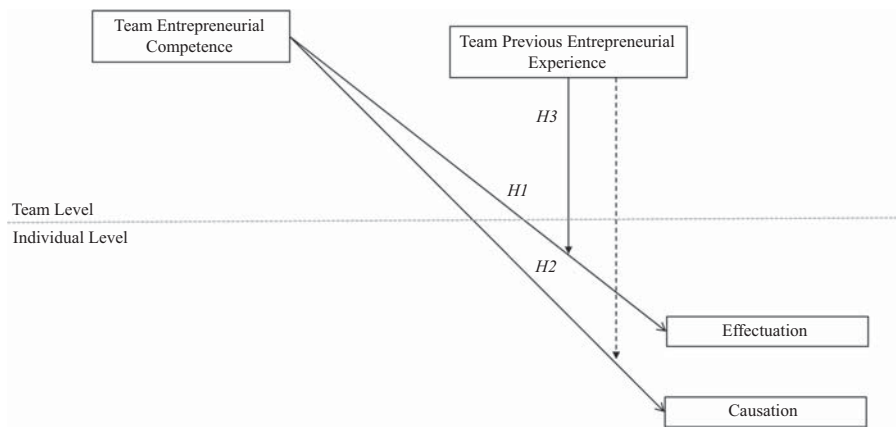
## Method

### *Sample and data collection context*

To test the model and hypotheses, this study was undertaken with 47 early stage entrepreneurial teams (144 individuals) involved in a venture competition for fundraising developed in a European country (response rate = 78.3 percent; 60 teams were invited to



**Figure 1.** Multilevel model of the influence of team entrepreneurial competence and team previous entrepreneurial experience on cognitive strategies of individuals



**Notes:** Team-level controls were deleted from the figure for simplicity reasons. Dashed line represents a non-significant relation

participate, and all members of 47 teams completed the questionnaires). A team is comprised of the set of people who come together in order to develop and implement a new venture (Klotz *et al.*, 2014). Team members in the venture competition are all co-founders of the business, with ownership shares, and do not include board members or advisors. The average size of each entrepreneurial team was three members (maximum = 6; minimum = 2). The participants were mainly male (78.5 percent), their ages ranged from 22 to 62 years old ( $M = 39.33$ ;  $SD = 11.75$ ), and almost all were Europeans (95 percent). A majority of the participants had a university degree (53.15 percent), with 23.17 percent completing high school, 13.28 percent completing a master degree and 10.40 percent having a doctoral degree. The entrepreneurial teams were competing in four thematic business tracks: medical devices and health IT, smart cities and industrial technologies, enterprise IT and smart data, and ocean economy.

As the level of analysis of this study is the team, it is also important to consider team-level demographics. Regarding gender, 26 teams were all-male, 11 were primarily male (> 50 percent), 9 were half-male and half-female, and only 1 was primarily female (> 50 percent). There were seven teams in which all members had previous entrepreneurial experience, 1 with more than 50 percent of members having entrepreneurial experience, 25 where half the members had entrepreneurial experience, 8 where less than 50 percent of members had entrepreneurial experience and 6 teams in which no members had entrepreneurial experience.

The venture competition unfolded over 10 months, from the applications period to the final announcement. At an early stage of the competition, the teams attended a one-week training bootcamp that addressed how to develop tech-based entrepreneurial ventures and successful go to market strategies. Data were collected during this early stage to avoid bias toward inflated ratings. The research team attended the bootcamp, presented the project and requested the participation of all team members. Participants were asked to complete the questionnaire, which was coded using a team ID. Participants were informed that data were collected only for research purposes and that results would not have any impact on the venture competition results.

### Measures

Team entrepreneurial competence was measured using the referent-shift approach (Chan, 1998), which was applied to the entrepreneurial potential assessment inventory (EPAI)

(Santos *et al.*, 2013). The set of items were preceded by the following instruction: “Think about your team. Having in mind the usual way of acting within your team, please indicate the level of agreement or disagreement with the following statements.”

The adapted version of the EPAI included 43 items capturing 12 dimensions of entrepreneurial competencies. These dimensions were measured as follows: communication and persuasion capacity, with three items (e.g. “Mostly, we are able to influence people in doing things which we want.”); capacity to develop the network, with two items (e.g. “We know people from different geographical locations/regions.”); leadership capacity, with six items (e.g. “We are easily able to lead people having different ideas than ours.”); innovation capacity, with three items (e.g. “People frequently take our help in implementing innovative activities.”); emotional intelligence, with two items (e.g. “We are able to identify our emotions easily.”); desire for independence, with three items (e.g. “The most important thing for us is to be our own boss.”); economic motivation, with three items (e.g. “Our main focus is to make money.”); resource mobilization capacity, with four items (e.g. “Mostly, we are able to find necessary resources to complete the projects.”); vision, with four items (e.g. “We can foresee what we want to achieve in two years.”); resilience, with four items (e.g. “It does not take long to recover from a stressful event.”); general entrepreneurial self-efficacy, with five items (e.g. “We feel competent to deal effectively with the real world.”); and creativity capacity was measured by four items (e.g. “Being creative is one of our advantages.”). All the items were answered on a five-point Likert scale, ranging from 1 (disagree completely) to 5 (agree completely). A second-order confirmatory factor analysis was conducted to verify the construct validity of entrepreneurial competence at the individual level (Byrne, 2013) using the software AMOS (see Table A1). The fit indexes evidenced a satisfactory fit of the data to the model ( $\chi^2 = 915.929$ ;  $df = 752$ ;  $p < 0,01$ ;  $\chi^2/df = 1.22$ ; CFI = 0.89; RMSEA = 0.04; SRMR = 0.06). The first- and the second-order standardized regression coefficients were significant. These results support construct validation at the individual level. Aggregation at the team level is discussed in the Results section.

Effectuation and causation were measured using the items and procedures developed by Chandler *et al.* (2011). The items were preceded by the following instruction: “Consider how you normally proceed in your venture and indicate the degree to which you agree or disagree with the following statements.” This introductory statement was specifically developed to place the referent shift at the individual level (Chan, 1998), as the respondent is briefed to think about his/her own actions and his/her own agreement with the statements. This is consistent with the instruction used by Chandler *et al.* (2011). All the items were measured on a five-point scale, ranging from 1 “strongly disagree” to 5 “strongly agree.” Causation was measured with 7 items (e.g. “We developed a strategy to best take advantage of resources and capabilities.”) and effectuation was measured with 16 items (e.g. “We allowed the business to evolve as opportunities have emerged.”). Effectuation and causation were measured and analyzed at the individual level (i.e. one score for each individual).

Team previous entrepreneurial experience was measured in two steps (Eisenhardt and Schoonhoven, 1990; Kor, 2003). First, the number of individuals within a team who had previous entrepreneurial experience was counted, by answering yes (1) or no (0) to the question “Did you have previous entrepreneurial experience prior to your current venture?” Then, the summed number was divided by the total number of team members.

Control variables included the percentage of males in the team and team educational level, as gender and educational heterogeneity have proven to be especially important characteristics of teams (Chandler *et al.*, 2005; Ensley and Hmieleski, 2005; Amason *et al.*, 2006; Jin *et al.*, 2017).

Table I presents descriptive statistics and reliability values for the measures at the individual level.

**Table I.**  
Descriptive statistics  
and reliability of  
measures at the  
individual level

	<i>M</i>	<i>SD</i>	Reliability
Communication and persuasion capacity	3.75	0.60	0.79
Capacity to develop the network	4.28	0.84	0.70
Leadership capacity	4.00	0.44	0.72
Innovation capacity	4.04	0.55	0.69
Emotional intelligence	4.43	0.48	0.38 <sup>a</sup>
Desire for independence	3.99	0.61	0.72
Economic motivation	3.59	0.73	0.70
Resources mobilization capacity	3.17	0.78	0.71
Vision	3.81	0.49	0.70
Resilience	4.06	0.49	0.70
General entrepreneurial self-efficacy	3.46	0.64	0.71
Creativity capacity	4.29	0.52	0.73
Previous entrepreneurial experience	0.42	0.49	–
Causation	3.80	0.57	0.71
Effectuation	4.02	0.36	0.72

**Notes:** Reliability was measured with Cronbach's  $\alpha$ . <sup>a</sup>Emotional intelligence includes two items and the reliability was measured with Pearson correlation,  $p < 0.01$

### Multicollinearity and common method variance

Multiple analyses were conducted to investigate the threat of multicollinearity and common method variance in the data. Concerning multicollinearity, the highest correlation between any pair of independent variables, was 0.55 (see Table III). No variance inflation factor scores were greater than 1.9, indicating multicollinearity was not a concern, as each of these results falls within acceptable ranges. Common method variance threats were analyzed following the procedures described by Williams *et al.* (1989) and recommended by Podsakoff *et al.* (2012). All variables were loaded on one (common) factor to examine the fit of the confirmatory factor analysis model. The model fit for the single factor measure was poor ( $\chi^2 = 763.086$ ;  $\chi^2/df = 4.037$ ;  $p < 0.001$ ; CFI = 0.478; RMSEA = 0.124). These results rule out the possibility of common method variance and, consequently, it is unlikely to bias the results.

### Results

#### *Aggregation at the team level*

As the level of analysis of entrepreneurial competence was the team, the aggregation of the individual answers at the team level for each of the 12 entrepreneurial competence dimensions was analyzed using two indices (Chen *et al.*, 2004). These included the index of within-group interrater agreement – Rwg(j) (James *et al.*, 1993), designed for multiple-item scales, using the 0.70 and above threshold to indicate an acceptable level of agreement (Cohen *et al.*, 2001); and the intraclass correlation coefficients, ICC<sub>(1)</sub> and ICC<sub>(2)</sub> (Bliese, 2000). These statistical procedures helped determine if the data collected at the individual level can be aggregated at the team level, and have been used by organizational theorists in assessing such constructs as team creativity (Pirola-Merlo and Mann, 2004) and shared mental models (DeChurch and Mesmer-Magnus, 2010). Table II presents the results for the Rwg(j), ICC<sub>(1)</sub> and ICC<sub>(2)</sub> indexes.

The values for the aggregation indexes were in accordance with the required thresholds: Rwg(j) above 0.70, ICC<sub>(1)</sub> between 0.05 and 0.50 and ICC<sub>(2)</sub> higher than ICC<sub>(1)</sub>. These indexes support the criteria for aggregation at the team level. Thus, there is empirical support for aggregating the individual data for the entrepreneurial competence dimensions at the team level. These results allow using of the variables at the team level and encourage analyzing the construct validation of team entrepreneurial competence.

	Rwg(j)	ICC <sub>(1)</sub>	ICC <sub>(2)</sub>	Team entrepreneurial competence
Communication and persuasion capacity	0.83	0.06	0.13	<b>1269</b> <b>Table II.</b> Rwg(j)'s and ICCs for the entrepreneurial competence dimensions
Capacity to develop the network	0.72	0.23	0.48	
Leadership capacity	0.91	0.07	0.17	
Innovation capacity	0.78	0.06	0.09	
Creativity capacity	0.77	0.10	0.24	
Emotional intelligence	0.73	0.13	0.51	
Desire for independence	0.92	0.12	0.30	
Economic motivation	0.88	0.12	0.29	
Resources mobilization capacity	0.79	0.33	0.60	
Vision	0.91	0.06	0.11	
Resilience	0.80	0.07	0.13	
General entrepreneurial self-efficacy	0.72	0.08	0.17	

### Construct validation

Confirmatory factor analysis with data aggregated at the team level was used to verify the construct validity of team entrepreneurial competence. The tested model included team entrepreneurial competence as a latent variable expressed by the 12 dimensions. The results showed an adequate fit of the data to the model ( $\chi^2 = 96.86$ ;  $df = 49$ ;  $p < 0.01$ ;  $\chi^2/df = 1.98$ ; CFI = 0.91; RMSEA = 0.06; SRMR = 0.06) supporting the team entrepreneurial competence construct. The standardized regression coefficients of the 12 dimensions were all adequate and statistically significant (see Table AII for the complete results). The reliability value for team entrepreneurial competence was 0.78. Overall, the confirmatory factor analysis and the reliability of team entrepreneurial competence lend further support to the construct validity of team entrepreneurial competence.

### Hypothesis testing

The descriptive statistics and the correlation matrix for all the study variables are presented in Table III. The correlation matrix indicated that team entrepreneurial competence is significantly correlated with both effectuation and causation ( $r = 0.35$ ,  $p < 0.01$ ;  $r = 0.28$ ,  $p < 0.05$ , respectively) and team entrepreneurial experience ( $r = 0.26$ ,  $p < 0.05$ ). The moderator variable, team previous entrepreneurial experience, was correlated with the percentage of males on the team ( $r = -0.25$ ,  $p < 0.05$ ), a control variable.

ANOVA results indicated that there was sufficient variance in causation ( $F(46, 97) = 2.83$ ;  $p < 0.01$ ) and effectuation ( $F(46, 97) = 2.17$ ;  $p < 0.02$ ) between teams to justify the multilevel approach. The data analysis procedure followed a systematic assessment of five different models, using the maximum likelihood method of analysis: the change in the  $-2\log$  likelihood ( $-2LL$ ) statistic or deviance statistic, the level of significance of the coefficients and the percentage of variance explained at the individual and team levels when new predictors are added to the model (Hox, 2002).

	M	SD	1	2	3	4	5
1. Team entrepreneurial competence	3.91	0.21					
2. % male in the team	0.76	0.25	-0.07				
3. Team education	3.83	1.60	0.27*	-0.20*			
4. Team previous entrepreneurial experience	0.43	0.36	0.26**	0.20**	0.03		
5. Effectuation (individual level)	3.84	0.36	0.35**	-0.02	0.15	0.42**	
6. Causation (individual level)	3.80	0.57	0.28*	0.01	0.14	0.35**	0.55**

**Notes:** Team level ( $n = 47$ ); individual level ( $n = 144$ ). \* $p < 0.05$ ; \*\* $p < 0.01$

**Table III.**  
Descriptive statistics  
and correlation matrix  
for all the  
study variables

First, the unconditional (or reduced) model, with no predictors (M1) and a random intercept, was fitted. In the second model (M2), the control variables, percentage of males on the team and team education, were introduced to control for the effect of these variables in subsequent models. In the third model (M3), the level 2 predictor (team entrepreneurial competence) was added to the analysis. In the fourth model (M4), the level 2 moderator (team previous entrepreneurial experience) was added. In the fifth model (M5), the interaction between team entrepreneurial competence and team previous entrepreneurial experience was included. Predictors were grand mean centered, as recommended by Hox (2002).

These five models were computed using effectuation at the individual level as a criteria variable, testing *H1* and *H3* (Table IV), and using causation at the individual level as a criteria variable, testing *H2* (Table V). These models included random intercept and fixed slopes once the relationships tested between the predictors and the criteria variable were assumed as constant across teams.

**Table IV.**  
Multilevel model predicting individual-level effectuation based on team entrepreneurial competence, team entrepreneurial experience and interaction effect

Predictor	M1 (uncond.)	M2	M3	M4	M5
Fixed effects					
Intercept	3.84**	3.68**	3.74**	3.78**	3.78**
% male team		0.00	0.02	0.02	0.02
Team education		0.04	0.02	0.02	0.02
Team entrep. competence			0.58**	0.59**	0.66**
T. previous entrep. exp.				0.121	0.11
T. entrep. competence × T. previous entrep. exp.					1.40**
Variance components					
Level 1 or within teams	0.10**	0.10**	0.10**	0.10**	0.10**
Level 2 or between teams	0.034**	0.032**	0.018	0.017	0.014
Goodness of fit					
-2LL	106.60	103.59	92.46	91.55	86.47
Deviance	-	3.01	11.13**	0.91	5.08**

**Notes:** Team level (*n* = 47); individual level (*n* = 144). Percentage of males on the team, team education, team entrepreneurial competence and team previous entrepreneurial experience are team-level variables. The dependent variable, effectuation, is an individual-level variable. \*\**p* < 0.01

**Table V.**  
Multilevel model predicting individual-level causation based on team entrepreneurial competence, team entrepreneurial experience and interaction effect

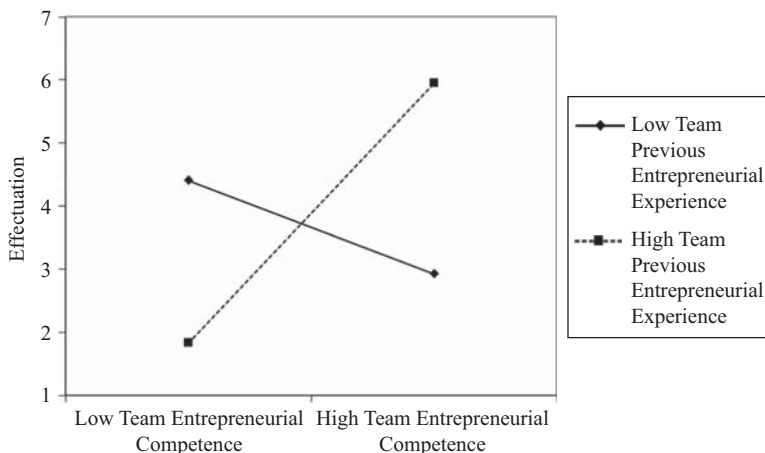
Predictor	M1 (uncond.)	M2	M3	M4	M5
Fixed effects					
Intercept	3.82**	3.82**	3.82**	3.82**	3.82**
% male team		0.10	0.14	0.05	0.05
Team education		0.05	0.02	0.03	0.03
Team entrep. competence			0.83**	0.83**	0.91**
T. previous entrep. exp.				0.23	0.22
T. entrep. competence × T. previous entrep. exp.					1.64
Variance components					
Level 1 or within teams	0.20**	0.20**	0.20**	0.20**	0.20**
Level 2 or between teams	0.12**	0.11**	0.09**	0.08**	0.08**
Goodness of fit					
-2LL	226.19	224.44	216.42	215.33	213.01
Deviance		1.75	8.02**	1.09	2.32

**Notes:** Team level (*n* = 47); individual level (*n* = 144). Percentage of males on the team, team education, team entrepreneurial competence and team previous entrepreneurial experience are team-level variables. The dependent variable, causation, is an individual-level variable. \*\**p* < 0.01

*Effectuation.* *H1* predicts that in teams with high entrepreneurial competence, individuals are more likely to use effectuation. The results of Model 3, shown in Table IV, suggest that team entrepreneurial competence is significantly and positively related to the individual use of effectuation ( $\beta = 0.58, p < 0.05$ ), controlling for the percentage of men on the team and team education. The change in the variance components from M2 to M3 indicates that the inclusion of the team-level predictor in the equation led to a significant reduction in the  $-2LL$  statistic (deviance = 11.13,  $p < 0.05$ ). Moreover, adding team entrepreneurial competence increased the variance explained for individual-level effectuation by 43.75 percent. Therefore, *H1* is supported.

*H3* predicts that team previous entrepreneurial experience moderates the relationship between team entrepreneurial competence and the use of effectuation by team members. In M4 (Table IV), team previous entrepreneurial experience showed a nonsignificant association ( $\beta = 0.121, ns$ ) with individual-level effectuation, and accordingly, the change in the  $-2LL$  was not significant (deviance = 0.91, ns). In M5 (Table IV), the cross-level interaction hypothesis for individual-level effectuation was tested. Both the coefficient of the interaction ( $\beta = 1.40, p < 0.05$ ) and  $\chi^2$ -test on the deviance change (deviance = 5.08,  $p < 0.05$ ) were significant, indicating that the differences in the relationship between team entrepreneurial competence and individual-level effectuation are associated with the levels of team previous entrepreneurial experience. Likewise, 17.65 percent of the between-teams variance was explained by this interaction effect. Individuals who are in teams with high team entrepreneurial competence and that have high levels of previous entrepreneurial experience were significantly more likely to engage in effectuation than were individuals in teams with low entrepreneurial experience (Figure 2). So, *H3* is supported.

*Causation.* The results of the multilevel model predicting individual-level causation based on team entrepreneurial competence, team entrepreneurial experience and the interaction effect are presented in Table V. *H2* predicted that in teams with a high team entrepreneurial competence, individuals are more likely to engage in causation. The result of Model 3 (Table V) shows that team entrepreneurial competence is significantly and positively related to the individual use of causal reasoning ( $\beta = 0.83, p < 0.05$ ), controlling for the percentage of men in the team and team education. The change in the variance components from M2 to M3 indicates that the inclusion of the team-level predictor in the equation led to a significant reduction in the  $-2LL$  statistic (deviance = 8.02,  $p < 0.05$ ). Adding team entrepreneurial competence increased the variance explained for individual-level causation by 18.18 percent. Therefore, *H2* is supported.



**Figure 2.** Cross-level interaction between team entrepreneurial competence and team previous entrepreneurial experience predicting individual-level effectuation

In M4, team previous entrepreneurial experience produced a nonsignificant association ( $\beta = 0.23$ , ns) with individual-level causation, and accordingly, the change in the  $-2LL$  was not significant (deviance = 1.09, ns). The cross-level interaction for individual-level causation is not significant. This result indicates that the differences in the relationship between team entrepreneurial competence and individual-level causation are not associated with the levels of team previous entrepreneurial experience. As a result, there is no additional percentage of the between-teams variance of individual-level causation explained by this interaction effect. Therefore, as theoretically expected, team previous entrepreneurial experience does not moderate the relation between team entrepreneurial competence and the use of causation strategies by individual team members.

### Discussion

This study explores cross-level effects of a team's entrepreneurial competence and its collective entrepreneurial experience on the tendency for individual team members to rely on causal and effectual reasoning strategies. As hypothesized, team entrepreneurial competence has a significant positive impact on the cognitive reasoning strategies adopted by individual members of founding teams. These findings contribute to effectuation theory (Sarasvathy, 2001), suggesting that both effectuation and causation are positively influenced by team-level characteristics, particularly by the level of shared competencies for entrepreneurial activities among those constituting a founding team. As such, team-level characteristics and processes are relevant predictors that should be integrated into effectuation theory, further reinforcing the critical role of a multilevel perspective in advancing theory in entrepreneurship (Shepherd *et al.*, 2010; Shepherd, 2011).

These findings are consistent with the emerging view that entrepreneurs do not exclusively rely on effectuation or causation (Gabrielsson and Politis, 2011; d'Andria *et al.*, 2018; Ilonen *et al.*, 2018) but rather make use of a hybrid combination of both depending on the controllability and other characteristics of the situation (Reymen *et al.*, 2015). A collective sense regarding team entrepreneurial competence can lead individual team members to engage in both reasoning strategies. Future research can build on this finding and explore the specific circumstances and conditions that are associated with each of them, as has been suggested at the individual level (Reymen *et al.*, 2015). Apart from one's own sense of competence, being part of a team that in the aggregate is perceived to be more, or less, competent in particular areas related to entrepreneurial action may affect the individual's outlook and assumptions regarding the future. These competencies on which the group is strongest may play the more dominant role. Hence, a team with strengths in competencies such as innovation, creativity and mobilizing resources may motivate the individual to adopt a cognitive strategy that is more experimental, adaptive, flexible and imaginative in taking advantage of resources at one's disposal, while a team with strengths in leadership, emotional intelligence, social skills and self-efficacy could lead one to adopt a more conservative, planned, data-driven and controlled approach. The team effectively becomes a source of situational strength, which Meyer *et al.* (2010, p. 122) define as "implicit or explicit cues provided by external entities regarding the desirability of potential behaviors." These cues can result in psychological pressure to engage in, or refrain from, particular courses of action, in effect reducing behavioral variance. The role of different team competencies in affecting cognitive strategies might also be tied to the criticality of a particular competency at a given stage in the entrepreneurial process or point in the evolution of a venture. Future studies may need to adopt a longitudinal perspective to capture the relationships.

The results also support the cross-level interaction between team entrepreneurial competence and previous entrepreneurial experience in affecting individual-level effectuation, consistent with the predictions of effectuation theory at the individual level (Sarasvathy, 2009). Thus, team entrepreneurial experience boosts the reliance on

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effectuation for those who are part of teams with high entrepreneurial competence. Alternatively, there was no interaction effect for team entrepreneurial experience on the relationship between team entrepreneurial competence and a reliance on causal reasoning, again as predicted.

Notably, a reliance on effectual thinking decreases in teams with low entrepreneurial experience and high team entrepreneurial competence, especially when compared to levels of effectuation in teams with low entrepreneurial experience and low team entrepreneurial competence (see Figure 2). This intriguing result may suggest that, when comparing the relative influence of both team-level characteristics (i.e. team entrepreneurial competence and team entrepreneurial experience) on effectual thinking, team experience might be the dominant consideration. Specifically, when there is low team entrepreneurial experience and low entrepreneurial competence, the individual still engages more in effectuation than when there is low entrepreneurial experience and high entrepreneurial competence, suggesting that team experience might supersede any shortcoming in team entrepreneurial competence. Exploring factors behind these patterns in the data is a worthy area for future research.

Another interesting pattern concerns the strong correlation between team entrepreneurial competence and team entrepreneurial experience. One might expect that prior experience would contribute to the presence of stronger team competence. Mastery of competencies requires practice (Neck and Greene, 2011; Sarasvathy and Venkataraman, 2011) and as such, team entrepreneurial competence and experience might be expected to have a reciprocal relation: competence shapes experience, and experience in turn influences the levels of perceived competence. Future research can further explore this relation.

#### *Implications and limitations*

A number of theoretical and empirical implications can be drawn based on these results. First, while competencies at the individual level are receiving growing attention from entrepreneurship scholars (Morris *et al.*, 2013), extending entrepreneurial competence to the team level is an important step that raises a number of intriguing questions regarding the nature of successful venture teams. Clearly, the competence of a team can transcend the capabilities and skills of individual team members. Entrepreneurial work accomplished in teams is conditioned by the interdependent activities and resources of team members, which create a shared pattern of behavior (Morgeson and Hofmann, 1999) that has important implications for venture outcomes. The issue becomes one of determining the ways in which the capabilities of individuals can be combined in ways that enhance overall team competence. It would seem, at a minimum, that this can be a function of who is on the team, when they join the team, the competencies at which they excel, the ways in which team members interact, and the opportunities to apply and refine a given competency. Understanding the dynamics of how the individual capabilities are transformed into team-level competencies is a priority question for ongoing research.

Second, existing research on effectuation and causation has primarily addressed individual-level phenomena (Wiltbank *et al.*, 2006; Karri and Goel, 2008; Sarasvathy and Dew, 2008). Researchers have paid insufficient attention to the influence of team-level characteristics and processes on how individuals within a team engage in causation and effectuation. This study integrates the team literature and effectuation theory to propose that there are team-level characteristics that have a significant effect on the reasoning strategies of individual team members. A variety of team competencies can affect the tendency of team members to rely on both causal and effectual reasoning. This opens new doors in terms of unexplored predictors and processes that can advance effectuation theory (Garud and Gehman, 2016; Gupta *et al.*, 2016; Reuber *et al.*, 2016).

The findings also raise the question of whether the team serves to reinforce, and possibly enhance, the existing proclivity of the individual to adopt a particular cognitive strategy, or



if team competence can lead the individual to adopt a different strategy. Assessing the potential of a highly competent team to actually change the individual's cognitive strategy is complicated by the ability to determine what the individual's preferred strategy would have been in the same context but absent the team. Despite the measurement issues, it is important that researchers begin to delve more deeply into the ways entrepreneurial teams change the individuals that comprise them.

Third, the strong emphasis placed on expertise by effectuation researchers (Sarasvathy, 2001, 2009) would also appear to be warranted at a team level. Team entrepreneurial competence and team experience act as two superordinate mechanisms that provide the required support and reinforcement for individual effectual logics. When considering individual entrepreneurs, it would seem that they either have enough entrepreneurship-related experience to constitute expertise, or they do not. However, with a team the various combinations of backgrounds and experiences that can produce a sense of expertise among members would seem much more extensive, especially with larger teams that have more complex interactions. There is a need for effectuation scholars to further investigate different types and combinations of experience, and their implications for team competencies, individual cognitive styles and behaviors, and organizational outcomes. Baron (2009) has examined the mechanisms underlying the acquisition of effectual expertise at the individual level, and such work should be extended to the team level.

Fourth, this study successfully employs an approach to measuring team-level psychosocial characteristics in a new venture creation context. The importance of such characteristics has been emphasized by others (West, 2007; Cardon *et al.*, 2017), but limited empirical work has appeared, in part due to the need for measurement instruments together with a means of capturing team-level characteristics without simply summing data for individuals (Breugst *et al.*, 2015; Khan *et al.*, 2015; Zhou, 2016). The data aggregation procedure employed here brings to entrepreneurship an approach that has been successfully used in organizational behavior research (Chan, 1998). It represents an approach that can facilitate the conduct of multilevel research within entrepreneurship (Shepherd *et al.*, 2010; Shepherd, 2011).

Implications can also be drawn for entrepreneurial practice and education (Santos *et al.*, 2016). When founding teams are forming (and as they are augmented), they must go beyond ensuring that team members have complementary capabilities. The results here suggest a need to consider a range of competencies that are addressed when building a team, and that the nature of the competencies should be tied to the entrepreneurial context being more controllable and predictable or more emergent, volatile and uncertain. In more uncertain contexts, it would also seem critical to augment the team with more experienced members. In addition, the development of team-level competencies is likely to be hindered when team members operate in isolation in addressing their respective responsibility areas. Fostering higher levels of interaction among the team members with different backgrounds may be critical for nurturing competency development.

Those involved in launching ventures can also benefit from a richer understanding of the factors influencing how team members think and approach decision making. The current study suggests that team psycho-social properties, in this case team competencies, affect how individuals reason. Under such circumstances, the ability of team members to properly gauge the capabilities not just of fellow team members, but of the collective team can be critical for selecting appropriate reasoning strategies. Misinterpreting team-level competencies may lead to errant assumptions regarding not only what the team is capable of, but also the appropriateness of causal vs effectual approaches to venture development.

Finally, the findings should also be interpreted with the limitations of the research in mind. First, confirmatory factor analysis at the individual and team levels, and the associated measure reliabilities, support the team entrepreneurial competence construct.

However, future research is needed to complement the validation process of the scale at the team level, including testing concurrent, discriminant and predictive validity. Second, entrepreneurial experience was measured with a “yes” or “no” answer. Future research should consider richer measures of entrepreneurial experience, with consideration given to the length, context and types of prior experience (e.g. Santos *et al.*, 2018; Morris *et al.*, 2018). Third, the participants in the current study were all practicing entrepreneurs and co-founders, with a business model already defined and looking for investment. Capturing teams at different stages of development would add more richness to our understanding of how team competencies influence cognitive strategies. Another limitation is the cross-sectional nature of the research, which fails to capture how competencies within a team develop over time. Lastly, the sample size of entrepreneurial teams was modest, and most founding teams were relatively small, which compromises the generalization of the results. Future research should consider larger samples with more variance in team size.

### Conclusion

This study represents an effort to empirically develop knowledge about entrepreneurial teams and contributes to two literatures. First, it advances the literature on teams by introducing team entrepreneurial competence, suggesting that entrepreneurial teams are not merely the sum of their member’s capabilities, or the cumulative combination of individuals with different knowledge and expertise, but they exist as a collective unit with a shared ability regarding their entrepreneurial capabilities. Thus, entrepreneurial phenomena that have proven to be important at the individual level can also play critical roles at the team level. As teams are especially prevalent in the founding of ventures in the contemporary environment, team-level phenomena offer much promise in explaining the dynamics of entrepreneurship, including both top-down influences and bottom-up processes. Further, with the current research, we provide clear evidence of top-down effects between team-level characteristics and the cognitive processes of individuals involved in founding a venture. Second, the study contributes to effectuation theory by showing that individuals engage both in effectuation and causation, highlighting the relevance of both reasoning strategies for the entrepreneurship process. Moreover, these results can be a step forward for effectuation theory as it demonstrates how team-level variables can meaningfully contribute to our understanding of the antecedents of causal and effectual reasoning. Beyond individual-level predictors, team processes, particular ones that produce higher levels of perceived team competence, can play a meaningful role in encouraging individuals to employ effectual reasoning.

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Appendix 1

Team  
entrepreneurial  
competence

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	<i>B</i>
Communication and persuasion capacity	0.566**
Capacity to develop the network	0.353**
Leadership capacity	0.872**
Innovation capacity	0.776**
Emotional intelligence	0.669**
Desire for independence	0.504**
Economic motivation	0.346*
Resources mobilization capacity	0.915**
Vision	0.993**
Resilience	0.489**
General entrepreneurial self-efficacy	0.754**
Creativity capacity	0.685**
Item 1.1	0.708**
Item 1.2	0.679**
Item 1.3	0.870**
Item 2.1	0.984**
Item 2.2	0.887**
Item 3.1	0.601**
Item 3.2	0.603**
Item 3.3	0.467*
Item 3.4	0.524**
Item 3.5	0.368*
Item 3.6	0.397*
Item 4.1	0.520**
Item 4.2	0.476**
Item 4.3	0.348*
Item 5.1	0.557**
Item 5.2	0.726**
Item 6.1	0.408*
Item 6.2	0.721**
Item 6.3	0.680**
Item 7.1	0.494**
Item 7.2	0.490**
Item 7.3	0.854**
Item 8.1	0.335*
Item 8.2	0.420**
Item 8.3	0.291*
Item 8.4	0.535**
Item 9.1	0.509*
Item 9.2	0.572**
Item 9.3	0.467**
Item 9.4	0.530**
Item 10.1	0.700**
Item 10.2	0.419**
Item 10.3	0.439**
Item 10.4	0.356**
Item 11.1	0.584**
Item 11.2	0.305**
Item 11.3	0.689**
Item 11.4	0.511**
Item 11.5	0.483**
Item 12.1	0.489**
Item 12.2	0.476**
Item 12.3	0.600**
Item 12.4	0.848**

Notes: \* $p < 0.05$ ; \*\* $p < 0.01$

**Table AI.**  
Second-order  
confirmatory factor  
analysis –  
standardized  
regression coefficients  
for the entrepreneurial  
competence  
dimensions



**1282**

**Table AII.**  
Confirmatory factor  
analysis –  
standardized  
regression coefficients  
for the entrepreneurial  
competence  
dimensions at the  
team level

	$\beta$	SE
Communication and persuasion capacity	0.51**	0.030
Capacity to develop the network	0.37**	0.048
Leadership capacity	0.52**	0.021
Innovation capacity	0.50**	0.026
Creativity capacity	0.66**	0.023
Emotional intelligence	0.53**	0.024
Desire for independence	0.52**	0.039
Economic motivation	0.24**	0.042
Resources mobilization capacity	0.71**	0.027
Vision	0.90**	0.019
Resilience	0.32**	0.032
General Entrepreneurial self-efficacy	0.60**	0.025

**Note:** \*\* $p < 0.01$

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