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Maitane Elorriaga-Rubio

THE BEHAVIORAL FOUNDATIONS OF STRATEGIC DECISION-MAKING: A CONTEXTUAL PERSPECTIVE

PhD School in Economics and Management

PhD Series 34.2018

CBS  COPENHAGEN BUSINESS SCHOOL
HANDELSHØJSKOLEN

The behavioral foundations of strategic decision-making: A contextual perspective

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I used to be like those kids that never stop making questions and my parents were always there to patiently answer them. Today, I would like to dedicate this dissertation to them. Thank you, Inma and Jon, for striving to provide me with the best possible education.

English summary

The behavioral foundations of strategic decision-making: A contextual perspective.

The main aim of this dissertation is to shed light on the contextual aspects that intervene with achieving strategically key behavioral outcomes in decision-making. Each of the chapters constitutes an independent research study exploring one of the following behaviors which are of wide interest to organizations: the willingness to make brand-new partnerships, risk-taking, and decision-making performance. With my main focus on strategic decision-making under uncertainty, I propose and test more specific contextual conditions related to the cognitive processing and the content of the information that individuals and teams rely on when making choices. I combine theories from both social and cognitive psychology and strategic management. By adopting a multi-disciplinary perspective, this dissertation contributes to general and strategic management as well as the field of entrepreneurship. Furthermore, my research complements and moves forward the novel framework of “behavioral strategy”.

This dissertation comprises of three experimental studies. The first study explores the role of positive and negative mood states as antecedents of a willingness to make brand-new partnerships under highly uncertain circumstances, and it proposes that the type of cognitive processing involved is an important moderator. The second study focuses on the influence of collective efficacy on risk perception and risk-taking by start-up teams in the context of inter-team competition. The study finds that these relationships are contingent on what type of performance aspirations an individual team has. Finally, the third study focuses on the moderating effect of both mood states and types of aspirations on explaining performance differences between overconfident decision-makers in overall competitive and uncertain situations.

Danks Sammendrag

Et adfærdsmæssigt grundlag for strategisk beslutningstagning: Et kontekstuelte perspektiv.

Hovedmotivationen bag denne afhandling er at belyse de kontekstuelle aspekter der påvirker tilblivelsen af strategisk central adfærd i beslutningstagning. Hvert af kapitlerne udgør selvstændig forskning der undersøger én af de følgende adfærdsmønstre af bred interesse for organisationer: Villigheden til at deltage i partnerskaber, risikovillighed og beslutningstagning præstation. Med strategisk beslutningstagning under usikkerhed som fokuspunkt foreslår og afprøver jeg mere specifikke kontekstuelle forhold i relation til beslutningstagningsprocessen og det indhold af informationen, som individer og teams er afhængige af når de træffer valg. Jeg kombinerer teorier fra både social og kognitiv psykologi og strategisk ledelse. Ved at tage et tværfagligt perspektiv bidrager afhandlingen til almen såvel som strategisk ledelse lige såvel som felter inden for entreprenørskab. Ydermere hjælper min forskning med at komplementere og fremskynde den nye ramme for adfærdsstrategi.

Denne afhandling består af tre eksperimentelle studier. Samlet set udforsker det første studie rollen af positive og negative humøritilstande som værende afgørende for viljen til at deltage i teams under meget usikre forhold, og foreslår derefter at typen af kognitive bearbejdning er en vigtig moderator. Det andet studie fokuserer på indflydelsen af kollektiv virkekraft på risikoopfattelse og risikovillighed i venture teams i en kontekst af konkurrence mellem teams. Jeg konstaterer at disse forhold er afhængige af typen af det individuelle teams aspiration til at præstere. Til slut fokuserer det tredje studie på den modererende effekt af både humøritilstande og typer af aspirationer på præstationsforskelle af overmodige beslutningstagere i konkurrenceprægede og usikre situationer.

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I am very fortunate for having had the chance of developing my PhD at CBS, in such an inspiring, open-minded and collegial environment. I am especially grateful to my supervisor, Louise Mors. My most sincere thanks, Louise, for your endless support, guidance, inspiration, valuable insights, mentorship, professionalism and the trust you have placed in me. Looking back, I cannot feel gladder about having you as my advisor. From the first moment, things just got unstuck and started working. I appreciate also your kindness and encouragement during the difficult times and your ability to make me feel calm. Thanks for enabling my autonomy and for your understanding. I will always be grateful for all you did.

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INTRODUCTION

This dissertation is divided into three experimental studies. The first study demonstrates that in the context of very high uncertainty and when the problem-solving task requires the use of deliberative (Type 2) processes, the effect of positive mood (in comparison to negative mood) increases willingness to join brand-new partnerships; however, when the task is easier to solve and requires more automatic or intuitive (Type 1) processes, one's mood state does not significantly affect the willingness to join a partnership. The second study shows, in the context of not only high uncertainty but also fierce competition, that the relationship between collective efficacy and perceiving and taking risks is dependent on the types of performance aspirations that teams have. Specifically, when teams have historical aspirations (vs. social aspirations) and thereby are focused on their past performance (vs. the performance of other competing teams) during their decision-making, collective efficacy plays a significant role in risky behavior. Finally, in the third study I find that in the context of high uncertainty and/or competition the negative relationship between overconfidence and performance can be attenuated by maintaining a positive mood (rather than a negative or a neutral mood). Furthermore, the beneficial effect of being in a happy mood is more pronounced when individuals have historical aspirations rather than social ones. Table 1 includes a summary of the key components of each study.

TABLE 1: SUMMARY OF THE DISSERTATION

	Study	Overall environment	Explanatory variables	Dependent variable	Method
1	Mood effects on the willingness to join a brand-new problem-solving partnership, depending on the difficulty of the task	High uncertainty	Mood, type of cognitive processes (Type 1 vs. Type 2 processes)	Willingness to engage in a brand-new partnership	Laboratory experiment
2	Collective efficacy and perception and taking of risks in strategic decision-making by teams, depending on the types of aspirations	High uncertainty and competition	Collective efficacy, historical aspirations, social aspirations	Risk perception and risk-taking	Experiment in class (Executive MBA)
3	Decision-making performance of overconfident individuals varies depending on different mood conditions and types of aspirations	High uncertainty and/or competition	Mood, historical aspirations, social aspirations, overconfidence	Decision-making performance	Laboratory experiment

Purpose of the dissertation: Contextualizing behavioral strategy

Companies are currently facing an era of extreme uncertainty and complexity. Furthermore, vast amounts of information, which often exceed individuals' information-processing ability and reaction capability, are available everywhere. This undeniable challenge invites new perspectives in management in order to shed light on how individuals and groups make decisions in such a fast-moving (Doz & Kosonen, 2008) and unforeseeable informational environment (Van Knippenberg *et al.*, 2015). The recognition of this reality has opened up space for emerging areas in strategic management and for new multi-disciplinary perspectives, such as behavioral strategy (Powell *et al.*, 2011). For instance, the study of the psychological foundations of dynamic capabilities with its focus on strategic decision-making places a strong emphasis on decision-makers' information-processing and affective elements (Hodgkinson & Healey, 2011; Healey & Hodgkinson, 2017). Cognition in organizations is increasingly gaining momentum (Hodgkinson & Healey, 2008), with a special focus on teams (Barsade & Gibson, 2012) and/or the business, social or competitive environment in which individuals operate (Doz & Kosonen, 2008; Eggers & Kaplan, 2013; Peteraf & Shanley, 1997). The emergent literature on competitive dynamics is an example of the importance of socially conceptualizing strategic issues (Chen & Miller, 2012). This theoretical posture increasingly views inter-firm competition as related to the psychological aspects of key decision-makers (Kilduff *et al.*, 2010). Similarly, the micro-foundations movement constitutes a robust example of the need to contextualize individuals' and teams' actions within the broad domain of firm behavior (Felin & Foss, 2005; Foss, 2011). In sum, being able to bridge psychological theory and strategic management is a promising but yet under-developed endeavor that can help move behavioral strategy research forward (Powell *et al.*, 2011; Hodgkinson & Healey, 2011).

Given that behavioral strategy is not yet a fully established subfield and that its theoretical foundation lacks sufficient development, it is important to start by defining behavioral strategy as it is understood in this dissertation. Adopting the definition by Powell *et al.* (2011), behavioral strategy can be defined as follows:

“Behavioral strategy merges cognitive and social psychology with strategic management theory and practice. Behavioral strategy aims to bring realistic assumptions about human cognition, emotions, and social behavior to the strategic management of organizations and, thereby, to enrich strategy theory, empirical research, and real-world practice.”

Research within the field of strategic management has shown that when the environment is highly uncertain, personal aspects play a greater role in explaining strategic behavior (Finkelstein & Hambrick, 1990).¹ Based on this premise, it has been argued that a psychological perspective may be a relevant standpoint in the study of strategic management (Hodgkinson & Healey, 2011; Miller & Toulouse, 1986; Powell *et al.*, 2011). In addition, research on strategy has long been interested in environmental variables, such as high-velocity or turbulent environments (Simsek *et al.*, 2010; Halebian & Finkelstein, 1993), growing versus stable markets (Eisenhardt & Schoonhoven, 1990; Katila *et al.*, 2012),

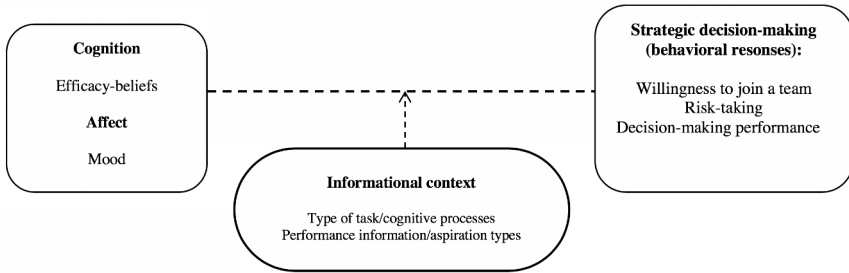
¹The term “behavior” is used throughout the text as a generic word. The three specific types of strategic behaviors analyzed in this dissertation are separately studied in each of the following chapters.

boundaries between firms or geographic regions (Mors, 2010) and competition (Chen & Miller, 2012). All these issues are worth studying in order to enhance our knowledge of strategic decision-making and of how firms operate in different environments. These variables may not, however, be the most proximal (and therefore optimal) for the study of individual and team-level psychological underpinnings. As Kahneman and Tversky have found (1981), the way decisions are framed can substantially influence decision outcomes. Similar contextual perspectives have been applied recently within strategic management to show how job anxiety can have a different effect on managerial decision-making depending on the framing adopted by executives (losses vs. gains) (Mannor *et al.*, 2016). In fact, behavioral strategy should adapt the chosen psychological theories to the specific level of analysis (individual or team) (Powell *et al.*, 2011). Drawing on this approach, there have been initial research inquiries to directly relate individual and team psychology and strategic firm behavior (Delgado-García *et al.*, 2010; Kisfalvi & Pitcher, 2003), particularly in small firms (Poon *et al.*, 2006). There is, however, still a need to provide more insight into the mechanisms that relate individual and team-level cognition to action during strategic decision-making (Hodgkinson & Healey, 2011; Powell *et al.*, 2011). Placing the emphasis on cognition and affect may be useful for understanding organizational phenomena in relation to external and internal cues (Kim, Payne & Tan, 2006).

One possible way for the field and the emerging framework of behavioral strategy to move forward is through gaining insight into the specific particularities of a decision-making context. As Powell *et al.* (2011) have highlighted, “the decision context of strategic management involves organizationally situated managers, widespread uncertainty, and poorly defined problems.” The main aim of this dissertation is to provide more specific contextual aspects as well as to show their moderating effect on the relationship between cognition and behavior. Given that the individual’s or the team’s psychology constitutes a relatively young, promising approach for studying strategic issues, the field as a whole could benefit from more specific and relevant contextual factors and mechanisms that enable or impede different behavioral outcomes at the individual and the team-level of analysis. Providing such a contextual approach with the clear purpose of tailoring strategically relevant environmental contingencies to individual and team behavior is the main goal of this dissertation.

The idea that the informational context is essential to connecting cognitive aspects and strategic choices is not entirely new. As Mintzberg, Raishighani and Théorêt (1976) have reasoned, after the necessity to make a particular strategic decision has been recognized, information needs to be diagnosed and processed before making the final choice. Some years later, Daniels (1999) added to this equation the important role of affect by highlighting its effect on cognitive and social processes and arguing for its importance in strategic decision-making. Based on a combination of these ideas, I present in Figure 1 the main conceptual framework of this dissertation. The figure also contextualizes and highlights the specific variables that I focus on and posteriorly test in each of the empirical studies.

FIGURE 1. Conceptual framework of the dissertation



Note: The dashed lines represent the potential moderation effects exerted by the contextual conditions on the relationship between cognitive and behavioral variables.

In light of arguments above, I seek to answer the following question:

Under which informational contexts do cognition and affect influence strategic decision-making?

The three experimental studies included in this doctoral thesis focus on the cognitive aspects of decision-makers and look at two main aspects: medium-duration affective states (i.e., moods) and confidence beliefs in one's ability (or one's team's ability). These cognitive aspects are separately investigated in each of the studies in relation to three different behavioral outcomes. The essential premise of the dissertation, however, is that the context of the decision-making itself cannot be neglected and needs to be simultaneously analyzed together with personal (or team) characteristics in order to comprehensively understand behavioral consequences in strategically relevant settings. In other words, by studying the specific conditions that can moderate the relationship between cognitive and behavioral aspects, this work is more likely to gain insight into the complex interdependencies of human behavior. The importance of considering situational

factors in explaining cognitive and behavioral accounts has been widely studied from the situationism perspective within psychology, evoking a tension between trait theories and situational theories (Bowers, 1973; Mischel, 1973), and the topic has been further developed by many other theories, such as social cognitive theory (Bandura, 1986). According to the latter view, personal factors (including cognitive ones), environmental aspects and behavior simultaneously and multi-directionally determine behavior. In the studies included as part of this dissertation, I experimentally manipulate specific contextual conditions in isolation or in combination with the rest of the elements (i.e., I manipulate individual cognitive factors as well as contextual aspects) as a way to gain a nuanced understanding of individual and/or team behavior. Figure 1 provides a summary of the main components of each study.

The overall research question presented before can be divided into three different sub-questions. Each of these research questions separately addresses different contextual mechanisms and strategically relevant behaviors and are discussed in Chapters 1, 2 and 3. The research questions explored are as follows:

- Does positive mood (in comparison to a negative one) affect the willingness to join a brand-new partnership? Which are the specific conditions that moderate this relationship?
- Does collective efficacy affect the perceived risk as well as the actual risk taken by start-up teams when making strategic decisions? Which are the specific conditions that moderate these relationships?
- Does a positive mood (in comparison to a negative or a neutral one) improve the decision-making performance of overconfident decision-makers? (In other words, does a positive mood moderate the relationship between overconfidence and decision-making performance?) Under which specific conditions does a positive mood have a higher likelihood of influencing the decision-making performance of overconfident individuals?

Cognition in strategic decision-making

In this dissertation, I focus on cognitive aspects, such as subjective interpretations and beliefs as well as affective responses, as both can widely affect strategic decision-making (Hodgkinson & Healey, 2011). It has been argued that affective mechanisms play a major role in explaining a wide variety of behaviors in organizations (Ashkanasy *et al.*, 2017), and this has implications for a variety of outcomes, such as firm performance (Vuori & Huy, 2016). The literature on strategic management, however, has only recently started to pay closer attention to affective mechanisms. This is surprising as affect can significantly influence the quality of executive decision-making, having long-lasting practical implications for firms particularly in today's fast-moving environments (Doz & Kosonen, 2008; Healey & Hodgkinson, 2017). While there has been a coherent and focused research endeavor specifically directed toward the topic of affect in strategic management (Ashton-James & Ashkanasy, 2008; Hodgkinson & Healey, 2011; Huy, 2011), there is still clear potential for studies within this domain (Ashkanasy *et al.*, 2017).

Strategy-making is a process where cognition and affect have the power to shape behavioral and decision outcomes (Ashton-James & Ashkanasy, 2008; Daniels, 1999). Affect has been used as a broad term to refer to both mood and emotions (Barsade & Gibson, 2007). As previous research has shown, affect can substantially influence economic decision-making (Lerner *et al.*, 2004; Loewenstein *et al.*, 2008). In the case of strategic decisions, certain strategic choices made at a given point in time can substantially determine the subsequent steps and future of a firm (Eisenhardt & Zbaracki, 1992). As strategic decisions are usually complex and subject to a variety of factors involving high uncertainty, they usually require extensive use of cognitive resources and information-processing. It is precisely in these types of highly complex situations where decision-makers are most susceptible to affective influences (Forgas, 1995a; Forgas & George, 2001). In other words, contrary to what might be expected, our feelings have a greater chance of affecting our behavior in situations where we more actively seek and process information than in those where we invest little cognitive effort.

Affect is immediate and temporary, and strategic decisions are similarly usually subject to a constant interplay between the present contingencies faced by the firm. In addition to immediate affective states, self-regulatory skills are therefore important aids for strategic decision-makers as a way to more flexibly adapt to changeable business environments and demands (Hodgkinson & Healey, 2011). For instance, individual differences in cognitive abilities that enable the supervision over and control of attention and thought processes have been shown to affect strategic decision-making performance (Laureiro-Martinez, 2014). Another way in which executives can regulate their behavior and focus on long-term results when making strategic decisions is by holding strong beliefs in their ability to achieve future goals (Crilly, 2017). In fact, without an acceptable level of confidence in one's abilities, there is little room for any action. In the words of (Bandura 2000: 184), "turning visions into realities is an arduous process with uncertain outcomes." Believing in your own ability or your team's ability to be successful is therefore an important cognitive aspect to consider within the field of strategic management.

Research on strategic management has also consistently highlighted the importance of extreme forms of efficacy beliefs which have been studied through different lenses, such as narcissism (Chatterjee & Hambrick, 2011), hubris (Tang *et al.*, 2015), optimism (Hmieleski & Baron, 2009) or overconfidence (Simon & Houghton, 2003). All of these approaches share the common basic premise that humans are naturally inclined to make overly positive and absolute assessments about their own self-value and potentiality. These tendencies to have a rose-tinted view of the self as well as the environment are known as positive illusions in psychology (Taylor & Brown, 1988). These positive illusions manifest in their most extreme forms in the case of executives (Hiller & Hambrick, 2005). Interestingly, recent research on this topic has increasingly adopted a contextual perspective to study positive illusions and their consequences (Li & Tang, 2010). From this perspective, different contextual aspects may moderate in different ways the relationship between overly optimistic evaluations of the self and performance-related outcomes. This approach is convenient, as there may be some situations

where overconfident responses are more instrumental than in others, where it may be particularly critical to control the effects of overconfidence. Therefore, the idea that positive illusions are always inevitably related to detrimental outcomes is starting to be challenged (Bollaert & Petit, 2010; Tang *et al.*, 2015).

Overall, research within the field suggests a need to take a contextual approach to the study of cognitive aspects in general, and of mood and efficacy beliefs in particular. The main goal of this dissertation is to provide a more nuanced understanding of the decision context and to provide an approach specifically customizable to each situation. In other words, the focus is on particular situations where cognitive variables (mood and efficacy beliefs) and the pertinent behavioral outcomes unfold. In the subsequent section, I present an overview of the contextual factors that I propose and study.

Information-related contextual moderators

The high-velocity environment in which many firms operate nowadays involves a great amount of uncertainty. Strategic decision-makers perceive environmental uncertainty when there is a clear lack of relevant information to help make strategic decisions and the state of the world cannot be predicted as a result (Milliken, 1987). Furthermore, with the development of new information technologies and tools, information is likely to exist which is not unavailable *per se* but rather is dispersed, fast-moving or too large in size to be instrumentally managed (e.g., big data) (Van Knippenberg *et al.*, 2015). Under these circumstances, individuals deliberately try to make sense of the environmental information (Weick *et al.*, 2005) and expend time searching for information in order to interpret the environment (Anderson & Nichols, 2007). Actually incorporating the available information into decision-making processes requires a great amount of cognitive resources and skills from individuals and teams (Doz & Kosonen, 2010; Hodgkinson & Healey, 2011). Uncertainty can thus be ultimately reflected in the type of problems that organizations face when adapting to unforeseeable and unpredictable environmental circumstances. In fact, as Galbraith (1974) has described, “the greater the task uncertainty, the greater the amount of information that must be processed among decision makers during task execution in order to achieve a given level of performance.”

Based on dual-process theories of human cognition (Evans & Stanovich, 2013; Evans, 2008), individuals have two main ways in which they can process information and solve problems under high uncertainty. While Type 1 processing is more context-dependent, automatic, heuristic and fast, Type 2 processing usually requires more working memory and analytical thinking. For instance, more difficult problems usually require more computational or analytic processes typical of Type 2 processing (Stanovich & West, 2000), and individuals are more likely to be influenced by their affective states under complex circumstances (Forgas, 1999). Complexity is usually the case with strategic decision-making where many possible scenarios and information need to be carefully processed before making a move (Ashton-James & Ashkanasy, 2008). This increased variance more easily prompts deliberate or Type 2 processing (Derfler-Rozin *et al.*, 2016). Strate-

gically relevant behavior can, however, also occur under particularly tight time constraints, requiring faster, automatic or heuristic (Type 1) processes to solve problems (Evans & Curtis-Holmes, 2005). In fact, both types of cognitive processes are important in strategic decision-making (Hodgkinson & Healey, 2011; Mintzberg *et al.*, 1976). Since both types of reasoning have different underlying cognitive processes (Evans, 2006), they may in principle prompt diverse mechanisms and have a different influence on behavior. The type of information-processing a person uses is thus proposed as an important contextual factor in the relationship between affect and behavior. This moderating variable, which is internal to the organizational actors' minds, is analyzed in the first study.

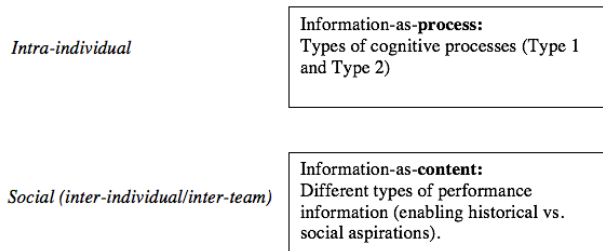
In addition to the intra-individual context-specific factors explained above, which answer the question of *how* information is processed (i.e., the type of thinking processes), it is important to know *what* information (i.e., the content) decision-makers focus on out of all the information that surrounds them. Uncertainty is also perceived when aspects related to competition cannot be prevented or known (Milliken, 1987). Competition is thus an integral part of the uncertain external environment that decision-makers try to understand.

For instance, it is relatively common among organizations to compare themselves to other organizations by directly imitating their moves (Massini *et al.*, 2005) or actively learning from the failure-related experiences of others (Kim & Miner, 2007). The behavioral theory of the firm proposes that firms learn from their environment and set performance aspirations accordingly as a way to direct firm behavior and enhance its future performance outcomes (Cyert & March, 1963). Studies on this topic have shown an important distinction between focusing on one's firm's past performance as a reference (i.e., historical aspirations) and focusing on other competitor firms' performance (i.e., social aspirations) when setting performance aspirations and making strategic decisions (Blettner *et al.*, 2015; Lant, 1992). Recent findings suggest that these aspirations are fundamentally distinct in their origins and processes, having the potential to affect behavioral outcomes differently (Kim *et al.*, 2015). Relatedly, literature on organizational learning highlights the importance of the learning context (Argote & Miron-Spektor, 2011). It is known that firms differ in their learning processes when they focus on different types of information, that is, information related to their own past performance or information related to the peers' performance (Aranda *et al.*, 2017). In Figure 2, I graphically represent the information-related contextual variables that this dissertation explicitly focuses on.

Strategically relevant behavioral outcomes

Not all micro-level firm foundations are equally relevant to strategic management, and they should be chosen on the basis of their potential relationship with firm-level value creation (Foss, 2011). While the last study explicitly focuses on strategic decision-making performance, the first two studies focus on the willingness to join partnerships and the risks taken by venture teams. It is important to note that the three behaviors explored in the studies are inherently related to each other and, more importantly, all of them (in isolation or in combination) support value creation for firms, ultimately

FIGURE 2. A graphical representation of the informational context-specific variables related to uncertainty



Note. The figure summarizes the informational aspects of an uncertain decision-making context.

enhancing their competitive positioning.

Furthermore, the three behavioral outcomes included in this dissertation substantially resonate with goal-framing theory, which addresses different human motives underlying behavior. Each of the outcomes has the potential to become a dominant behavioral response depending on the circumstances (Lindenberg & Steg, 2007). Specifically, the normative motive for joint production motivation highly resembles the outcome variable of the first study, namely the willingness to join a (brand-new) partnership. The paper focuses on the affective roots of the willingness to join a common problem-solving team through sharing complementary resources and in the process thinking about the interests of the collective (or team, in this case) rather than one's self-interest. The gain motive is best captured in the second study where teams compete with each other for the best positioning within the market, a competitive element that seems to be closely related to maximizing one's earnings (Foss & Lindenberg, 2013). Lastly, the hedonic goal, which places striving to maintain a pleasant affective state (i.e., a happy mood) as the ultimate motive, is analyzed in the third study in the context of the relationship between overconfidence and decision-making performance. In particular, the study contrasts the hedonic motive of aiming to maintain a positive mood (instead of a negative one) with the instrumental role that positive mood may have on cognitive processes more related to a gain-goal.

The relationship between the willingness to join partnerships, risk-taking and decision-making performance

The three behavioral variables analyzed in this dissertation have strong inter-dependencies and are substantially related to each other. While the strategic management field is mainly interested in performance-related outcomes, both the willingness to join partnerships and risk-taking are intrinsically related to performance. For instance, very different drivers may lie behind the willingness to join a partnership. On the one hand, a risk-diversification motive may prompt

the desire to join a partnership in order to decrease the risks associated with individual-level variance, such as bad luck or individual differences in psychological elements (Dohmen *et al.*, 2011). On the other hand, research suggests that there is a strategic risk associated with being matched with a non-productive partner (Bäker & Mertins, 2013). Probably due to a combination of both factors, partnerships often have more value-creation potential and reach higher levels of performance than individual agents alone (Singh & Fleming, 2010).

Risk-taking in management has been studied in the context of firm performance for a long time. Both initial insights into the topic, arguing that returns are intrinsically related to risk-taking (Bromiley, 1991; Cyert & March, 1963), and more recent conceptualizations of the behavioral theory of the firm (Gavetti *et al.*, 2012; Hu *et al.*, 2011) leave no doubt that risk-taking is closely related to performance. In fact, there is substantial evidence suggesting that, depending on the obtained level of firm performance, decision-makers will adapt their subsequent performance aspirations, ultimately affecting future performance (March, 1988; Lant, 1992). This goal-adaptation in turn translates into more risk-seeking behavior when the decision-maker operates below a target performance aspiration, in contrast to more risk-averse behavior when operating above performance aspirations (Cyert & March, 1963). One way to adapt decision-making behavior to prevailing performance circumstances is to focus on different performance information, that is, different types of aspirations (historical and social) (Audia *et al.*, 2015). For example, when companies are close to bankruptcy, it is more likely that they will focus on how competitors are performing when setting their future aspirations; while very young as well as mature companies tend to focus on their own past performance (Blettner *et al.*, 2015).

DISSERTATION STRUCTURE

The following three chapters consist of individual research studies. The first study is co-authored with Marion Poetz and Mirjam Van Praag, the second one with Louise Mors and Daniel Lerner, and the third paper is single-authored. The three studies draw on different experimental data. The first study focuses on the influence of mood on the willingness to join a brand-new partnership. In the second study, the analysis is done at the team level, and I explore team-efficacy beliefs (i.e., collective efficacy) in relation to risk-taking while controlling for mood effects. Finally, the third study focuses on both mood and extreme efficacy beliefs (i.e., overconfidence) in the context of strategic decision-making performance.

Chapter 1: In the mood to collaborate: An experimental study on the effect of mood on people's willingness to join brand-new partnerships

The second chapter of this dissertation examines whether individuals' moods influence their willingness to join a problem-solving partnership under very high uncertainty and pure anonymity. Together with my co-authors, we consider affective aspects (moods) of decision-makers important predictors of collaborative approaches, especially under specific

circumstances. Specifically, we identify a task-related contextual moderator of the relationship between mood and the willingness to join a new partnership. In an incentivized (as well as randomized) laboratory study, we find that mood is a significant predictor of the willingness to join brand-new partnerships. Being in a positive mood, rather than a negative one, increased individuals' willingness to join partnerships. This relationship did not, however, hold true for our entire sample. Interestingly, the effect was entirely contingent on the difficulty level of the problem-solving task. Only when individuals were requested to solve highly difficult problems and thereby were elicited to use Type 2 processes, did mood significantly predict the willingness to join a partnership. In contrast, when the problems were less difficult, prompting the use of Type 1 processes, mood effects were not significantly related to the willingness to collaborate with someone. Our study adopts a multi-disciplinary perspective to help to reconcile previous contradictory evidence on the topic and proposes a contingency perspective. We also help advance theory on tie formation by proposing individual affective antecedents in relation to problem characteristics. Furthermore, this study has important practical implications for the management of virtual work and problem-solving platforms in general. Because the study highlights the key role of the difficulty of the problem or task, which is a tangible variable subject to managerial control, organizations can learn from it and implement tools to promote a positive mood more efficiently, particularly in knowledge-intensive settings, as a way to enhance collaborative behavior with the external environment.

Chapter 2: Collective efficacy and risk-taking in the context of start-up team competition

The second paper explores the role of collective efficacy (an efficacy belief regarding a team's ability to be successful) on the risk taken by start-up teams in their strategic decision-making. Specifically, we conduct a randomized experiment in a classroom setting (in the context of an Executive MBA program) with two different aspiration conditions, namely historical and social aspirations. The results from a realistic as well as competitive strategic decision-making simulation reveal that collective efficacy is negatively related to risk perception and positively related to risk-taking. Moreover, these relationships are dependent on the type of aspirations the teams have. Only when teams have historical aspirations is collective efficacy significantly related to both risk perception and risk-taking. With this study, we are able to shed light on the relationship between collective efficacy and risk-taking, advancing our existing knowledge of opportunity pursuit in the context of start-up teams. Furthermore, we advance strategic-management and entrepreneurship theory by providing a contextual perspective to the differentiation between two types of performance aspirations (historical and social). Additionally, this study has practical implications for the coaching and leadership of start-ups, as the decision-making context can be intentionally varied depending on the psychological profiles of the teams.

Chapter 3: When benefiting from overconfidence depends on your mood: A study of strategic decision-making performance

Overconfidence has been extensively related to detrimental outcomes for firms, but less attention has been paid to the contextual moderators of the relationship between overconfidence and decision-making performance. I argue that overconfident beliefs may be a natural psychological reaction to highly competitive and uncertain settings and that there may thus be important contextual differences in decision-making performance. Specifically, mood might be an important moderator driving the performance differences of overconfident decision-makers. I design and test an incentivized laboratory experiment that simulates the conditions of high uncertainty and competition. Both mood (happy vs. sad) and the type of aspiration were manipulated (historical vs. social aspiration). In line with our expectations, individuals in a positive mood outperform people in either a neutral or a negative mood under the historical-aspirations condition when mood has a higher chance of affecting behavior. In addition, this beneficial effect of positive mood is proven to be stronger under the historical-aspirations condition than under the social-aspirations one. I find similar results in another non-competitive but highly uncertain decision-making setting. Against the backdrop of different cognitive and motivational mechanisms as well as different human motives (gain vs. hedonic), this study provides insight into the contextual aspects of the relationship between overconfidence and decision-making performance. Furthermore, it advances strategic decision-making theory self-enhancement theories of learning from performance feedback.

IN THE MOOD TO COLLABORATE: AN EXPERIMENTAL STUDY ON THE EFFECT OF MOOD ON PEOPLE'S WILLINGNESS TO JOIN BRAND-NEW PARTNERSHIPS

Maitane Elorriaga-Rubio¹ Marion K. Poetz¹ C. Mirjam Van Praag¹²

Abstract

The pervasiveness of collaborative knowledge-sharing and problem-solving both within and across organizations has clearly increased in recent years. Such partnerships entail increased social complexity and high uncertainty (e.g., virtual settings). People are increasingly creating brand-new partnerships with a variety of people around the globe who are not yet part of their existing social circle. In weakly defined situations without a clear social script, an individual's behavior is especially sensitive to temporary mood states. Specifically, moods are expected to "color" the content of thoughts in a mood-congruent manner, and they may consequently influence an individual's willingness to embark on a brand-new partnership. We created a highly uncertain situation in a between-subjects incentivized laboratory experiment (2 x 2 matrix) and tested the effects of positive (happy) and negative (sad) moods on the willingness to join a partnership with a stranger instead of "going solo" to solve either a simple or a complex real-effort problem-solving task. Our results show that if the problem-solving task has a high level of difficulty and therefore requires deliberate (Type 2) processes, individuals in a happy mood are more willing to join such partnerships than those who are sad. Mood has no effect on joining partnerships in the case of a less difficult task triggering more automatic (Type 1) processes. Our findings thus support the need to approach tie formation from a contingency perspective as well as consider both temporary mood states and task characteristics simultaneously.

Keywords: Affect; mood; new ties; problem-solving; type 1 and type 2 processes; strangers

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INTRODUCTION

Organizations are currently facing an environment where fast technological improvements, information overload, and economic volatility are quickly becoming central aspects (Van Knippenberg *et al.*, 2015). This has enabled the emergence of new alternative working arrangements and ways of collaborating (Petriglieri *et al.*, 2018; Cappelli & Keller, 2013). Individuals are gaining autonomy and room to maneuver with regard to their working lives and partnership choices. Consequently, the pervasiveness of independent workers is growing exponentially. In this gig-economy, the key characteristics of a growing independent workforce are a higher level of autonomy, payment based on the task performed, and temporary contracts (McKinsey & Co., 2016). Novel forms of collaborative approaches are therefore becoming more dominant, facilitating knowledge-sharing and common problem-solving between individuals. Open innovation communities or online discussion forums are clear examples of the current trend (Haas *et al.*, 2015; Foss & Rullani, 2015). Social interactions in these settings usually involve anonymity, virtual interactions, volatility of membership, temporality, different power-law distributions, the absence of non-verbal language, and new trust-building frameworks, imposing significantly more complexity and uncertainty (Constant *et al.*, 1996; Cramton, 2001; Crisp & Jarvenpaa, 2013; Griffith & Neale, 2001; Haas *et al.*, 2015; Wasko & Faraj, 2005).

These types of situations are known as “weak situations” because they lack specific social cues that would allow a uniform behavioral response to the situation, and individual responses to the situation hence become more relevant than trait differences under these circumstances (Mischel, 1973). This situational approach is in contrast to traditional ways of studying prosocial and collaborative behavior based on social preferences and personality variables, such as altruism or positive affective traits (Dur & Sol, 2010; George, 1991; Lyubomirsky *et al.*, 2005). As opposed to collaborations between partners that know each other, brand-new partnerships are based on “a new connection with someone you have never met and never interacted with” (Levin & Walter, 2018). Establishing new connections can facilitate access to more novel knowledge and resources (Lazarini *et al.*, 2008), and collaborative attitudes may help enhance creativity (Soda *et al.*, 2017). This extends to those cases in which the new connections involve complete strangers (Constant *et al.*, 1996). Despite the advantages of new partnerships, individuals have a strong tendency to share knowledge with people they already know and who are part of their existing network (Ingram & Morris, 2007). This phenomenon extends to managers, who may feel intimidated or anxious about reaching out to brand-new connections (Levin & Walter, 2018; Walter *et al.*, 2015). Similarly, as affect and ethical behavior are closely interrelated (Moore & Gino, 2015), people may have feelings of moral impurity when networking with someone for mere instrumental reasons (Casciaro *et al.*, 2014).

In these novel collaborative structures, affective factors are more likely to explain the willingness to join brand-new partnerships. Building on this idea, recent research has begun to look at the types of problems that attract the attention of online contributors (Haas *et al.*, 2015) instead of only looking at personal factors affecting social interactions. Among the

different individual characteristics that impact tie formation, affective factors have been highlighted as important in the traditional context of already known, existing relationships (Casciaro & Lobo, 2008; Casciaro *et al.*, 2014). We, however, know little about the role of affect in the particular context of brand-new tie formation, where relational feelings toward the partner (Casciaro, 2014) have not yet been developed. It is likely that mood effects will have different implications for collaborative (versus independent) behavior in situations of extreme uncertainty where potential partners have never interacted before. Recent research has suggested the relevance of exploring the influence of affective variables in the specific context of new tie formation (Levin & Walter, 2018).

Affective variables can take very different forms. “Trait affect” refers to individuals’ average mood dispositions leading them to react in affectively similar ways across situations, in contrast to temporary mood states which are activated in a particular situation (Lyubomirsky *et al.*, 2005; Watson & Pennebaker, 1989). According to the affect-as-infusion theory, mood states have the highest potential to influence social behavior under highly uncertain and complex social conditions (Forgas, 1995a), especially in atypical situations that require individuals to use extensive cognitive resources (Forgas & George, 2001). Temporary mood states are therefore closely related to the informational aspects of the tasks or problems to be solved in a joint partnership. Problems can differ in a variety of aspects, such as their difficulty. Depending on the demands of the task to be solved, qualitatively distinct types of cognitive processes may arise (Evans & Stanovich, 2013). According to dual-process theories, when the problems involved are difficult, individuals are more likely to cognitively engage in the use of more mentally taxing or elaborate (Type 2) processes than more automatic or heuristic (Type 1) processes (Carpenter *et al.*, 1990; Stanovich & West, 2000). Complex problems are particular types of decisions that unfold within interdependent and changeable structures (Knauff & Wolf, 2010). They usually involve a broader range of rules (Derfler-Rozin *et al.*, 2016) and a limited degree of working memory (Evans, 2008). Specifically, different cognitive processes (e.g., more elaborated versus simplified) will be activated depending on the difficulty of the task, and these processes may interact with existing mood states to predict collaborative—or non-collaborative—patterns.

Hence, our study provides insight into the yet under-explored role of affective antecedents of brand-new partnerships in the context of problem-solving. Moreover, we adhere to recent conceptualizations focused on “contributor-problem” relations rather than solely focusing on individual actors’ personal characteristics (Haas *et al.*, 2015). Furthermore, by taking a contingency perspective that explores both the actors’ affective states as well as the problem-solving tasks’ characteristics, our study helps to reconcile previous contradictory insights into the role of affective states in collaborative behavior (Drouvelis & Grosskopf, 2016; Hertel & Fiedler, 1994; Hertel *et al.*, 2000; Tan & Forgas, 2010). Overall, this study has broad implications for modern knowledge-sharing and open innovation partnerships, especially in virtual settings where individuals connect with each other inter-organizationally.

THEORY AND HYPOTHESES

Joining brand-new partnerships under high uncertainty: Unravelling mood effects

Taking an individualistic as opposed to a socially-oriented approach, depends on a variety of factors. To what extent this occurs depends on individual factors, such as gender (Kuhn & Villeval, 2013), personality (Bäker & Mertins, 2013), cognitive factors including beliefs regarding the other contributor's performance (Czibor *et al.*, 2017), and emotional factors, such as moods (Drouvelis & Grosskopf, 2016).

Moods are defined as “low intensity, diffuse and relatively enduring affective states without a salient antecedent cause and therefore little cognitive content” (e.g., feeling good or feeling bad) (Forgas & George 2001: 12). Moods are important affective drivers of social predispositions, beliefs and behavior, in particular in complex and uncertain situations (Forgas, 1995a; Forgas & George, 2001). In fact, mood itself can be used as a source of information when making a decision, and individuals often make decisions based on their answers to the question “How do I feel about it?”—which is known as the affect-as-infusion heuristic (Clore *et al.*, 2001). Happy and sad moods are universal affective states that are undoubtedly positive and negative and have been extensively studied within psychology following this categorization (Bless *et al.*, 1996; Forgas, 1995a; Watson & Tellegen, 1985). Unlike other affective states, such as short-lived discrete emotions, which focus on a specific target or cause (e.g., joy or anger), moods are neither predictable nor focused on a specific cause. However, moods are also different from stable affective traits, which are enduring personality tendencies capturing a person's affective lens on the world (Watson & Tellegen, 1985). Instead, moods are characterized by medium-duration positive or negative feelings (Barsade & Gibson, 2007). Following the main psychological theories of affect (Forgas, 1995a; Forgas & George, 2001; Russell, 2003), we focus on affect with an intra-personal perspective and exclude affect with an interpersonal focus (i.e., how a person feels about someone else). This makes particular sense in the specific case of joining a brand-new partnership.

Despite a long research trajectory on affect, mostly in psychology research, findings regarding affective effects on social behavior have been contradictory. Some researchers have found that happiness, which is intrinsically related to a positive mood (Lyubomirsky *et al.*, 2005), increases the likelihood of cooperation (Drouvelis & Grosskopf, 2016) and that positive moods stimulate prosocial behavior at work (Baron, 1997; George, 1991). In contrast, others have found that a positive mood is related to more selfish choices, whereas a negative mood increases preferences for fairness (Tan & Forgas, 2010). Hence, it is still unclear whether a positive mood, as compared to a negative one, actually increases willingness to join a new partnership (Hertel & Fiedler, 1994; Hertel *et al.*, 2000). The key to explaining previous inconsistent results has been suggested to lie in contextual characteristics, usually related to the task itself (Forgas & George, 2001; Tan & Forgas, 2010).

The affect-cognition link has been extensively studied in cognitive psychology, arguing that human memory is formed and stored in a network of associations. Within this network, memories of past experiences are linked to specific emotion-nodes, which connect affectively similar information (Bower, 1981). Thus, moods can bring up certain memories and, vice versa, certain affective experiences can remind one of a past event, evoking the same mood again (Blaney, 1986). This process is known as affect-priming. For instance, a person in a positive mood is more likely than someone in a negative mood to have affectively congruent positive memories triggered and readily available (Rottenstreich & Hsee, 2001; Johnson & Tversky, 1983). Likewise, when joining partnerships, past pleasant experiences of collaboration are likely to be more active in the mind of a person in a positive mood. Accordingly, we argue that a good mood increases one's willingness to join a new partnership, while a negative mood promotes more negative thoughts regarding past or potential future unsatisfactory experiences, eventually preventing people from joining brand-new partnerships.

The Affect-as-infusion model (AIM) (Forgas, 1995), argues that mood is congruently primed into our cognition by the process of affect-priming. The theory further proposes that the more the decision-maker needs to reflect on similar past experiences in order to form a response (Eich *et al.*, 1994), the more mood will affect the decision-maker's behavior. Thus, when an individual must decide whether to join a partnership under very uncertain circumstances (e.g., in virtual collaborations), it is very likely that he or she will need to rely on personal interpretations and reflections, rather than on external cues which are less informative given current ways of collaboration. Examples of weaker external cues include the absence of non-verbal language (Griffith & Neale, 2001) or the uncertainty derived from virtual and anonymous settings (Walther *et al.*, 2009). An individual in a positive mood will therefore more likely recall and interpret potential partnership in a positive way, ultimately increasing the chances of that individual joining a partnership. This will especially be the case when the circumstances are not easy to predict and require more cognitive elaboration, such as in virtual-tie formation.

In addition to cognitive mechanisms, affect can more directly influence behavior through motivational roots. Previous evidence from social judgment research suggests that positive moods are linked to more optimistic, approach-oriented and confident patterns, while negative moods relate to avoidant, competitive and pessimistic patterns (Forgas, 1998; Carver *et al.*, 2000). Studies therefore indicate a positive association between social orientation and mood. Furthermore, in social situations involving potential emotional costs and threats (e.g., the threat of joining an unproductive partnership), a positive mood has been shown to facilitate openness to negative diagnostic information from others (Trope & Neter, 1994). In contrast, a negative mood promotes self-focus instead of openness to the environment (Green *et al.*, 2003), thereby possibly decreasing the willingness form partnerships in socially complex and uncertain situations. Thus, we hypothesize the following:

Hypothesis 1: Individuals in a positive mood are more willing to join a brand-new partnership than individuals in a negative mood.

Mood effects and the difficulty of the problems: Type 1 and Type 2 processes

The AIM theory (Forgas, 1995a) predicts differences in the strength of mood effects on behavior, dependent on the cognitive processes adopted. In this study, we focused on two main, qualitatively distinct processes: automatic or simplified (Type 1) and deliberate (Type 2) processes. There is robust empirical evidence from the dual-process theories of cognition on the widespread distinction between these two different cognitive processes (Evans & Stanovich, 2013; Evans, 2008). Following this idea, the AIM theory (Forgas, 1995), similarly predicts that these different types of processes will substantially moderate the relationship between mood and behavior in organizational contexts (Forgas & George, 2001).

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The type of required cognitive processes that are active in an individual's mind in a particular moment depend on the circumstances, such as the task and its characteristics. Type 1 processes are usually elicited by easy problems, involving perceptual, automatic and context-specific mechanisms (Kahneman, 2003; Carpenter *et al.*, 1990). Higher order or Type 2 processes are typically characterized as effortful, demanding working memory and the use of hypothetical and consequential inferences (Evans & Stanovich, 2013). In other words, when the problem has higher order computational needs, the individual needs to go beyond the presented stimuli and engage in more analytical (Type 2) reasoning (Evans, 2008). Similarly, the AIM theory also predicts that these types of processes will likely be adopted in tasks that require accuracy and are unfamiliar, atypical and complex (Forgas, 1995a). This claim has been supported in a variety of studies in a range of decision-making and cognitive tasks (Fiedler, 1991; Forgas, 2002, 1999).

Furthermore, the AIM theory (Forgas, 1995a) predicts that the mood-congruency effect will be particularly strong in the presence of Type 2 processes, as compared to Type 1 processes: mood-primed information is more likely to spread across the associative network, with multiple inter-connections and richer content being processed. The argument behind is that Type 1 processes, as compared to Type 2 processes, rely on less informational cues, facilitating a faster answer (Berg & Hoffrage, 2008; Kahneman, 2011). Therefore, in simple tasks, quick heuristics or mental shortcuts are often applied, involving less and more direct contingencies than difficult tasks (Fiedler *et al.*, 2010). In contrast, Type 2 processes, which usually occur in difficult tasks, often involve more variety of operations, such as switching between different subtasks (Derfler-Rozin *et al.*, 2016). As a result, less information is simultaneously processed under Type 1 processes and fewer associative cues are expected to spread across the memory network, including affectively primed information.

¹Both the complex and simplified or automatic (Type 1) and elaborate (Type 2) cognitive processes have been extensively studied in previous literature in relation to a wide variety of bargaining and social behaviors influenced by affect (Forgas, 1998; Forgas & Cromer, 2004), often using a different terminology depending on the study (Evans & Stanovich, 2013). Moreover, while the AIM model clearly distinguishes between these two essentially different cognitive processes, it uses a different terminology (i.e., heuristic and substantive information-processing) (Forgas, 1995a). Potentially, both processes may ultimately lead to equally correct solutions to the same problem (Gigerenzer & Gaissmaier, 2011). While the literature has differentiated between two forms in which the two processes may interact—the default interventionist and the parallel-competitive views—entering into this discussion is beyond the scope of this paper. In fact, this is still a controversial theoretical debate (Hodgkinson & Sadler-Smith, 2017). We do, however, defend that both individual characteristics and contextual factors—in our case task difficulty—intervene in the relative final weight of these processes on behavior (Epstein, 1994).

As a consequence, according to the theory, weaker overall mood priming is expected during Type 1 processes, as compared to Type 2 processes, which will activate a larger set of information and mental operations. However, it is important to note that although the AIM theory predicts substantially larger mood effects on behavior for Type 2 processes as compared to Type 1 processes, this does not mean that mood cannot potentially affect behavior under Type 1 processes, by the affect-as-information heuristic. The latter will promote individuals to ask themselves how do they feel about someone or something and to consider this feeling state as a valid source of information to make their choices (Schwarz, 2000).

In sum, and in alignment with the AIM theory and many previous studies that have found mood effects on a variety of behaviors, Type 1 processes are expected to have a more limited mood-priming effect than complex or substantive processing. Thus, we expect that situations that require more elaborative (Type 2) processes (i.e., highly difficult tasks) will entail stronger mood effects on the willingness to join partnerships in comparison to tasks involving automatic (Type 1) processes. Based on this premise, we hypothesize:

Hypothesis 2: The relationship between mood and the willingness to join a brand-new partnership is moderated by the complexity of the task, i.e., the mood effect is stronger in complex (vs.simple) tasks.

METHOD

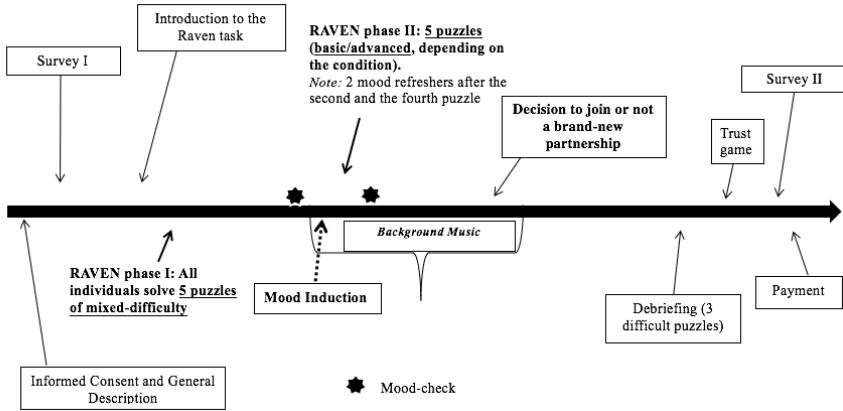
Design

We used a between-subject experimental design, simultaneously manipulating mood (sad vs. happy) and the type of cognitive processes (Type 1 vs. Type 2); see Table 2 for a summary of the four experimental treatments. While we are aware that positive and negative moods may by themselves promote the use of Type 1 or Type 2 processes (Fiedler, 2001; Fiedler *et al.*, 2003), we further explored mood effects when using different types of processes. To this aim, we manipulated not only mood but also the cognitive demands of the task (i.e., difficulty level) altogether in the second round of Raven puzzles. This way we exogenously varied the types of cognitive processes we were interested in. In Figure 3, we graphically illustrate a time-line of the experiment, summarizing the critical steps of the experiment.

TABLE 2: Summary of the treatments

Treatments	Low difficulty	High difficulty
Positive (happy) mood	Treatment 1	Treatment 2
Negative (sad) mood	Treatment 3	Treatment 4

FIGURE 3. Time-line of the experiment



Sample

The experimental sessions took place in a specialized laboratory for economic experiments (LINEEX) at the University of Valencia in Spain. The recruitment call was open to voluntary participants of all ages, although the majority of the sample, due to the location of the laboratory, were Spanish students. The laboratory has specific protocols to ensure randomization and compliance with ethical requirements. After an initial pre-test of the software (Z-Tree), we performed one pilot session with 40 subjects under controlled experimental conditions. Finally, four experimental sessions were completed. A total of 240 subjects were randomly assigned to each of the four treatments (negative vs. positive mood; Type 1 vs. Type 2 cognitive processes; 60 subjects per treatment). The final sample consisted of 113 males and 127 females, of whom 80% were undergraduate students and 10% had postgraduate-level education. The mean age was 23.28 years (SD = 4.49).

Incentives: Partnership or individual option

Incentives were introduced to the subjects as experimental units (one unit was equal to €1 for the main part of the experiment). For both the individual and the partnership options, every correct puzzle was rewarded with 2.75 units. Individuals were informed that only two out of five puzzles per person would be randomly selected and paid for at the end of the experiment. The maximum earnings when “working solo” therefore amounted to 5.5 units. In contrast, the option to join a partnership entailed potential synergies, leading to maximum earnings of 11 units if the subject correctly solved

different puzzles than the assigned partner did. The subjects knew that their earnings would be at least as high if choosing the partnership option as if they chose the individual option, but they were also aware of the costs of bidding (and possibly losing) for the partnership option. The next section explains the details of the partnership option and the appendix shows the specific examples that were provided to the subjects to inform them about this option.

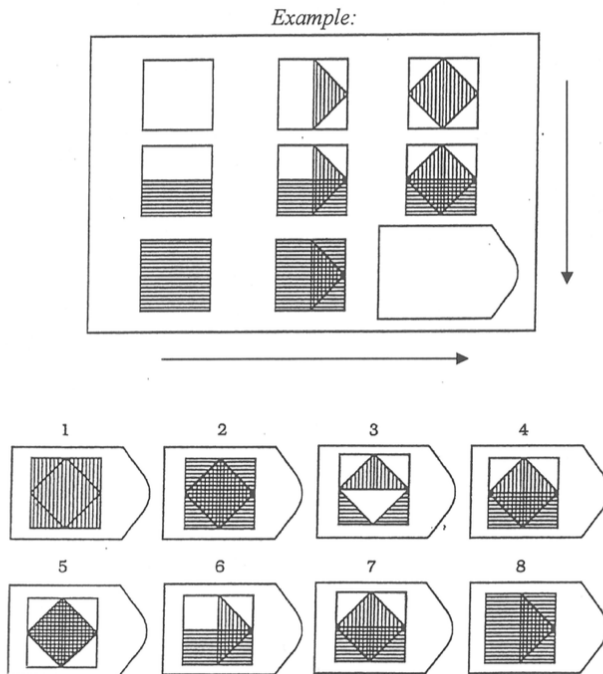
Procedure

At the beginning of the session in the laboratory, subjects filled out an initial questionnaire measuring relevant control variables. Earnings and the incentive structure were clearly communicated. Subjects were informed about the nature of the task they were about to perform and that they would be randomly assigned to a potential partner, with whom they could not communicate and whose identity would remain secret during the entire experiment. Next, they were introduced to the task, which had two different rounds. The experiment lasted 1 hour and 15 minutes and the subjects earned €13.21 on average.

Problem-solving task. The real-effort task chosen consisted of a selection of puzzles from the Raven test. This test was originally developed to measure general cognitive ability (Raven, 2000b) and requires subjects to select the missing figure out of eight possibilities to complete a logical pattern (see Figure 4). There is only one correct answer per raven puzzle. In the first round, there was no option to join a partnership, and subjects were exposed to a variety of mixed-difficulty-level puzzles. Only in the second round we explicitly manipulated the difficulty level of the puzzles (low vs. high) according to the treatments and we subsequently gave them the opportunity to join a brand-new partnership or on the contrary work on an individual basis. Each of the two rounds consisted of five different puzzles. After a pilot test to have an approximation of the time needed to solve the task, we established a realistic time-frame of five minutes to solve the first round and eight minutes to solve the second one. This was important as individuals had short written exercises between puzzles aiming at maintaining their mood in the second round (a more detailed explanation is provided in the mood manipulation section). Thus, we tried to reduce time pressure to some extent, which could have resulted in anxiety. Subjects did however have a time limit (5 minutes to complete the first phase and 8 minutes for the second phase). The average time spent in solving the five puzzles of the second round was 6.57min and the standard deviation 1.70 min. Some individuals answered very fast on average (2.3 min), while others answered more slowly (8 min).

The mood manipulation. Previous studies have shown that various mood induction techniques can be used in combination and that the effects add up when more than one technique is included as part of the same procedure (Bower, 1981; Clark, 1983). We induced positive (or negative) moods by using a primary technique consisting of evoking detailed and vivid memories of a past life event that had made the respondent feel particularly happy (or sad). This written exercise was presented to the subjects as a memory task (Forgas & Ciarrochi, 2001) in order to avoid demand characteristics. From the start of the memory task, the subjects wore individual headphones and listened to classical background music

FIGURE 4. An example of the Raven task



Note: The figure above was presented to individuals as an example. From Raven et al. (2003).

that has been empirically tested to evoke and prolong a happy (or sad) mood (Västfjäll, 2001).³ They continued listening to the music until debriefing at the end of the experiment. Because cognitively demanding tasks can alter mood states (Kim, & Kanfer, 2009), two mood refreshers ensured that the intended mood persisted during the entire task. Specifically, individuals were requested to recall and spend a minute writing about the feelings generated by the written-story exercise. Mood refreshers have been used successfully in previous research to keep an intended mood effect constant (Bramsfeld & Gasper, 2008). To check the constant effect of the mood manipulation in a non-interfering way, subjects were requested to fill out a short self-reported mood scale before and after the second round of puzzles. In order to finally test the success of the mood induction, we used a self-reported scale designed by Van Knippenberg, Kooij-de Bode and Van Ginkel (2010), where a positive mood is associated with the items “happy”, “active” and “cheerful”, and a negative mood with “sad”, “blue” and “miserable”.

The mood induction was implemented prior to the second round. Consequently, the results of the first round of puzzles were not subject to any mood manipulation, and we used this measure as a proxy for an individual’s cognitive ability (see Hoogendoorn et al., 2017). The fact that the subjects were acquainted with difficult puzzles from the first round on allowed us to control for possible strong emotional reactions, such as anxiety responses to difficult puzzles, during the second round. In addition, keeping the difficulty level constant (either low or high) across the two rounds could have elicited unintended direct-access processing. This type of processing usually occurs in highly familiar circumstances and hence potentially attenuates any mood effect on behavior (Forgas, 1995a). Therefore, differences across the four sessions, according to the level of task difficulty (low vs. high) and the induced mood (happy vs. sad), were only effective during the second round.

After the second round, the subjects were asked to make their bids for the partnership option and to propose their dichotomous choices. The timing of this decision was explicitly chosen to avoid free-riding (Czibor *et al.*, 2017). A third set of three high-difficulty puzzles was presented to the individuals after they had made their bids in order to get rid of the induced moods before the second part of the survey was filled out. We applied this debriefing technique because cognitively demanding tasks have been shown to “repair” induced (negative) moods, as being absorbed by a cognitively demanding task naturally decreases the frequency of negative thoughts (Erber & Erber, 2000; Kim & Kanfer, 2009). At the end of the experiment, a detailed overview of each subject’s performance in solving the puzzles during each of the rounds and their earnings were presented to the subjects. All individuals were thanked for their participation and paid their earnings.

Manipulation of the task difficulty. We used a series of Raven puzzles to manipulate the difficulty level of the task. Raven puzzles or matrices have been widely used in economic experiments (Herz *et al.*, 2014) and as measures

³It is not uncommon to use more invasive mood induction techniques based on the use of guided imagery (Mayer *et al.*, 1995). As part of these induction techniques, subjects are asked to visualize fictitious but often dramatic situations (e.g. to imagine the death of a beloved one). Due to ethical considerations, we did not implement this technique.

of cognitive ability in research (Hoogendoorn *et al.*, 2017). Specifically, for the high-difficulty problem-solving task, we used one particular version of the Raven test, known as the Raven's Advanced Progressive Matrices (APM) Test. Difficult problems have been shown to require the involvement of Type 2 processes (Stanovich & West, 2000), as these are characterized by a high degree of abstract reasoning (Evans, 2008). This is fundamentally the case of the advanced Raven puzzles (Carpenter *et al.*, 1990). In contrast, less difficult puzzles show a clear and coherent graphical background which lacks one specific element. The respondent has to find out which figure from a set of alternatives fits better the background by distinguishing similar graphical characteristics. In these types of Raven puzzles, fast, heuristic or intuitive approaches (Type 1 processes) (Kahneman, 2011) are likely cognitive responses (Inhelder & Piaget, 1964).

Furthermore, the advanced puzzles were developed to differentiate between individuals with higher levels of cognitive ability (Raven, 2000b). Particularly, this test has been applied to university students (Rushton *et al.*, 2003). This shows that even highly educated individuals find the advanced puzzles challenging. In contrast, for the low difficulty condition, we selected the initial (and therefore the easiest) puzzles from the Raven's Progressive Matrices test. This test has been primarily used to measure basic cognitive functioning in children (Raven, 2000b). Thus, the matrices from this test are of very low difficulty and require graphical/perceptual and intuitive (Type 1) mechanisms to solve it, as opposed to the more mature, logical or analytical (Type 2) processes required to solve the more advanced matrices (Hunt, 1974). In fact, there is evidence that these two qualitatively different (perceptive and analytical) strategies are used to solve the low-difficulty and the high-difficulty Raven puzzles, respectively (Carpenter *et al.*, 1990). Furthermore, it has been shown that both strategies can be independently targeted and trained using different training techniques, supporting further the existence of these two types of processes when solving the Raven task (Kirby & Lawson, 1983). Despite the empirical evidence suggesting that it is more likely to use Type 2 processes to solve high-difficulty tasks (vs. Type 1 processes to solve low-difficulty tasks) we are aware that our manipulation may not fully tap into Type 1 and Type 2 processes, which is a limitation of the study design.

Measures

The option to join a brand-new partnership. Our design for eliciting preferences for joining a partnership is based on Czibor *et al.* (2017). The subjects were presented with the option of either working on an individual basis or joining a partnership with a randomly assigned individual. In addition to the binary choice between joining a partnership or “going solo” that we gave to the subjects, we elicited our outcome variable, the willingness to join a brand-new partnership, by including a bidding mechanism (Becker *et al.*, 1964; Czibor *et al.*, 2017). This way, individuals were requested to pay for the option of joining a partnership. This resulted in a more informative and continuous measure of the willingness to join a brand-new partnership in an incentive-compatible way. We included these two different measures (binary and continuous) of the dependent variable for replication purposes.

The bidding mechanism was operationalized by first giving each respondent an endowment of 4 units/€ that they could (entirely or partly) keep or (entirely or partly) use to bid for the option of joining a partnership. Participants were informed that the actual price of the partnership option would be randomly drawn by a computer out of an interval ranging from one to four units. The partnership option would be realized if and only if both the subject's and their assigned partner's bid were at least as high as the auction price for the partnership. Thus, mutual consent was the underlying requirement for the bidding mechanism to lead to partnership formation; this is a rather realistic approach to partnership or team formation (Czibor *et al.*, 2017). Bids only had to be paid in case the subjects actually formed a partnership. Participants were explicitly reminded that reporting their preferences truthfully would result in an outcome serving their best interests, making "strategic misreporting" unnecessary.

It is important to note that the creation of a partnership did not involve real communication or interaction between partners. The absence of interaction avoids the presence of confounding factors such as other types of processes apart from Type 1 and Type 2 processes (Forgas, 1995a). This is a common choice in experimental economics (e.g. Czibor *et al.* 2017; Kuhn & Villeval 2013; Cooper & Saral 2013). Collaboration without ongoing communication or interaction resembles many real-life partnerships in the world of (open-source) software developers, crowd sourcing and even, sometimes, academia.

Other Measures

Socio-demographic controls. Immediately after the introduction to the experiment, the subjects answered questions related to socio-demographic characteristics. The sociodemographic variables measured were gender, education and age. Gender has already been connected to decisions on collaborating (Kuhn & Villeval, 2013), as has education (Czibor *et al.*, 2017).

Personality-related controls. We used the Positive and Negative Affective Schedule (PANAS scales) by Watson, Clark and Tellegen (1988) to measure the individuals' affective traits. The instrument is composed of two scales, one for trait-positive affect ($\alpha = 0.76$) and the other for trait-negative affect ($\alpha = 0.84$). It measures the stable tendency of a person to feel more positive vs. negative in general across different life situations, and it is an important control in our study since exogenously imposed mood treatment is utilized. The measure was taken ex-ante to prevent possible confounding effects by the mood-induction technique used later in the experiment.

We also measured the subjects' conscientiousness personality dimension as defined by the big-five personality test using the NEO-FFI scale ($\alpha = 0.75$) (Benet-Martínez & John, 1998). It refers to a sense of personal ambition or a willingness to achieve (McCrae & Costa Jr, 1997). This dimension has been negatively related to team preferences (Bäker & Mertins, 2013). We also measured altruism as a personality trait, because evidence supports its effect on preferences for social cooperation (Dur & Sol, 2010) and its link to positive mood (Lyubomirsky *et al.*, 2005). We used the Spanish

scale ($\alpha = 0.72$) by Sing, Corral Verdugo, Tapia Fonllem and García Vázquez (2012). Another personality-related control, which relates to the willingness to join partnerships, is risk attitude. This was operationalized as a single-item subjective measure of general willingness to take risks using an 11-point Likert scale ranging from 0 (completely unwilling to take risks) to 10 (completely willing to take risks) (Dohmen *et al.*, 2011).

Cognitive controls. A number of measures related to cognitive ability were measured to include them as controls. One of these variables was perceived self-efficacy. Efficacy beliefs can be defined as a personal confidence in one's domain-specific ability (Bandura, 2006a), which has been shown to affect cooperative strategies in economic game situations (Karamanoli *et al.*, 2014). We measured self-efficacy tailored to the Raven puzzles (i.e., self-confidence regarding ability to solve puzzles), measured on a 10-point Likert scale ($\alpha = 0.94$). Additionally, to control for beliefs (Czibor *et al.*, 2017), we also measured the subjects' beliefs about their own competence and their beliefs about their partners' competence, as such beliefs might possibly influence their willingness to join a partnership. We also proxied IQ using the count of how many puzzles of mixed difficulty levels the subject solved correctly in the first round. Finally, we used the time spent to make the bidding decision as an auxiliary measure for cognitive ability.

Social-preference controls in the trust game. In this game, one unit was equivalent to €0.5, and the subjects were informed of this change. To eliminate the possibility of social preferences driving the results, an incentivized trust game, structured and operationalized as in Dohmen *et al.* (2011) was introduced to the subjects at the end of the experiment after the debriefing. Each participant played the game twice, both as a first and second mover. They were informed that only one of the two games would be randomly chosen for payment. As first movers, subjects received an endowment of seven units, which they could use to send 0 to 7 units to their assigned partner prior to knowing how many units they would receive back. The amount sent is our measure of trust. Responses as a second player, i.e., what each subject sent back to their partner, were used as a measure of reciprocity.

RESULTS

Descriptive Statistics and Randomization Check

In Table 3 we present the results of a simple randomization check, which supports the random distribution of subjects across the treatments according to all relevant variables: all mean differences are statistically insignificant. The descriptive statistics and correlation analyses between the willingness to join a partnership and all other variables are exposed in Table 4. Multi-collinearity is low and is supported by a low average variance-inflation factor (VIF) of 1.57. The highest correlation is between the subject's beliefs about their partner's and their own competence ($r = 0.59$, $p = 0.00$).

TABLE 3: Mean differences between conditions (Randomization Check) ^a

	Low difficulty	High difficulty	Positive mood	Negative mood
Mood	14.17	13.9	14.09	13.98
Age	23.42	22.95	23.22	23.15
Gender	.54	.51	.54	.51
Education	9.51	9.43	9.33	9.61
Trait positive affect	36.38	35.25	36.27	35.35
Trait negative affect	19.97	20.79	20.51	20.25
Altruism	25.6	24.65	25.44	24.80
Risk attitude	7.01	6.77	7.05	6.74
Conscientiousness	34.14	33.62	33.75	34.01
Perceived self-efficacy	79.32	77.65	79.84	77.13
Own competence beliefs	3.41	3.35	3.40	3.36
Beliefs about the partner's competence	3.62	3.56	3.55	3.63
Cognitive ability	3.45	3.46	3.49	3.43
Decision time	17.16	17.51	16.48	18.19
Trust	4.04	3.9	3.85	4.08
Reciprocal	50.33	51.40	48	53.74

^a All mean differences were statistically insignificant.

A proportions t-test was used to calculate gender mean differences.

TABLE 4: Descriptive statistics and correlations ^a

	Mean	S.D.	Min	Max	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Mood ^b	0.5	0.5	0	1																	
2. Task difficulty ^b	0.5	0.50	0	1	.00																
3. Willingness to join a partnership	1.86	1.07	0	4	.02	-.15															
4. Age	23.18	4.49	18	43	.00	-.05	-.01														
5. Gender ^c	.52	0.5	0	1	.02	-.02	-.05	-.11													
6. Education	9.47	1.75	4	16	-.08	-.12	-.07	.30	-.00												
7. Trait Positive affect ^d	35.81	4.68	16	46	.09	-.12	.06	-.02	-.04	.02	.01										
8. Trait Negative affect ^d	20.38	6.37	10	41	.02	.06	.00	-.02	-.04	-.01	-.18										
9. Altruism ^d	25.12	6.06	12	42	.05	-.07	.05	-.06	.26	-.01	.37	.01									
10. Risk attitude ^d	6.89	1.88	1	10	.08	-.06	.15	.00	-.04	-.02	.24	-.23	.18								
11. Conscientiousness ^d	33.88	4.95	15	45	-.02	-.05	-.01	.19	.11	.08	.35	-.15	.07	-.01							
12. Perceived self-efficacy ^d	78.48	17.72	19	100	.07	-.04	.06	.01	.00	.13	.23	-.08	-.05	.08	.14						
13. Own competence beliefs ^d	3.38	0.98	1	5	.02	-.02	.00	.02	.08	.07	.15	-.19	-.02	.02	-.01	.35					
14. Beliefs about the partner's competence ^d	3.59	.85	1	5	-.04	-.03	.12	.04	.20	.05	-.00	-.06	.01	-.08	-.02	.13	.59				
15. Cognitive ability ^d	3.46	1.06	0	5	.02	.00	.07	-.09	-.05	.10	.03	-.06	-.21	-.00	-.05	.24	.56	.37			
16. Decision time	17.33	13.40	2.41	102.83	-.06	.01	-.02	-.03	.00	.06	-.05	-.05	-.07	-.09	.02	.09	.06	.00	.10		
17. Trust	3.97	1.97	0	7	-.05	-.03	.28	.05	-.20	-.06	.07	.05	-.08	-.01	.03	.06	-.06	-.04	.02	.01	
18. Reciprocal interaction	50.87	33.8	0	140	-.08	.01	.01	.03	.00	.01	.07	.03	.13	.03	.03	-.04	-.12	-.08	-.12	-.08	.29

^a N=240. Correlations greater than 0.13 are significant at 5 %. ^b Experimentally manipulated between subjects variables. For mood, negative mood=0, positive mood=1. For task difficulty, low difficulty=0, high difficulty=1. ^c For gender male=0, female=1. ^d Measures taken before the treatments.

Mood Manipulation Check

According to expectations, mood scores do not vary across experimental groups before the mood manipulation, neither for positive ($t[236.41] = -0.05, p < 0.95$) nor negative moods ($t[238] = 0.55, p < 0.57$). However, after the mood manipulation, subjects in a positive mood condition had a significantly more positive mood than subjects in a negative mood condition (10.47 vs 8.39, $t[238] = 6.28, p < 0.00$), and those in the negative mood condition felt a more negative mood than subjects in the positive mood condition (5.59 vs 4.1, $t[219.26] = -5.77, p < 0.00$). This statistically supports the effectiveness of our mood manipulation procedure.

Type 1 and type 2 processing check

We used the time spent solving the puzzles from the second round, as a behavioral proxy for Type 1 and Type 2 processes (Chaiken, 1980). The convenience of this measure has been supported by a variety of scholars (Chaiken, 1980; Forgas, 1995b; Laureiro-Martínez & Brusoni, 2018). As variances in time response were significantly different depending on the condition, we conducted a t-test for unequal variances. As expected, individuals affected by the Type 2 processing manipulation in the second round invested significantly more time (measured in minutes) in solving the five difficult puzzles than the group who was primed to use Type 1 processes in the second round (7.52 vs 5.62, $t[182.08] = 10.35, p < 0.00$).

Step-wise OLS regression models

Taken together, two dummy variables represent the different treatments in the OLS regression analyses: one for mood states (0 = negative mood, 1 = positive mood) and one for the difficulty levels of the task (0 = low difficulty 1 = high difficulty). We estimated regression coefficients for these dummies and their interactions to test our hypotheses using a step-wise procedure. All independent variables were mean-centered following recommendations by Aiken, West and Reno (1991). Furthermore, all regression models were calculated with robust standard errors. The estimation results are shown in Table 5.

Model 1 only includes the treatment dummies. In Model 2, includes the interaction between the two treatments (thereby testing Hypothesis 2, but without controls). Model 3 includes socio-demographic variables (i.e., age, gender and years of education) and all personality-related controls (i.e., trait-positive and trait-negative affect, altruism, risk attitudes and conscientiousness). Model 4 excludes the socio-demographic variables but includes the above-mentioned personality controls and variables describing other cognitive aspects potentially related to cognitive ability: perceived self-efficacy, beliefs about partner's and one's own competence, time spent making the decision, and the number of puzzles correctly solved during the first round. In Model 5, we included the variables of the previous model plus variables measuring

social preferences: trust and reciprocal interaction. In Model 6, we included all the control variables. As shown in Table 5, all models paint a consistent picture regarding the results relevant for testing our hypotheses. Finally, we conducted a likelihood-ratio test to confirm that the full model including the interaction explained better the data than the same model without the interaction term. The test proved that the inclusion of the interaction significantly improved the model ($p < .02$).

TABLE 5: OLS regression results for the willingness to join a brand-new partnership ^a

DV: Willingness to join a partnership	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Mood ^b	.05	-.17	-.26	-.28	-.23	-.25
Task difficulty ^b	-.33*	-.56**	-.59**	-.60**	-.56**	-.58**
Age			-.00			-.00
Gender (dummy) ^c			-.08			-.03
Education			-.04			-.04
Trait positive affect ^d			.00	.01	.00	.00
Trait negative affect ^d			.00	.00	.00	.00
Altruism ^d			-.00	-.00	.00	.00
Risk attitude ^d			.09*	.10*	.10**	.10**
Conscientiousness ^d			-.00	-.00	-.00	-.00
Perceived self-efficacy ^d				.00	.00	.00
Own competence beliefs ^d				-.23*	-.19†	-.19†
Beliefs about the partner's competence ^d				.29**	.28**	.29**
Cognitive ability ^d				.09	.07	.08
Decision time				-.00	-.00	-.00
Trust					.16**	.15**
Reciprocal interaction					-.00	-.00
Mood x Task difficulty		.46†	.54 †	.61*	.58*	.60*
Constant	2**	2.11**	2.19**	2.15**	2.13**	2.16**
Adjusted R ²	.02*	.03*	.07*	.10**	.18**	.19**
Δ R ²		.01	.04	.03	.08	.01

^a All coefficients were calculated using robust standard errors. $N=240$. ^b Experimentally manipulated between-subjects variables. For mood, negative mood=0, positive mood=1. For task difficulty, low difficulty=0, high difficulty=1. ^c For gender male=0, female=1. ^d Measures taken before the treatments.
 $p < .10$ † $p < .05$ * $p < .01$ **

Hypotheses testing. We did not find support for a direct main effect of mood on the willingness to join a brand-new partnership (Hypothesis 1). The results show a consistently significant interaction effect between the difficulty of the task and the mood treatments, in support of Hypothesis 2. Being in a good mood affects the decision to join a brand-new partnership positively, but only in the case of a highly difficult task. Indeed, post-estimation analysis shows that the average bid for the partnership option is higher in a positive than in a negative mood condition (1.83 vs. 1.55 out of 4 endowment units) when the task difficulty is high; while there is a non-significant difference when the task difficulty is low. Similarly, when comparing the two experimental groups that had an equally negative mood (the third and the fourth treatments), we are able to notice that as compared to the low difficulty condition, subjects in a negative mood bid significantly less in the high difficulty condition. This finding is coherent with our predictions. Table 6 presents a summary of these effects.

TABLE 6: The average effects of the treatments on decision-making performance

	Low difficulty	High difficulty
Positive mood	1.94 (.44)	1.83 (.40)
Negative mood	2.11 (.47)	1.55 (.39)

Note: Standard deviations are reported in parenthesis.

Other results. The difficulty treatment has a negative main effect on the probability to join a partnership. In other words, the higher is the difficulty of the problem, the lower is people’s inclination to join a brand-new partnership (probably related to the strategic risk of being associated with a low-performing partner). Although we did not have any specific a priori expectation, we believe this is an interesting additional finding. In order to shed light on the significant main effect of task difficulty on the willingness to join a new partnership, we tested whether the subjects’ beliefs about their partners’ competence were significantly related to their decisions in the high-difficulty condition, as compared to the low-difficulty one, where the effect was not significant. To this end, we included an interaction term between beliefs about a potential partner’s competence and task difficulty and found that beliefs about the partner’s competence are more significantly related to the willingness to join a partnership in the high-difficulty condition than in the low-difficulty one (not tabulated but available on request). This intuitive result lends extra support to the success of the task-difficulty manipulation.

We find that none of the demographic characteristics, such as age, gender or education, are associated with a subject’s preference to join a partnership. Some of the personality-related controls are also unrelated to partnership preferences based on our experiment. The PANAS scales turned out to not have a significant effect on people’s willingness to join a partnership, as expected based on using it as a control variable. This non-significant effect additionally supports that it is our mood treatment, and not the subjects’ general tendencies to feel a certain way, that is driving the results. Furthermore,

the conscientiousness dimension from the big five personality factor is not negatively related to joining a partnership, and the measure of altruism also lacks a positive association with partnership preferences. Another personality-related control, risk attitude, that was operationalized as a single-item subjective measure of general willingness to take risk (see Dohmen et al., 2011), shows a consistently positive association with one's willingness to join a partnership. This was an expected result, as we were aware that the partnership option entailed the strategic risk of being matched with a low-performing potential partner (Bäker & Mertins, 2013).

Perceived self-efficacy has no association with partnership preferences in our models. However, a closely related variable that we included to control for beliefs (Czibor et al., 2017) —a measure of a subject's beliefs in their own competence —shows the expected negative association: people who believe they are able to solve the puzzles by themselves are less inclined to seek a partner. Likewise, and also in line with expectations, we found that the subjects' positive beliefs about their partners' competence positively affected their decision to join a partnership. The number of puzzles correctly solved and the time needed to make a decision about joining a partnership have no additional effects on the outcome variable.

The results from the trust game indicate that the measure of trust resulting from this game (when people act as a first player) indeed affected the willingness to collaborate in the expected way. Reciprocity (measured in the same game for the second players) turned out to be an insignificant control.

Robustness-checks. Although our mood manipulation was successful, we empirically tested for any indication that specific emotions, rather than generally positive and negative mood states, could have altered the results. To this end, we included in the regression analyses, as separate variables, the specific affective states that comprise both positive (i.e., happy, active and cheerful) and negative mood (i.e., sad, blue, miserable) categories. None of these variables yielded significant results.

If the difficult task had elicited unintended emotions, such as anxiety or other types of highly aroused negative-affective states, then individuals in the negative mood condition should have felt significantly more activation or arousal than those in the positive mood condition. However, this was not the case. On the contrary, individuals in our sample felt significantly more aroused in the positive mood condition (3.65 vs 2.99 , $t[227.29] = 5.47$, $p < 0.00$). This result provides evidence against the possibility that strong emotional reactions, especially in response to exposure to the difficult puzzles, could have confounded the effect of our mood treatment.

We also measured the preference to join a partnership in a binary form, based on which we estimated logit models to test the hypotheses. We found no support for the effect of any of our treatments using this specification, perhaps due to the fact that the measure was binary and not as accurate as a continuous measure would be. Nevertheless, the signs of the coefficients (both positive and negative) of the regression coefficients remain the same in both types of analysis.

We also tested that the manipulation of the type of cognitive processes was the intended one in the specific moment in

which individuals had to decide if they wanted (or not) to join a brand-new partnership. A t-test confirmed that individuals in the Type 2 processing condition (as compared to individuals in the Type 1 processing condition) needed significantly more time (measured in minutes) to solve the difficult puzzle that was presented to them immediately upon making their choices –as part of the defrieffing technique (1.81 vs 1.68, $t[238] = 2.16$, $p < .03$). Hence, the intended types of cognitive processes were maintained during the entire length of the decision-making task (i.e., during the bidding mechanism).

A final robustness test was based on a question at the end of the experiment, in which we asked the subjects to guess the objective of the experiment. None of the subjects correctly predicted the aim of the study, which further increases the internal validity of the findings.

DISCUSSION

Organizations and decision-makers are entering an intense, information-driven era, where the influence of fast-paced spread of information, abundant information, constant change, and uncertainty call for new perspectives to management research (Van Knippenberg *et al.*, 2015). This shift is clearly reflected in emerging trends as seen in recent international conferences on management, such as the Strategic Management Society's Special Conference (2018), entirely dedicated to the topic of "sharing" in organizations, including discussions on open innovation, crowdsourcing, and social-network applications as new forms of collaboration.

The present study demonstrates, based on affect-as-infusion (AIM) theory Forgas (1995a) and dual-process theories of human cognition Evans (2008), that individuals' temporary mood states influence their willingness to join brand-new problem-solving partnerships. Specifically, we found that individuals in a positive mood are more likely to join brand-new partnerships than those in a negative mood. Interestingly, this was only the case when the problem-solving task was highly difficult and not when the problems were easier to solve. Our study helps to resolve previous inconsistencies in the literature and highlights the joint importance of both temporary mood states and the difficulty levels of the problems to be solved.

Theoretical Contributions

Our study resonates with a variety of theoretical approaches. For instance, organizational and social network research has highlighted the importance of new tie formation outside of the boundaries of an organization. Novel ties, as compared to existing ones, may help improve innovation performance by contributing to generate new valuable knowledge (Burt, 2004; Lazzarini *et al.*, 2008; Walter *et al.*, 2015) at least under the right circumstances (Mors, 2010). Based on this observation, research has mainly focused on tie formation from a dyadic perspective, such as similarity, physical proximity, interpersonal trust, and affect (Casciaro & Lobo, 2008; McPherson *et al.*, 2001; Vissa, 2011). Less attention has been

paid to the specific personal characteristics of the actual actor or decision-maker who autonomously chooses to join, at an early stage, highly uncertain, brand-new partnerships. There are, however, some studies on this topic. For instance, collaborative behavior in the context of repeated interactions has been shown to be affected by individuals' positive emotions toward the potential partner (Casciaro & Lobo, 2015). Mild mood states, however, are not as intense as emotions and are usually not directed at a particular person or event; therefore, they are likely to exist before a partnership has commenced. In fact, affective states are the preliminary experiences of an organism which often determine individual preferences and behavior even before a conscious cognitive evaluation regarding a particular person or situation has been made or a preference has been formed (Zajonc, 1980). The beauty of moods is their ephemeral nature and the fact that they are not subject to a particular cause or situation. Yet, they are powerful enough to influence a variety of behaviors without our awareness (Forgas & George, 2001). This may be in part related to the marked individuals' difficulty in establishing new relationships and being open to initiating conversations with new people (Ingram & Morris, 2007). If one's existing mood does not facilitate a posterior positive evaluation about forming a new knowledge-creation partnership, the chances of engaging in such a collaboration in the first place are likely to decrease. Moreover, initiating a brand-new partnership has attached the value uncertainty over not having any guarantee that the collaboration will be successful (Lazzarini *et al.*, 2008). This is in line with research that has demonstrated how a positive mood promotes openness to the environment and a less defensive response to potentially threatening stimuli —such as highly uncertain new collaborations (Trobe & Pomerantz, 1998; Green *et al.*, 2003).

Another body of literature that our study contributes to is studies on open innovation software communities and virtual problem-solving and discussion platforms (Foss & Rullani, 2015; Haas *et al.*, 2015; Wasko & Faraj, 2005). Research on virtual teams (Griffith & Neale, 2001) and other organizational studies have started to acknowledge new conceptualizations of teams as dynamic hubs of individuals with increased fluidity, overlap, and dispersion (Mortensen & Haas, 2018). As the more stable, structural aspects of team dynamics are increasingly lacking, researchers have started to focus on temporary mechanisms – comparable to mood states —such as paying attention to the particular problems to be solved by joint contributors (Haas *et al.*, 2015).

Studies on the behavioral foundations of strategic decision-making have also begun to look at individual antecedents to embarking on innovation collaborations. For instance, people's networking skills and aspiration gaps (i.e., differences between their performance and that of their peers) are likely to affect collaboration preferences (Schillebeeckx *et al.*, 2016). Similarly, the study of affect in relation to Type 1 and Type 2 processes has been highlighted as a promising avenue in the study of the psychological foundations of dynamic capabilities (Hodgkinson & Healey, 2011). The willingness to join a partnership in the context of high uncertainty (e.g., fast-moving knowledge-exchange partnerships or strategic alliances) can also be understood as a dynamic capability (Allred *et al.*, 2011). Our findings support the notion that

in strategic contexts where deliberate (Type 2) processes are predominant, mood effects are likely to shape behavioral outcomes (Ashton-James & Ashkanasy, 2008). Although both Type 1 and Type 2 processes –as well as the capacity to switch between them– are needed for successful decision-making performance (Laureiro-Martínez & Brusoni, 2018), our results show that in high-difficulty settings where Type 2 processes are more likely, mood has the highest chances of significantly affecting individuals willingness to join brand-new partnership. This will ultimately affect new knowledge-creation and the potential to form brand-new partnerships.

Implications for practice

Being able to adapt to increasingly uncertain and changeable environments, such as joining a new partnership to support knowledge creation seems to require emotion regulation as a way to enhance positive mental states (Healey & Hodgkinson, 2017). Our results show empirical support for this. According to our findings, positive mood is beneficial for new partnership formation in the presence of both high uncertainty and high difficulty. Thus, fostering and maintaining a positive mood, as compared to a negative one, may be ultimately adaptive for organizations, as a way to help them tap into new successful ideas and different knowledge domains (Burt, 2004), promoting creativity (Soda *et al.*, 2017) and ultimately learning and productivity (Reagans & Zuckerman, 2001). Complex or substantive cognitive processes are common in daily organizational life (Forgas & George, 2001), and this makes the role of affect relevant and worth considering in executive training.

Large multi-nationals such as Google already seem to be moving in this direction, as they often implement a variety of activities to promote their employees' positive affective states. In this study, we empirically evidenced that these initiatives might be worthwhile, at least in contexts where complex problems have to be managed in a new partnership. Furthermore, and on the basis of our findings, organizations are advised to be aware of the importance of creating the right virtual scenarios (e.g., in ad hoc communities or open problem-solving platforms). Because moods are instantaneously malleable and vulnerable to subtle cues (Murphy & Zajonc, 1993), small changes such as music or nice colors in an online setting could successfully increase people's willingness to join partnerships. In addition, preventive practices seem important. For instance, tedious procedures to sign up to make a contribution in virtual contexts could easily be prevented. In sum, our study sheds light on the specific conditions under which individuals' willingness to form brand-new partnerships can be more efficiently managed to encourage collaborative approaches.

APPENDIX

Table A1. Two synergy examples of the partnership option

Example 1: Auction price of €3

Player A	<i>Auction price: €3.</i> Amount of the €4 endowment invested: €4 (above the auction price).	Result: A partnership is <i>not</i> created. Player A keeps the full amount of the endowment (It will be added to his/her the final payment).
Player B	<i>Auction price: €3.</i> Amount of the €4 endowment invested: €2 (below the auction price).	Result: The partnership is <i>not</i> created. Player B keeps the full amount of the endowment (It will be added to his/her the final payment).

Example 2: Auction price of €2

Player A	<i>Auction price: €2.</i> Amount of the €4 endowment invested: €3 (above the auction price).	Result: The partnership is created. Player A keeps the remaining 1 euro of the endowment (It will be added to his/her the final payment).
Player B	<i>Auction price: €2.</i> Amount of the €4 endowment invested: €2 (exactly the auction price).	Result: The partnership is created. Player B keeps the remaining €2 of the endowment (It will be added to his/her the final payment).

COLLECTIVE EFFICACY, AND PERFORMANCE ORIENTED RISK PERCEPTION AND TAKING IN START-UP TEAMS

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Abstract

This article introduces collective efficacy, and examines its connection to performance-oriented risk perception and risk-taking. We test predictions with a randomized experiment where 133 teams of Executive-MBAs engaged in an established business simulation, involving start-up strategic decision-making as well as competitive firm performance. The results reveal that collective efficacy is associated with both lower risk perception and higher risk-taking. Our study contributes to strategic entrepreneurship with insight into the under-explored role of collective efficacy. We also add a contextual perspective to the distinction between historical versus social performance aspirations.

Keywords:

Collective Efficacy; teams; risk perception; risk-taking; performance aspirations; cognition

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INTRODUCTION

In this paper, we explore how collective efficacy affects performance-oriented perceptions of risk and risk-taking. We build on extant psychology and business venturing literature, empirically analyzing the cognitive and behavioral implications of collective efficacy from a social-cognitive perspective. This theoretical approach has been suggested as a promising theoretical lens to study entrepreneurial cognition and behavior, such as for example, new venture performance (Hmieleski & Baron, 2008b; Shepherd & Krueger, 2002). Collective efficacy refers to the degree of confidence a team's members have in the teams' ability to achieve a particular performance goal or aspiration (Baker, 2001; Bandura, 2006b). We address the role of collective efficacy and its perceptual and behavioral implications at the venture team-level—a perspective that has been all but ignored in prior work—(Hmieleski & Baron, 2008a; Schjoedt *et al.*, 2013). Furthermore, we contextualize collective efficacy in the domain of (start-up) team competition (e.g., Katila, Chen and Piezunka, 2012), by distinguishing between different types of performance aspirations (i.e. historical and social).

Numerous studies have shown that risk perception and taking are important for entrepreneurial action (Simon *et al.*, 1999; Forlani & Mullins, 2000) and key elements in the success of start-up ventures (Wiklund & Shepherd, 2011). Start-up team cognition has started to receive scholarly attention, mainly from a theoretical perspective (Harper, 2008; West, 2007). Yet, we still know relatively little about the role that collective efficacy plays on these variables at the start-up team level (Shepherd & Krueger, 2002; Shepherd & Patzelt, 2018). By building on the well-established connection between individual self-efficacy, risk perception and risk taking, this study presents one of the first examinations of the role of collective efficacy on lead/start-up team risk perception and taking.

According to social-cognitive theory, behavioral aspects of decision-making can only be comprehensively understood by simultaneously considering both cognitive and environmental influences (Bandura, 1986). Entrepreneurs navigate in high uncertainty environments when exploring for new business opportunities (McMullen & Shepherd, 2006). Efficacy beliefs have been found to be important for regulatory and motivational purposes. They are related to individual-level entrepreneurial behavior in adapting to highly uncertain environments (Hechavarria *et al.*, 2012; Hmieleski & Corbett, 2008). From a social-cognitive perspective (Bandura, 1986), in situations where there is no circumscribed response or a socially scripted response (as is typically the case in business venturing), efficacy beliefs are likely to drive action.

Furthermore, efficacy beliefs are key drivers of venture performance (Stajkovic *et al.*, 2009), especially at the initial entrepreneurial stage (Baron & Henry, 2010; Hmieleski & Baron, 2008b). Considering that strategic decisions are often made by firms and venture teams, it is particularly important to study collective (and not just individual) efficacy. Shepherd and Krueger (2002) theoretically suggest the entrepreneurial relevance of collective efficacy, and tentatively propose a positive connection between collective efficacy and entrepreneurial intent. Furthermore, their study suggests the importance of performance feedback in the context of collective efficacy. While it is a theoretically inspiring, it does

not empirically test the moderating variables between collective efficacy and entrepreneurial behavior—but rather motivates such research. With our study, we seek to find if there is a positive relationship between collective efficacy and entrepreneurial risk perception and taking, and under which specific conditions may these relationships be stronger (i.e., studying teams with different types of performance aspirations).

THEORETICAL FRAMEWORK AND HYPOTHESES

Risk perception and risk-taking are central to strategic decision making and action. In line with prior research, we consider risk as “a characteristic of decisions reflecting the extent to which there is uncertainty about whether potentially significant and/or disappointing outcomes of decisions will be realized” (Sitkin and Pablo, 1992: 10). Perceptual and subjective factors often have a more pervasive effect on entrepreneurial action than objective indicators (Foss & Klein, 2012; Kahneman, 2011).

Also connected to risk-taking is entrepreneurial orientation—a well-studied construct that considers firms’ strategic posture towards the environment. It is comprised of risk-taking, as well as innovation and proactiveness (Miller, 1983; Lumpkin & Dess, 1996). Collectives (e.g., companies or start-up/senior-management teams) that engage in relatively more risky behavior in their decision-making are usually considered as more entrepreneurially oriented (Covin & Slevin, 1991; Miller *et al.*, 2011). Previous work has consistently shown that such firms seek variance, and as such assume greater risk, enabling long-term performance (March, 1991; McGrath, 2001). Hence, entrepreneurial orientation is related to firm performance (Wiklund & Shepherd, 2003,0). Yet, despite the link, little is known about risk-taking in start-up teams (Ireland & Webb, 2007).

According to social-cognitive theory, aspirations are the basis for the development of efficacy beliefs. When a team evaluates its ability for future achievements, this assessment is usually relative to a specific performance aspiration level. Hence, efficacy beliefs are better understood when tailored towards a specific goal, such as start-up firm performance (Hechavarria *et al.*, 2012; Shepherd & Krueger, 2002). Related work in strategic management has also recently gained momentum, with increasing interest in different types of performance aspirations, rather than just focusing on the level of the aspirations (Audia *et al.*, 2015; Shinkle, 2012).

When setting performance aspirations, a start-up or lead-team can either consider its own past performance, or consider its own performance in comparison with competing peers’ performance (the competitors). In the first case, the team sets *historical aspirations*, while in the second case, *social aspirations* (Cyert & March, 1963). Different types of performance aspirations may influence human cognition (Audia *et al.*, 2015) and motivation (Bénabou, 2015) in different ways. Because both constitute different sources of information, it is likely that they will have different behavioral implications (Kim *et al.*, 2015). We thus expect that the *type* of performance aspiration will be an important factor influencing the

relationship between collective efficacy and a start-up-team's risk perception and behavior.

The importance of the decision-making environment

Behavioral patterns emerge in the process of a joint interaction between actors— i.e., the individual or the team— and the environment within which they make decisions (Bandura, 1986). Specifically, entrepreneurial action can be considered in a variety of ways, depending on the specific characteristics of the business environment and the process of ongoing opportunity-pursuit. For example, in a start-up context, the key element of the environment is the irreducible uncertainty that entrepreneurs must bear when making strategic decisions (Miller, 2007). In this type of environment, the probability of success is entirely unknown and unknowable ex-ante (Alvarez & Barney, 2007; Knight, 1997; Sarasvathy, 2001) and systematic rules or plans are of little help in successfully adapting to the environment (Hmieleski & Corbett, 2008). Furthermore, the decision-maker's perceptions are of critical importance. Often, opportunities remain latent or are even yet-to-be constructed by the decision-maker/team, before taking action in a specific environment (Sarasvathy, 2001; Shane & Venkataraman, 2000). The entrepreneurial team is therefore a central, essential, active element in business venturing. Firms emerge, and strategic change occurs, as a result of actors (in this case teams) pursuing opportunities in continuous interaction with the environment (Alvarez & Barney, 2007; Miller, 2007; Lerner *et al.*, 2018).

The study of firm behavior from a contingency perspective has received a great amount of interest in both entrepreneurship (Hmieleski *et al.*, 2015) and strategy research (Stam & Elfring, 2008). In addition to the uncertainty and dynamism of the entrepreneurial environment, competitive forces have also been suggested to be important moderators between the cognitive and behavioral responses of a team (Chen & Miller, 2012). Furthermore, there is still a fertile ground for research exploring competition in nascent markets (Rindova *et al.*, 2010). In fact, competition imposes significant and specific challenges to entrepreneurship (Haveman *et al.*, 2012). It is widely acknowledged that new small firms have to cope with strong competition (Madsen & Walker, 2007), and suffer from liability of newness (Hannan *et al.*, 1998), as well as high rates of failure (Dunne *et al.*, 1988). Therefore, new venture teams must bear not only intense uncertainty, but also fierce competition.

Sometimes, competition is explicit when decision-makers are directly exposed to the performance of players in the market. These influences how teams' set performance aspirations and take risks (Bothner *et al.*, 2007; Boyle & Shapira, 2012; Kahneman & Lovallo, 1993). Yet in other instances, teams have negligible if any performance information about their competitors, especially when the market is relatively new. In other words, teams can vary in the performance information that they have to inform their strategic decisions at any given time.

There are clear differences between the two aspiration contexts. One possibility is that when teams lack information (and thus face higher uncertainty) about the performance of competitors, they will generally set their performance aspirations relative to their own prior performance (i.e., historical aspirations). Alternatively, when there is more information or

less uncertainty about competitors' performance, this information likely shapes the team's performance aspirations (i.e., social aspirations). This distinction – i.e., whether the point of reference is the team's performance *relative to others* or *relative to own prior*, has been shown to be important. Fundamentally, the (type of) aspiration may affect motivation and subsequent action in different ways (Audia *et al.*, 2015). In the following pages, we further elaborate our thesis while delineating a number of specific hypotheses.

Efficacy beliefs and risk in a start-up setting: From individual to collective

Risk perception is defined as a “decision-maker’s assessment of the risk inherent in a situation” (Sitkin and Pablo 1992: 12). According to prior findings, there is a negative relationship between self-efficacy and perceptions of risk. This is key, as entrepreneurship can be understood as a particular way of thinking that focuses on opportunities over threats (Krueger Jr, 2000). Based on this idea, it has been shown that self-efficacy at the individual level is a positive predictor of higher perception of opportunities over threats (Krueger Jr & Dickson, 1994). However, it is important to consider that *collective* efficacy (at the team level) and self-efficacy beliefs (at the individual level) may not affect risk perception in the exact same way. Similarly, it is important to note that both refer to phenomena based at different levels and hence, although highly related, should be treated as theoretically different variables (Bandura, 2006b).

Collective efficacy estimates are dynamic, as the start-up team receives performance feedback and updates learning in a continuous interplay with the environment (Baker, 2001). As collective efficacy evolves, a team's success and failure experiences are also likely to change over time, promoting the emergence of new cognitive and behavioral responses (Shepherd & Patzelt, 2018; Silver & Bufanio, 1996). In this respect, individual perception has been shown to be closely related to team-level achievements. For example, there is evidence that a team's prior performance experiences affect individual perceptions about the team's ability (Riggs & Knight, 1994). Similarly, in another study it was found that perceived collective efficacy at the level of the individual entrepreneur predicted higher persistence with underperforming ventures (DeTienne *et al.*, 2008). In emergent startup teams united by a common performance goal, it is likely and rational for individual team members to focus on the exploitation of opportunities and the shared earnings as a team (Harper, 2008; Lechler, 2001).

In addition, individual assessments of self-efficacy might serve to motivate perception and behavior, by promoting positive feelings such as self-pride (Bandura, 1986). This motivational effect is highlighted when social-referents (such as competitor teams) have a salient role in the environment (Bandura, 1977). This motivational or reinforcing effect, in turn, will affect perceptions of risk. However, for this effect to arise, the task has to be personally relevant (Bandura, 1991). It is reasonable to expect a high personal relevance toward the joint task, when the team shares a common strategic goal (Harper, 2008; Bandura, 1986). Furthermore, social processes within the team are also likely to enhance joint perception and learning (Kefan *et al.*, 2011), ultimately affecting risk perception and taking at the team level (Sitkin &

Pablo, 1992). Hence, from this perspective, efficacy beliefs have the strongest potential to influence perception when information regarding one's particular performance (as a team) is explicitly available (Bandura, 1986, 2001).

However, the basic premise of social-cognitive theory is that personal factors will be translated into action when situational contingencies are particularly weak or uncertain (Bandura, 1986). Therefore, the relationship between collective efficacy and perceptions of risk will be dependent on the level of uncertainty that the environment imposes. Teams that lack information about the performance of the competitors are operating under higher uncertainty. In such high uncertainty conditions, entrepreneurs will tend to neglect and mischaracterize the competition in market entry contexts as a result of their beliefs in their own abilities (Cain *et al.*, 2015; Camerer & Lovallo, 1999). Furthermore, this inward-looking approach may bias teams toward focusing on their own abilities and strengths and even overestimating them (Kahneman & Lovallo, 1993). We therefore expect that when teams lack information on their relative performance and take their own performance as a reference for making decisions, their collective efficacy will lead them to minimize risk perception. Taken together, we posit:

Hypothesis 1a: Higher collective efficacy leads to lower team-level risk perception.

Hypothesis 1b: Higher collective efficacy leads teams with historical aspirations to have lower risk perception than teams with social aspirations.

Extant work has presented mixed findings on the association between overly optimistic approaches and the presence of competitors' performance information (Greenberg & Pyszczynski, 1985; Kahneman & Lovallo, 1993). In principle, collective efficacy beliefs are drivers of motivation and may help regulate thought and action in response to environmental demands (Bandura, 1986). While evaluative information regarding one's performance may be reinforced by the presence of similar social referents (Bandura, 1977) such as competitor teams, it is unclear whether this exposure will enhance or attenuate the relationship between collective efficacy and risk perception and taking.

Recent empirical findings in economics have highlighted the human difficulty of dealing with performance feedback; especially when this information is negative (Möbius *et al.*, 2011) and it is provided in the form of performance rankings (Eil & Rao, 2011). Along this line, there is evidence showing that self-enhancement motives are likely to arise when the outcomes of others are publicly displayed (Greenberg & Pyszczynski, 1985) and when the audience has the power to influence the decision maker's future state (Jordan & Audia, 2012).

Similarly, the literature on teams has found that similar groups can show a positive bias or in-group favoritism, when exposed to other similar teams (Henderson-King *et al.*, 1997; Jetten *et al.*, 1998). In the context of competition, psychological reactions to rivalry are more pronounced when similarity among rivals is high (Kilduff *et al.*, 2010). Furthermore, in hyper-competitive environments, how well the senior-management team works together, will significantly predict competitive behavior (Chen *et al.*, 2010b). In general, it seems that inter-group competition can boost motivation (Mulvey &

Ribbens, 1999; Tauer & Harackiewicz, 2004). In addition, being exposed to other role models' performance scores, could increase the salience of what is feasible, promoting the interplay between collective efficacy beliefs and entrepreneurial actions (Krueger Jr, 2000). These arguments, suggest that in situations where teams have social aspirations, collective efficacy will facilitate motivational resources to translate into lower risk perception and higher risk-taking.

In contrast, if we look closer at the nature of entrepreneurial decision-making in the context of venture creation, then the opposite outcome also seems plausible. When entrepreneurs are part of an initial creation process, other forms of logic, different from objective performance information, are likely to drive entrepreneurial action (e.g. Lerner *et al.*, 2018). Examples include improvisation (Hmieleski & Corbett, 2008) or behavioral disinhibition (Lerner, 2016; Lerner *et al.*, 2018). While entrepreneurial efficacy beliefs may facilitate the explicit use of plans (Brinckmann & Kim, 2015), they can also serve as primary regulatory mechanisms for action. This is particularly useful in the process of pursuing challenges and adapting entrepreneurial action towards a dynamic environment (Hmieleski & Baron, 2009). In fact, from the creation perspective entrepreneurs' primary focus has been suggested to be on acceptable or affordable risk (Alvarez & Barney, 2007; Sarasvathy, 2001), rather than on their potential gains or opportunities. Intuitive, inward-looking approaches have greater relevance in such circumstances (Kahneman & Lovallo, 1993; Miller, 2007). In other words, start-up teams shape their business realities in an active exchange between their actions and the business reality. When entrepreneurs operate under creation-based logics, self-confident patterns are more likely to emerge (Hayward *et al.*, 2006). However, when external views are salient and decision-makers are necessarily exposed to statistical or comparative performance information from competitors, self-flattering views are then likely to dissipate (Kahneman & Lovallo, 1993). According to this literature, collective efficacy will have a higher potential to influence risk-taking when teams are not exposed to their competitors' performance and instead rely on historical aspirations.

Similarly, previous research in psychology has found that when a competitor is present, no matter the relative performance of this competitor, it will have a threatening effect on self-evaluations (Muller & Butera, 2007). This is coherent with the well-studied threat rigidity hypothesis. In the presence of a particularly salient threat, a group's most rigid or dominant responses will be prevalent (Staw *et al.*, 1981). In other words, in the presence of a potential threat, there will be less room for new approaches and entrepreneurial action. We therefore expect a weaker relationship between collective efficacy and risk-taking in the presence of competitors and social aspirations.

Moreover, in unstable environments there will likely be a natural inclination to try to find regularities and contingencies in the environment. This causes what is known as illusory control (Langer, 1975). An example that clearly illustrates this phenomenon is the evidence showing that people feel greater control if they personally throw a dice, than if someone else throws it (Fleming & Darley, 1990). We should expect that the more uncertain the environment, the more likely one is to hold illusory beliefs about one's ability (Bandura, 1986). Therefore, an environment with higher uncertainty in

terms of performance information will be more facilitative of confidence-based behavioral patterns. In formal terms, we hypothesize:

Hypothesis 2a: Higher collective efficacy leads to higher risk-taking at the team level.

Hypothesis 2b: Higher collective efficacy leads teams with historical aspirations to higher risk-taking than teams with social aspirations.

METHODS

Sample and data

To test our hypotheses, we studied a total of 133 teams comprised of 542 respondents. Our sample was constituted by professionals, full-time executives enrolled in the executive MBA (EMBA) program at a top-ranked Business School in the United Kingdom. The professionals participated in the study, as part of an in-class business start-up simulation exercise (later elaborated). Thus, consistent with many other controlled experiments (Davis *et al.*, 2017; Lerner, 2016; Souitaris *et al.*, 2007), the design focused on the relatively mundane reality of individual and collective judgements related to business venturing – particularly efficacy beliefs, and performance oriented risk perception and taking.

There was little variation in team size as the participants were assigned to teams of six members by the school administration, prior to running the simulation exercise. We collected data at three different points in time, starting in 2015 and finishing in 2016. Exactly the same procedure was followed for each of the data collections. Within each of these three data collections, we had access to two classes of students each time. The average response rate was 73% and there were on average four respondents per team. Mean respondent age was 31 years. The gender proportion for the program was 30 percent female. As business practitioners with an average 11 years of professional work experience, the participants do not proxy 20-year-old app-economy or necessity entrepreneurs – but rather resemble start-up/lead-team members of operating ventures looking to scale (particularly in formal or capital intensive industries). Furthermore, their age is consistent with research indicating founders of high growth ventures are later career individuals with a mean age of 31 (Frick, 2014) or older (Azoulay *et al.*, 2018). The appropriateness of the sample and data for the research question is given further attention in the following pages and the Discussion.

Research setting

In regards to external validity, the simulation should provide a complex and comprehensive business setting that was as realistic as possible. With this in mind, we chose the *People Express* business simulator (Serman, 2014). The simulation was developed by MIT Professor John Serman 1988) and has been used at many different universities and

companies worldwide to teach a variety of concepts in management and strategy. Simulations are characterized by their social aspect and the existence of constantly emerging possibilities (Andersen, 2009). These features are closely in line with the theoretical framework adopted in this study. Furthermore, simulation approaches combined with questionnaires have been shown to be a useful methodology when studying team decision-making in the context of competition (Katila *et al.*, 2012; Chen & Miller, 2012).

The teams ran the *People Express* business for a number of years in the timescale of the simulation game. The simulation game is particularly suitable for the study of performance oriented risk-taking, as it entails new market entry and the potential for both significant gains and losses. The teams have to make five major strategic decisions: the number of aircraft purchased, ticket pricing, marketing expenditure, hiring of personnel, and the scope of the service level offered – to maximize firm performance.

Procedure

The executive participants were divided into two classes, taught in two separate auditoriums and by different faculty members. All instructors introduced and explained the main features of the *People Express* simulation to the class in a similar fashion. In all groups a competitive environment was created as individuals' were encouraged to do their best in the simulation so that they could out-compete the other teams in the class. The main performance goal consisted of maximizing the new firm's share price. Every team was then sent to a separate group room to run the simulation for two rounds. When returning to the auditorium after the first round, they were asked to report the lowest share price of the four quarters in the final year. They were intentionally requested to provide the lowest share price (instead of the highest), so as to avoid them making last minute unrealistic and bold decisions. Upon return to the auditorium after the first simulation round, we asked the students to fill out a short questionnaire. We only consider the data for this study after they run the first round of the simulation. Teams were already acquainted with the simulation after the first round, which enabled them to have realistic performance aspirations for the second round. Moreover, we use behavioral data from the second round as a robustness check.

Experimentally controlled information/ Aspiration conditions

In order to exogenously control the referent information available to teams (related to their performance), teams were randomly assigned to one of two conditions. In the *historical aspiration condition*, teams' had only their historical performance as a reference point upon which to base their performance aspirations for the next round; in other words, half the teams were presented with the primary data collection questionnaire without knowing the performance scores of the other teams. In contrast, the teams in the *social aspiration condition* were exposed to the performance of the other teams, after which they completed the data collection. Accordingly, potential individual and team differences were randomized

across the two conditions. As such, myriad endogeneity threats that would be endemic to a field study were controlled by the experimental design and do not threaten spurious results.

Table 7 summarizes the experimental design and procedure.

TABLE 7: Experimental design and procedure

Condition 1: Social aspirations	Condition 2: Historical aspirations
1. First round of the simulation	1. First round of the simulation
2. Exposure to competitor teams' performance information	2. Questionnaire (without performance information regarding the competitor teams' performance)
3. Questionnaire	

Measures

As our focus of analysis is the venture team, all the variables in our study were aggregated to the team level by calculating the average of individual scores.¹ We first checked that the standard deviation of collective efficacy at the team level did not significantly vary across the two treatments; there were not significant differences, suggesting that teams from both conditions had similar heterogeneity of efficacy beliefs at the team level. In addition, based on prior research on intra-class correlations (ICC) as a justification for aggregation (Bliese, 2000), we computed one-way random effects ICCs. We found ICC levels of 0.09, 0.24 and 0.18, respectively, for collective efficacy, risk perception and risk-taking. The average ICC of these critical variables is in the average-range of values commonly found in management research, and therefore supports the aggregation (Woehr *et al.*, 2015).

Dependent variables. To measure risk perception, we used an adapted version of the measure developed by Sitkin and Weingart (1995). Following Podoyntsyna *et al.* (2012), we tailored the measure to the specific decision-making context. The only item that was explicitly adapted was the first item. The original measure used the concepts of 'opportunity' and 'threat' as direct opposites. However, in the context of our simulation, the main threat that start-ups faced was bankruptcy, which is very likely at an early stage. Therefore, we replaced the term 'threat' by 'bankruptcy'. As bankruptcy does not necessarily need to be considered as the opposite of an opportunity, we asked respondents to simply select their

¹Cognizant of potential aggregation/multi-level issues, herein we focus on the team-level based on the following. (1) Given the research question, our focus was on lead-team risk perception and taking as it relates to strategic decision-making for firm performance, under varying types of performance aspirations. Teams are logically formed by individual members; with individual beliefs about the team's efficacy composing the collective efficacy (metaphorically, the individual *atoms* composing the larger *molecule*). To objectively assess potential cross-level disconnects, the reported analyses were also run based on unaggregated individual-level variables (with multi-level modeling) – and similar results were found. (2) Also related to the matter of aggregating individual responses, it is important to note that our treatment of *collective efficacy* is consistent with its theoretical roots – focusing on efficacy beliefs about the *collective* (i.e. the start-up team) instead of the *self* (Bandura, 1986). In this line, aggregation approaches have proven suitable, since there is a tight relationship between team efficacy beliefs, aspirations and subsequent performance in a variety of contexts (Feltz & Lirgg, 1998; Silver & Bufanio, 1996).

level of conformity for each of the items, keeping a unipolar (rather than a bipolar) scale. For clarification purposes, the contrasting concepts were presented in brackets at the ends of the scales. The rest of the items were left in line with the original measure. Respondents had to answer to what extent they perceived that the statements were describing the general strategic situation they faced in the People Express simulation. Specifically, they were asked to rate, on a seven-point Likert scale (1= Very slightly or not at all, 7= Extremely), the extent to which their group perceived the general strategic situation as an opportunity (vs. a potential for bankruptcy); as having potential for gain (vs. financial losses); and as an overall negative situation (vs. positive situation). The first two items were reverse-scored. The Cronbach α for risk perception (after aggregation) was 0.83.

To operationalize risk-taking, we used the risk-taking scale of Entrepreneurial Orientation (Covin & Slevin, 1989). There is robust empirical evidence supporting the independent use of the different dimensions of entrepreneurial orientation, as they have been shown to vary significantly depending on the situation and to be very weakly correlated with each other (Kreiser *et al.*, 2002; Lumpkin & Dess, 1996; Lyon *et al.*, 2000). This operationalization of risk-taking is particularly suitable in our study, as it was originally developed to assess strategic risk-taking behavior in highly uncertain and volatile conditions (Miller, 1983).

Based on the original measure of risk-taking by Covin and Slevin (1989), we asked respondents to answer on a 7-point Likert scale (1= Very slightly or not at all, 7= Extremely) to what extent their team's behavior was characterized by each of the following three items: "When confronted with decision-making situations involving uncertainty, my group will typically adopt a cautious, 'wait-and-see' posture in order to minimize the probability of making costly decisions" (reverse-scored); "My group believes that, owing to the nature of the environment, bold, wide-ranging acts are necessary to achieve our objectives"; and "My group has a strong preference for taking high risk (with chances of very high return)". In comparison with the original scale (Covin & Slevin, 1989), we only changed the subject of the sentence from "top-managers of my firm" to "my group" when referring to the subject. In the decision-making simulation, the different groups acted as lead-team executives of the start-up airline company. The Cronbach α was 0.71, which is similar to prior research using the same measure (Kreiser *et al.*, 2002). In line with previous studies using the same scale, the respondent is the individual; we aggregate the measure to the group, as we conduct analyses at this level of analysis, before calculating Cronbach α . Individual measurement of this variable has previously been used as a reliable measure for predicting small firms' behavior (Covin & Slevin, 1991; Simsek *et al.*, 2010).

Independent variable. Following Bandura (2006b), collective efficacy beliefs were aggregated at the team level based on individual team members' perceptions of their team's ability. Collective efficacy beliefs are more suitable when tailored to a specific task or domain (Bandura, 1986; Shepherd & Krueger, 2002). We therefore asked respondents to set a performance aspiration for the second round of the simulation immediately prior to the measure of collective efficacy

in the same questionnaire. In particular, when answering the collective efficacy question, participants rated the extent to which they perceived that their team had the ability to achieve the performance aspiration that they indicated in the previous question on a 6-point Likert scale ranging from 1 “extremely likely” to 6 “extremely unlikely”. Answers to this question were reverse-scored when coding the data.

Control variables. A number of control variables were included in the regression analyses. Age and gender have both been consistently related to risk-taking (Byrnes *et al.*, 1999; Vroom & Pahl, 1971). Therefore, both are included as controls in all the regression models. Similarly, the mean age was calculated based on the teammates’ individual age. Similarly, a gender fraction was calculated based on the number of women divided by the number of respondents per team. Furthermore, following the official categorization of the EMBA’s business administration, the individual’s industry background was also accounted for in the regression analyses. Specifically, a team level industry background proportion was calculated based on how many different industry backgrounds were represented in the total number of respondents per team. This was relevant, as top-management team research has shown that industry experience can directly affect risk-taking (Simsek, 2007), or act as a proxy for cognitive heterogeneity, ultimately impacting the strategic decision-making process (Pitcher & Smith, 2001).

In addition, in the risk perception models, we control for the mood state of the respondents (Mayer *et al.*, 1995), as it has been argued that different affective states can influence entrepreneurial risk perceptions (Podoynitsyna *et al.*, 2012). In particular, we include happy and sad moods, as these have been considered two clearly distinct, universal feelings (Watson & Tellegen, 1985). The individuals’ mood is aggregated at the team level, as this has been shown to be a valid approach (Barsade & Gibson, 2012). For the risk-taking models, we additionally control for the mean performance aspiration level of the team, as aspiration size can influence risk-taking (Boyle & Shapira, 2012).

Finally, the performance scores obtained in the first round of the simulation (i.e., before filling out the questionnaire); were also included in the regression models for both risk perception and risk-taking. In fact, prior performance has been consistently shown to affect risk-taking (Bromiley, 1991), as well as positive biases in risky decisions (Durand, 2003).

RESULTS

Analytic strategy. We first performed a randomization check. We compared baseline mean differences across the treatments for the team-level variables that could have indicated a non-random distribution. As presented in Table 8, the results were not statistically significant (all p values >0.05). We calculated means, standard deviations and correlations for all the variables before conducting Ordinary Least Squares (OLS) regression analyses. Descriptive statistics are shown in Table 9. A dummy variable was created in order to represent the two different aspiration conditions (0= *social aspirations*, 1= *historical aspirations*). We followed a stepwise model building or comparison approach in order to

clearly show the contrasting effects generated by including different types of control variables in separate occasions. Furthermore, all independent variables were mean-centered following recommendations by Aiken, West and Reno (1991) and all coefficients calculated using robust standard errors. Missing data was treated following listwise deletion.

TABLE 8: Mean differences between conditions (Randomization check)^a

	Social aspiration	Historical aspirations
Collective efficacy	4.60	4.49
Age	31.75	30.76
Gender	.29	.30
Background fraction	.95	.91

^a All mean differences were statistically insignificant.
A proportions t-test was used to calculate gender mean differences.

TABLE 9: Descriptive statistics and correlations ^a

	Mean	SD	1	2	3	4	5	6	7	8	9	10
1. Aspiration condition	.45	.49										
2. Perceived risk	7.98	2.29	.02									
3. Risk-taking	11.7	2.20	.08	.03								
4. Age	31.25	4.05	.12	.18*	.18*							
5. Female fraction	0.29	0.21	-.02	.15†	-.10	-.04						
6. Industry background fraction	0.93	0.11	.17*	-.17*	.07	.11	.05					
7. Previous performance	29.98	26.95	-.14†	-.42**	-.17*	-.18*	.04	.12				
8. Happy mood	11.59	1.76	-.09	-.17*	.07	.12	.08	.08	.34**			
9. Sad mood	4.91	0.87	.02	.32**	.08	-.11	-.09	-.17*	-.33**	-.27**		
10. Aspiration level	4.27	1.05	-.23**	-.07	-.02	-.15†	-.06	.14	-.16†	-.19*	.03	
11. Collective efficacy	4.55	0.49	-.11	-.09	.26**	.01	-.20*	.09	-.10	.08	.14†	.23**

^aN= 133 teams.

† p < .10.

* p < .05.

** p < .01.

Regression models explaining risk perception. The first model included only the effect of the aspiration condition dummy variable (0=Social aspiration, 1=Historical aspiration). This variable alone did not have a significant effect on risk perception. This was not surprising, as we expected the aspiration condition to have an effect on the relationship between collective efficacy and risk perception. Model 2 included socio-demographic variables, mean age, the gender and the industry background fractions. In Model 3, we included the effect of previous performance (in the first simulation

round). In Model 4, we added controls for moods.

Collective efficacy was included in the next model (Model 5). While the relationship with risk perception had a negative direction, it did not reach statistical significance ($\beta = -0.57$, $p = 0.17$).² Therefore, we did not find support for Hypothesis 1a. In order to see if there was a different relationship between collective efficacy and risk perception depending on the aspiration condition, simple-slopes were first calculated rather than directly calculating the interaction term. In fact, our research question addresses the effect of collective efficacy on risk perception and taking, which may be different across the two experimental conditions. This is consistent with the theoretical framing of this study, as the social-cognitive approach is interested in the relationships between cognitive and behavioral variables, which can substantially vary depending on environmental circumstances. This approach is different from expecting that collective efficacy and the treatment condition together, will on top of their respective individual effects, help to predict the outcome variable. For this reason, checking the simple-slopes has been suggested to be a more intuitive and sensitive approach to test two-group differences (i.e., treatment) when having continuous dependent and independent variables (Robinson *et al.*, 2013). To this end, the interaction term between collective efficacy and the aspiration condition was included in Model 6, while simultaneously including the main effect of the aspiration condition in the same model. Fundamentally, this is simply a reparameterization of the traditional model where interaction terms are included in addition to all the main effects, as the overall model remains equal (see UCLA: Statistical Consulting group, 2017). This model was however highly informative, as it clearly showed that the interaction term was significant. Specifically, the effect of collective efficacy on risk perception was significantly different from zero in the historical aspirations setting ($\beta = -0.87$, $p = 0.04$), but not in the social aspirations setting, where the effect was non-significant ($\beta = -0.18$, $p = 0.79$). Based on this, we ran post-hoc sub-group analysis, and a Wald-test confirmed that including collective efficacy, significantly improved the model when we looked into the subgroup of historical aspirations ($p = 0.00$), but not in the social aspirations group ($p = 0.93$). See Figure 5 for a graphical representation of the results. Thus, both analytic strategies yielded consistent results, supporting Hypothesis 1b. The statistical models for risk perception are presented in Table 10.

Regression models explaining risk taking. Following the same model-building approach as above, in the first model, we only include the effect of the aspiration condition. The second model added mean age as well as the gender and the industry background fractions. In Model 3 previous performance (in the previous simulation round) was included. In Model 4, we included the effect of collective efficacy, which was positively and significantly related to risk-taking ($\beta = 1.18$, $p = 0.00$), supporting Hypothesis 2a. Following the same procedure as for the risk perception models, in Model 5 we included the interaction term between collective efficacy and the aspiration condition, while accounting for the main

²Results at the individual level of analysis (using both multi-level and team fixed effects), enabled us to find a negative and significant relationship between individually measured collective efficacy and risk perception for all our sample, $\beta = -0.74$, $p < .00$. This is in line with findings from Krueger and Dickson (1994) regarding self-efficacy. However, as both our research question and the theory are based at the team level we reject Hypothesis 1a based on our team-level results.

TABLE 10: Regression results for risk perception^a

DV: Risk Perception	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Aspiration condition	.09	.16	-.11	-.13	-.22	-.22
Age		.12*	.08†	.11*	.10*	.11*
Female fraction		1.95†	2.04*	2.26*	1.98*	1.89†
Industry background fraction		-4.39*	-3.02†	-2.47	-2.04	-1.97
Previous performance			-.03**	-.02**	-.02**	-.02**
Happy mood				-.06	-.03	-.03
Sad mood				.61**	.66**	.65**
Collective efficacy					-.57	
Collective efficacy x Aspiration condition						-.87*
Constant	7.93**	7.59**	7.68**	3.94	5.79*	2.95
Adj. R ²		.10*	.25**	.30**	.31**	.32**
Δ R ²		.10	.15	.05	.01	.01

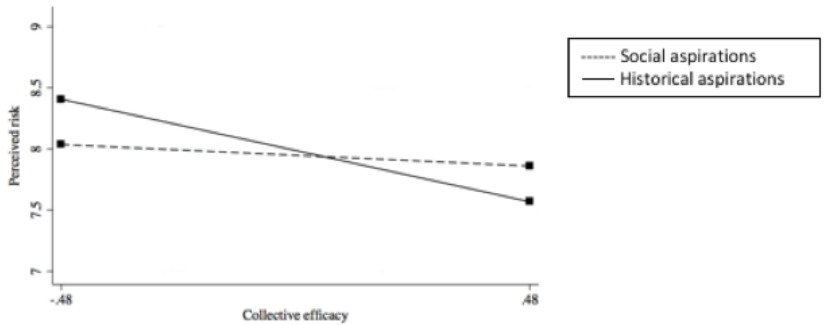
^aN= 133 teams. For Aspiration condition 1=Historical aspirations 0= Social aspirations

† p <.10.

* p <.05.

** p <.01.

FIGURE 5. Interaction between collective efficacy and aspiration condition on risk perception



Note: The effect of collective efficacy (on risk perception) depending on the aspiration condition.

effect of the aspiration condition in the same model. The results supported Hypothesis 2b. Specifically, only in the setting of historical aspirations the effect of collective efficacy on reported risk-taking was significantly different from zero ($\beta = 1.01, p = 0.03$); in the social aspirations condition it was not significant ($\beta = 1.39, p = 0.06$). Sub-group analyses confirmed this result. See Figure 6 for a graphical representation of the results. Furthermore, a likelihood ratio test showed ($p = 0.00$) that including collective efficacy as an interaction term together with the aspiration condition, significantly improved the risk-taking model that included only relevant control variables and the effect of the aspiration condition.

Although we did not a priori expect that the relation between collective efficacy and risk perception and taking would not be different from zero in the social aspirations condition, the fact that we do not find support for a full interaction model could possibly be related to insufficient statistical power. Yet, we still found statistical support for a different relationship between collective efficacy and both risk perception and taking based on the type of aspirations condition. The statistical models for risk-taking are presented in Table 11.

TABLE 11: Regression results for risk-taking^a

DV: Risk taking	Model 1	Model 2	Model 3	Model 4	Model 5
Aspiration condition	.38	.23	.08	.21	.22
Age		.09†	.07	.07	.07
Female fraction		-.99	-.99	-.41	-.44
Industry background fraction		1.03	1.71	1.05	1.07
Previous performance			-.01*	-.01	-.01
Aspiration level			-.08	-.17	-.16
Perceived risk				-.02	-.02
Collective efficacy				1.18**	
Collective efficacy x Aspiration condition					1.01*
Constant	11.51**	8.00**	8.03**	8.57**	8.49**
Adj. R ²	.00	.05	.07†	.13*	.13*
Δ R ²		.05	.02	.06	.00

^aN= 133 teams. For Aspiration condition 1=Historical aspirations 0= Social aspirations

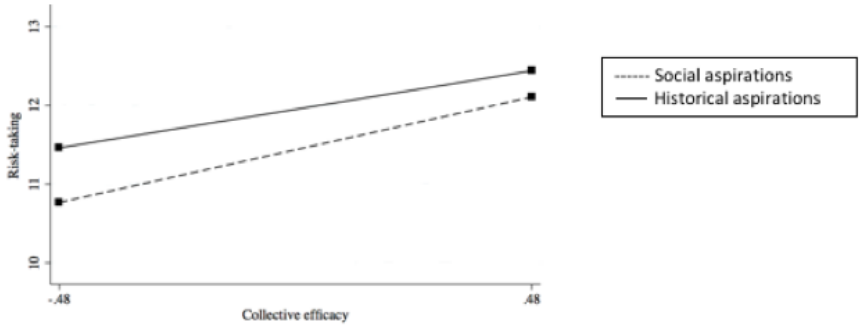
† p < .10.

* p < .05.

** p < .01.

Robustness checks. Considering our risk-taking measure was based on a self-reported scale, we checked the real correlations between this measure and other relevant behavioral measures based on the actual decisions made by the teams. Measuring the same variable with different sources of information allowed us to decrease possible common-method bias (Podsakoff *et al.*, 2003). Risk-taking entails being flexible (Covin & Slevin, 1991), embracing change (Miller & Friesen, 1982) and being opportunity oriented when dealing with the product-market dynamic (Miller, 1983). Following this rationale, from the five different types of business decisions that teams had to make, the most strategically relevant were the product pricing and the width of the service offered to the customer. Risk-taking, as per entrepreneurial orientation,

FIGURE 6. Interaction between collective efficacy and aspiration condition on risk-taking



Note: The effect of collective efficacy (on risk-taking) depending on the aspiration condition.

is best captured by the fluctuations or variance in decision-making subject to managerial action (Miller *et al.*, 2011). Accordingly, we calculated the variance of the second round's decisions that most affect the product-market relationship (i.e. ticket pricing and service scope), for the range between the beginning and the last year of the simulation. The Pearson correlations results revealed, that the variance measure for the tickets' pricing was positively related to risk-taking, although this association was only marginally significant ($r = 0.17$, $p = 0.06$). In addition, the variance of the decision regarding the scope of the service offered, proved to be positively related to our self-reported risk-taking measure, reaching statistical significance ($r = 0.24$, $p = 0.00$). The results from the triangulation generally confirm our prior expectations. However, the reason for not reaching statistical significance in the first case, may be related to limited statistical power, as we have missing behavioral data for some of the teams. We also tested the correlations between our risk-taking measure and the variance of the rest of the decisions, which are more operational decisions related to marketing, hiring and purchasing. The correlation between our risk-taking measure and the hiring of personnel decision is negative and significant ($r = -0.23$, $p = 0.00$), as well as for the aircraft purchase decision ($r = -0.18$, $p = 0.03$). The negative sign of the correlation is consistent with the premise that lower risk taking is reflected by consistent expenditures in operations and firm infrastructure – while higher risk taking is reflected by varying and bolder moves related to what is most uncertain and most beyond the control of the firm – how consumers and competitors will respond to price and service changes.

Finally, in order to ensure that our aspiration condition did not directly affect collective efficacy, but rather, the relationship between collective efficacy and risk perception and risk-taking, we also conducted a t-test. This test compared collective efficacy in the historical and the social aspiration conditions. There was a non-significant difference in collective efficacy between the social and the historical aspirations setting respectively (4.60 vs 4.49, $t[131] = 1.29$, $p = 0.19$).

This result additionally supports the randomization across the two experimental conditions.

DISCUSSION AND CONCLUSION

In this paper, we set out to better understand the relationship between collective efficacy, and lead-teams' risk perception and taking for new venture performance. Our findings suggest that collective efficacy is, indeed, significantly associated with risk perception and taking at the team level, under specific conditions. Thus, the study also provides a contingency perspective. Specifically, we highlight that two types of performance aspirations, i.e., historical and social aspirations, have different influences on team cognition and strategic decision-making. It appears that when teams are oriented towards their own historical performance, collective efficacy affects risk perception and risk-taking. As different types of aspirations come from different knowledge sources, they are in principle able to prompt different action patterns. This is exactly what we found. Our findings are in line with recent predictions by Miller (2007). He argued that entrepreneurial action needs to be considered by applying different lenses: backward-looking (i.e., the historical aspect), forward-looking (i.e., aspirations for the future), as well as inward-looking.

Limitations and future research directions

The simulation we have chosen follows an extensive research tradition and it is well suited for both teaching and training executives on actual strategic decision-making (Stermann, 2014). Therefore, it follows prior research and is realistic (Paich & Sterman, 1993; Sterman, 1987). Yet, the fact that participants are operating in a learning context may lead to the perception of a safer environment than would otherwise be the case. Nevertheless, given that participants knew teams' performance would be revealed at the end of the simulation, there was indeed a social consequence for doing poorly. Thus our findings suggest the opportunity for future research with decision-makers operating in higher-stakes entrepreneurial environments. In this respect, field studies could complement our experimental findings (Simon & Houghton, 2003). Our design enabled us to theoretically contribute to establishing a new relationship (Colquitt, 2008) at the relatively under-explored team-level of analysis. While our sample is not constituted by actual venture teams, the simulation offers the advantage of a highly controlled setting and mirrors the decision-making reality faced by start-up teams. This allows us to provide our experimental setting with realism and to adhere to external validity concerns (Berkowitz & Donnerstein, 1982). Furthermore, the random distribution of teams to conditions helped to counterbalance possible endogeneity issues commonly associated with field studies and to provide an interesting contextual framework for future studies. For instance, it would be interesting to clarify, which of the two aspiration environments (historical or social) is more suitable for sustained start-up firm performance.

Furthermore, in this study we cannot claim causality. Yet, the clear conditional effects related to the types of as-

pirations that teams have suggest a causal mechanism driven by the exogenous experimental manipulation –namely the relatively subtle historical versus social aspirational performance information present in the decision environment. This, in turn, appears to explain the actual role (significant or insignificant) that collective efficacy exerts on lead-teams' performance-oriented decision-making. This finding is interesting and highly informative, as it sheds light on underpinning thought, depending on the different aspiration contexts. Furthermore, regarding the directionality of the relationships, given the controlled experimental design, the reported associations stand to be based on collective efficacy as an antecedent—rather than as a consequence of prior risk perception and taking (which would be endogenous in a field-setting). This is further supported by the robustness check using teams' subsequent decision-making behavior that occurred after the measurement of collective efficacy (see page 23). The later behavioral measures helped to strengthen our findings and further support our self-reported risk-taking scale.

Theoretical implications

With this study, we extend business venturing team research in general (Harper, 2008; West, 2007), particularly as it relates to highly uncertain contexts (Alvarez & Barney, 2007; Hmieleski & Corbett, 2008; Hmieleski *et al.*, 2015; Miller, 2007). We provide a contingency perspective that sheds light on the venture team's cognitive characteristics in relation to a more or less supportive opportunity-related context (Alvarez & Barney, 2007). It has already been suggested that less uncertain or more stable environments may weaken the relationship between cognition and firm behavior, simply because there is less variance in the strategies that teams can use in stable settings (Hmieleski & Baron, 2008a). In our study, we show how even subtle changes in the uncertainty level attached to performance information (i.e., the type of performance aspiration), can show clear differences in the way teams cognitively and behaviorally react to the existing environmental information.

While there has been some interest in the study of the different cognitive and motivational mechanisms underlying historical and social aspirations, recent approaches have been mostly theoretical (Hu *et al.*, 2011; Shinkle, 2012). Research that considers and juxtaposes the two types of aspirations is relatively scarce. This is surprising, as the original model of the behavioral theory of the firm (Cyert & March, 1963), aligns theoretically closer with a model that explicitly supports different aspiration types. In fact, strategic reference point theory (Fiegenbaum *et al.*, 1996) and the attention-based view in strategy (Ocasio, 1997) have shown how individuals and firms shift their attention depending on the environmental contingencies. Moreover, there is evidence supporting the switching model between different reference-points, over models that weight the average of both social and historical aspirations in the same measurement (Bromiley & Harris, 2014). Interestingly, recent studies are starting to place the emphasis on the different cognitive and behavioral patterns that may underlie different types of performance aspirations. This distinction has proven useful in the study of risky strategic moves, such as acquisitions (Kuusela *et al.*, 2017; Kim *et al.*, 2015). Yet, this work has not specifically focused

on start-ups, nor considered collective efficacy beliefs. To our knowledge, the reported study is one of the first to consider that historical and social aspirations might be juxtaposed and more importantly, that they may create important cognitive and motivational differences in the behavioral patterns of lead/start-up teams. It makes particular sense to focus on start-ups, as the start-up environment is among the most uncertain, including in regards to competitors and their performance. Furthermore, in new and emerging markets, performance information about the competitors may just be absent or underdeveloped. Hence, in such contexts, firms may not be able to consider both historical and social aspirations simultaneously and may instead have to rely on the information that they have available.

Relatedly, in the literature of learning from performance feedback, firm aspirations are usually analyzed in relation to “problemistic search”(Cyert & March, 1963) in knowledge-intensive contexts (Greve, 2003). However, in the specific context of entrepreneurship, action, heuristics and impulse-driven logics, seem to be more important for entrepreneurial action, at least when setting historical aspirations. Therefore, our findings highlight the need to apply other lenses than the “problemistic search” when studying performance aspirations. Our results also support the need to extend our focus from aspiration levels (Lant, 1992; Hu *et al.*, 2011), towards the types of aspirations that are held. Moreover, studies focusing on both levels and types of aspirations at the same time can yield interesting results. In fact, one of the possible mechanisms that could be tested in future research is the interplay between these two. Perhaps collective efficacy is more easily maintained and translated into risk-taking if the level of aspiration is more achievable than unrealistically high. If social aspirations signal that more action is needed to cope with a threatening competition, then aspirations are likely to increase. Our data finds preliminary support for this idea, as teams in the social aspirations conditions had significantly higher aspiration levels than in the historical aspirations condition, respectively (4.51 vs 4.03, $t[131] = 2.70$, $p = 0.00$).

The reported study has also relevant performance implications. We know from prior studies that both individuals and teams are vulnerable to overconfidence bias (Snizek & Henry, 1989). Similarly, other studies have highlighted the importance of the external environment in contributing to trigger or attenuate overconfidence (Kahneman & Lovallo, 1993; Kahneman, 2011). Our results resonate with this idea. This is shown by the seemingly de-biasing effect of exposing teams to the performance ranking of the competition – whereby collective efficacy no longer (significantly) effects risk perception and taking. Although the focus of this study is on collective efficacy rather than overconfidence, the conditional effects that emerge are clear: In our data, when lead-teams have socially oriented aspirations, collective efficacy (regardless if realistically estimated or not), does not affect (i.e. alter) risk perception and taking. This is also coherent with research that shows how engaging in more deliberate, counterfactual thinking can counterbalance overly optimistic approaches (Flannelly & Flannelly, 2000). While efficacy-beliefs may help entrepreneurs to persist in the face of adversity (DeTienne *et al.*, 2008), collective efficacy may result in faulty decision-making and unreasonable persistence in the face of failed courses of action (Whyte, 1998). This is consistent with the findings that moderate (but not high) levels of

optimism accompanying efficacy-beliefs have positive performance implications (Hmieleski & Baron, 2009).

This study also contributes to the competitive dynamics literature. Specifically, we shed light on the importance of the strategic context, and how this is perceived, an aspect that has been neglected in prior work (see Chen and Miller, 2012). Moreover, the emphasis on decision-making lead/start-up teams – that at early stages are largely the firm – helps advance our understanding of competitive dynamics (Chen *et al.*, 2010a). This is especially true for under-resourced start-ups that often have to deal with uncertain new markets and competition from other start-ups or established firms (Chen *et al.*, 2010a). Finally, this study proposes a new team-level, socio-cognitive variable, namely collective efficacy, as a promising avenue to bridge micro and macro level aspects in the context of start-up and new-entrant competition.

Our research has also important practical implications. Some venture teams tend to pay attention to other firms' experiences and learn (Aranda *et al.*, 2017). However, at a very early entrepreneurial stage, this may not necessarily be a good idea. Prior research has demonstrated the positive influence of efficacy beliefs in successfully adapting to challenging and life-threatening situations (Taylor, 1983), as well as new venture performance (Hmieleski & Corbett, 2008). Research in positive psychology also highlights the importance of preserving self-efficacy as a valid way to cope with stress and persist in the face of adversity (Taylor & Brown, 1988). In the context of start-up ventures, it seems particularly important to preserve psychological well-being (Hmieleski *et al.*, 2015) and entrepreneurial passion (Cardon *et al.*, 2012). Therefore, as young firms make their first steps and grow, there may be good reason to focus on one's own performance as a reference point, rather than the social reference point of competitors' performance (Blettner *et al.*, 2015). Adopting an inward-looking approach, in light with our results, may unlock motivational processes related to collective efficacy. However, at very early stages of team creation, an inward-looking orientation and collective efficacy may decrease process conflict, which has been shown to increase performance (Goncalo *et al.*, 2010). Nevertheless, in the specific case of start-up teams, these will likely differ in terms of fit with the opportunity environment (Alvarez & Barney, 2007). We believe that in creation contexts and early entrepreneurial phases, venture teams could benefit from searching out a safe, exploratory environment as a way to preserve their collective efficacy.

In conclusion, our study shows how in the presence or absence of performance feedback from the competitive environment teams show different cognitive-behavioral patterns in start-up teams. It is likely that teams who are confronted too early with the competition, may not sufficiently capitalize on the benefits of collective efficacy when confronting risk. It seems however important to acknowledge the fine balance between firmly believing in a team's ability and the reality that is often imposed by the competition.

DOES YOUR MOOD AFFECT WHETHER YOU BENEFIT FROM OVERCONFIDENCE?: AN EXPERIMENTAL STUDY OF STRATEGIC DECISION-MAKING PERFORMANCE

Maitane Elorriaga-Rubio⁵

Abstract

Overconfidence may be a natural reaction in highly uncertain and competitive situations, where strategic or entrepreneurial decisions are usually made. Yet, research has under-explored which factors moderate the overconfidence-performance relationship. In an incentivized laboratory experiment, happy and sad moods were induced by means of performance feedback manipulations under two types of aspirational conditions (historical and social). The results evidence that overconfident individuals who were in a positive mood outperformed those who were in a neutral mood (i.e., control condition) when the task involved high uncertainty (i.e., historical aspirations context). Individuals in a positive mood also outperformed those in a negative mood under the same condition. Furthermore, the benefits of having a positive mood in the presence of overconfidence were stronger in the high uncertainty condition (i.e., historical aspirations context) than in the context with lower uncertainty (i.e., social aspirations context). The main results were replicated in a high uncertainty but non-competitive setting. By considering both cognitive and motivational mechanisms, the paper contributes to the literature on affect and strategic decision-making as well as overconfidence and self-enhancement theories of learning from performance feedback.

Keywords:

Affect, mood; overconfidence; strategic decision-making; performance; historical vs. social aspirations; competition

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INTRODUCTION

"The heart has its reasons which reason does not understand"

Blaise Pascal.

Executives and entrepreneurs are especially prone to feeling extreme forms of self-confidence (Hiller & Hambrick, 2005). Consider the case of Volvo back in 1993. The leader at the time had a paradigm-shifting vision: to transform the industrial workplace by promoting a new team-based production system that would drastically alter traditional assembly lines. In the words of Maccoby (2000) "[h]is overestimation of himself led him to believe that others would want him to be the czar of a multinational enterprise. In turn, these fantasies led him to pursue a merger with Renault, which was tremendously unpopular." The reaction from the stakeholders was so negative that the leader of Volvo resigned. Another popular case is the historical sinking of the Vasa, an enormous 135-foot warship with vast artillery that was built in 1628 during the reign of King Gustav. After learning that a competitor was constructing a large ship with similar characteristics, the king exerted extreme pressure to fabricate an enormous vessel without any engineering rigor, and it sunk on the first day of operations (Fairley & Willshire, 2003). It is not hard to imagine that overconfident actors in both examples were influenced by their affective states, which ultimately shaped the final decision outcomes. In this paper, I would like to shed light on the affective mechanisms behind overconfident decision-making.

There is no doubt that overconfidence can lead to detrimental consequences, such as warfare (Johnson & Tierney, 2011), accidents (Weir, 2002), suboptimal decisions (Goodie, 2005; Hayward & Hambrick, 1997; Malmendier *et al.*, 2011) and entrepreneurial failure (Hayward *et al.*, 2006). Nevertheless, research has suggested that overconfidence has also a productive side (Maccoby, 2000; Hayward *et al.*, 2010), which can, for instance, enhance innovation performance (Hirshleifer *et al.*, 2012; Tang *et al.*, 2015) and promote market-entry decisions (Camerer & Lovallo, 1999; Cain *et al.*, 2015). In view of the diversity of findings on the topic, the relationship between overconfidence and performance could be more comprehensively understood from a contextual perspective (Bollaert & Petit, 2010).

Previous research on overconfidence has mainly focused on stable personality characteristics, such as narcissism (Chatterjee & Hambrick, 2011), optimism (Hmieleski & Baron, 2009), and hubris (Hiller & Hambrick, 2005; Tang *et al.*, 2015). In contrast, this study focuses on more dynamic and contextually circumscribed subjective factors. When strategic decision-makers set their performance aspirations for the future, and overestimate their ability to be successful (i.e., display overconfidence), they are likely to pay close attention to the immediate outcomes of their decisions. Depending on the primary appraisal of the obtained result –positive or negative– individuals will feel different mood states (Frijda, 1993; Weiss & Cropanzano, 1996). Therefore, overconfidence is a situation-specific phenomenon. Strategic and entrepreneurial decisions that are driven by overconfidence are often made in one particular moment yet have wide-ranging

implications for the future of a firm (Cain *et al.*, 2015). According to the affect and cognition theory of strategic decision-making (Ashton-James & Ashkanasy, 2008), economically relevant performance cues, such as successes and stumbles, promote varied affective responses (i.e., moods) in the decision-makers. These mood states will, in turn, influence strategic decision-making. Therefore, how individuals feel in response to performance feedback from the environment may substantially affect motivational mechanisms and therefore, the performance of subsequent strategic decisions.

Interestingly, recent studies in economics have reported that humans respond in fundamentally different ways to good and bad news from the environment (Bénabou, 2015; Möbius *et al.*, 2011). Research in this area has explored the influence of exposure to objectively ranked variables, such as intelligence quotient (IQ) and attractiveness, that are important for people's self-esteem. These studies have demonstrated that humans are widely shaped by a systematic tendency to under-respond to negative feedback as opposed to positive feedback (Eil & Rao, 2011). This tendency seems to be even more salient when an individual's self-worth is at stake (Möbius *et al.*, 2011). Executives are extremely performance-oriented individuals and highly sensitive to ability-related cues. In fact, it is likely for them to evaluate their self-worth based on their performance achievements and identify a variety of cognitive ways to restore their jeopardized self-image in the aftermath of a failure (Jordan & Audia, 2012).

Research in organizational learning and strategic management has focused on different performance standards or levels of aspirations to understand the interplay between a decision-maker's aspirations and the feedback that he or she receives from the environment (Cyert & March, 1963; Hu *et al.*, 2011). From this perspective, a decision-maker engages in problem-solving or pursues behavioral changes if there is a gap between the desired and actual performance levels, whereas these attempts to change the course of events are less pronounced if the performance standards have already been met. However, this problem-solving perspective neglects other forms of logic, such as ego-protective motives (Jordan & Audia, 2012; Campbell & Sedikides, 1999). Prior experimental evidence suggests that motivational accounts may drive overconfidence to help individuals reduce the dissonance between their current and desired achievements (Blanton *et al.*, 2001). It is therefore plausible that executives are sensitive to not only objective performance cues, but also to *affective responses* to performance cues. In other words, it is likely that decision-makers are influenced by their current mood in responding to performance feedback. In sum, this study presents evidence regarding a motivational-affective mechanism in the presence of overconfidence. Furthermore, the effect of mood is likely to be more pronounced in situations where there is higher uncertainty regarding performance information (i.e. when individuals do not have any objective performance information for reference about the competition, and they exclusively focus on their own past performance when forming performance aspirations).

THEORY AND HYPOTHESES

The relationship between affect and cognition in strategic contexts

In order to understand the relationship between affect and cognition, it is important to first define affect. The term “affect” usually encompasses both moods and emotions. Affect has been demonstrated to significantly impact strategic decision-making (Daniels, 1999; Delgado-García *et al.*, 2010). Moods, as opposed to emotions, usually respond to multiple causes (Russell, 2003). In terms of their valence, moods can assume two universally distinct forms: “pleasantness” or “unpleasantness” (Watson *et al.*, 1988). In colloquial terms, moods can generally be described as “feeling good” or “feeling bad” (Barsade & Gibson, 2007). Moreover, mood states can exert a pervasive effect on a variety of firm behaviors, even without being noticed, because they are not particularly connected to any specific mental content (Forgas & George, 2001).

It is relevant to highlight that moods and cognition are inherently related to each other (Fiedler, 2001). The core mechanism by which mood influences the content of processed information is known as *affect-priming*. This mechanism refers to the process by which affectively charged information (positive or negative) is incorporated into the mental processes (Forgas, 1995a; Forgas & George, 2001). Cognitive theories of human memory comprise the basis of affect-priming. This perspective interprets memory as an associative network in which different mood nodes connect separate pieces of affectively similar information (Bower, 1981). According to this principle, when a person is in a particularly happy (versus sad) mood, positively (versus negatively) associated information and memories will be more likely to be activated.

Strategic and entrepreneurial situations are predominantly uncertain, and decision-makers often lack comprehensive knowledge to make fully informed decisions. Therefore, they are often forced to substantively and simultaneously process a vast amount of information that relates to multiple possible or anticipated probabilities and outcomes. It is precisely in such situations involving a variety of hypothetical scenarios and unforeseeable contingencies, that mood states have the strongest influence on the cognition and behavior of individuals (Ashton-James & Ashkanasy, 2008; Forgas, 1995a, 2002). For example, in one experiment by Fiedler (1991), memory was evaluated in two different task conditions after inducing positive and negative moods. The memory task involved interpersonal verbs with positive or negative connotations (e.g. love, hate, help, hurt). In the generative condition, individuals had to produce as many interpersonal verbs as possible. Contrarily, in the reproductive condition, individuals received a pre-established list of verbs. The results indicate that individuals in the generative condition recalled more mood-congruent verbs compared to individuals in the reproductive condition. Therefore, situations in which individuals must heavily rely on their thought processes are more likely to facilitate mood effects on cognition and behavior.

Instrumental and motivational mood effects

Both the affect and cognition theory of strategic decision-making (Ashton-James & Ashkanasy, 2008) and economic theories of motivated beliefs (Bénabou, 2015) agree that humans are driven by judgment as well as affect. Usually, “‘judgment-driven’ behaviors involve conscious assessments of information from the environment” (Ashton et al.: 15) and relate to a successful execution of working tasks (Weiss & Cropanzano, 1996). In other words, they correspond with a motivation to improve performance (Bénabou, 2015). In contrast, affect-driven mechanisms respond to particularly early-stage and relatively automatic responses to a specific event in the environment (e.g. performance feedback) (Zajonc, 1980). Depending on the hedonic tone of the environmental event (i.e., pleasant or unpleasant), the decision-maker experiences positive or negative moods (Weiss & Cropanzano, 1996). These initial affective appraisals (i.e., feeling positively or negatively about a particular event), involve personal relevance and an ideal preference of the self or the world (Frijda, 1993; Zajonc, 1980). When there is a substantial gap between the present state of affairs and the desired one, individuals are motivated to improve their mood by restoring their self-image (Jordan & Audia, 2012). Thus, unpleasant or negative mood states are likely to alter behavior by promoting affect-driven impulsive reactions such as emotional outbursts (Ashkanasy *et al.*, 2002) and risk-seeking behavior (Lerner & Keltner, 2001) in an attempt to change the circumstances.

Overconfident individuals may be especially sensitive to performance-related news from the environment, which, if negative, has the potential to threaten their optimistic self-image. This may incentivize affect-driven motives over judgment-driven ones, which could impair decision-making performance. Contrarily, a positive mood, does not impose a significant threat to the extremely positive self-evaluations of overconfident individuals. In fact, a positive mood may even enhance cognitive performance in complex tasks (Erez & Isen, 2002). Based on this argumentation, the main goal of this study is to empirically test if positive and negative moods do indeed affect the decision-making performance of overconfident individuals. Specifically, I expect that a positive mood —as opposed to a neutral or negative mood— will improve performance. Furthermore, based on the theory, I anticipate that this beneficial effect of a positive mood will be stronger in instances with higher uncertainty in regard to performance information (i.e., in the condition that enables historical over social aspirations). Table 1 summarizes the design of the experiment.

The beneficial performance implications of positive mood in strategic settings

Academic literature has widely related positive mood states to overconfidence and similar optimistic biases (Lewis, 1997; Taylor & Brown, 1988). A feeling of elation, however, may be an important motivational source in uncertain circumstances. For instance, in strategic settings, it can act as an action mobilizer (Doz & Kosonen, 2008) and facilitate strategic decision-making (Eisenhardt, 1989; Hodgkinson & Healey, 2011). One fundamental way in which a positive mood may increase decision-making performance is by improving cognitive functioning, particularly when making ef-

ficient and flexible use of cognitive resources. For instance, an experimental study by Erez and Isen (2002) has found a facilitative effect on judgment for individuals with a positive mood compared to subjects who were not induced into any particular mood state (i.e., neutral mood in the control condition). Their study used an anagram task in the context of complex decision-making. Compared to individuals in a neutral mood, those who were in a positive mood reflected a higher perceived contingency between their efforts and performance on the task. This difference enabled cheerful individuals to increase their motivation, persistence, and, ultimately their task performance. Similarly, an experiment by Baron (1990) has used a clerical task with various sub-tasks to determine that subjects in whom a positive mood had been induced employed a more efficient strategy to solve the task. Unlike their neutral-mood counterparts, individuals in a positive mood engaged in the second task only after finishing the first one. An experiment by Isen and Means (1983) has similarly indicated that a positive mood, as opposed to a neutral mood, was related to a lower likelihood of reviewing already processed information as well as ignoring less relevant informational cues. Consistent findings have emerged in a variety of contexts, including medical decisions. In a study by Estrada, Isen and Young (1997), individuals in a positive mood were likely to form diagnostic hypotheses earlier than decision-makers in a neutral mood while still remaining open to new information. In sum, a positive mood evidently facilitates more cognitive flexibility and efficiency in complex decision-making compared to a neutral mood.

The beneficial effect of a positive mood, however, is expected to be stronger when the decision context is atypical or lacks relevant information (Ashton-James & Ashkanasy, 2008; Forgas, 1999). Therefore, when sensitive performance information for competitors is *not* explicitly available in a particular moment, mood effects may be more likely to shape decision-making. In such uncertain conditions, individuals determine other ways to self-regulate their behavior in order to preserve motivation and cope with unpredictability (Bandura, 1986). In fact, research has demonstrated that confidence in one's own ability is an important motivational source of perseverance in contending with difficulties (Bandura, 2001). Moreover, overconfident responses may assume more instrumental forms in response to a drive to improve performance when individuals are not directly confronted with a potentially threatening external environment (Bénabou, 2015; Eil & Rao, 2011). Considering both the joint facilitative effect of positive mood on cognitive processes and the potentially more functional role of overconfidence in the absence of a direct threat (from the competition), I present the following formal hypothesis.

Hypothesis 1: Overconfident individuals in a positive mood perform better than those in a neutral mood in the context of historical aspirations.

Performance implications of positive and negative moods

When comparing performance differences under positive and negative moods, the direction of the effects is not always straightforward. The reason for such a lack of consistency has been related to the characteristics of the task itself or the decision environment (Forgas, 1995a). Generally, a positive mood leads to heightened efficiency and flexibility in cognitive processing (Baumann & Kuhl, 2005; Isen *et al.*, 1991), variance-seeking (Delgado-García *et al.*, 2010) and purposive decision-making behavior (Nygren *et al.*, 1996). These characteristics all seem advantageous in highly uncertain strategic situations (Ashton-James & Ashkanasy, 2008). In contrast, a negative mood has been demonstrated to consistently elicit a highly analytical type of thinking (Schwarz, 2000). This may facilitate performance under some circumstances (Au *et al.*, 2003), but it yields non-adaptive consequences in cases where analytic reasoning is not the most suitable approach (Ambady & Gray, 2002; Gleicher & Weary, 1991). Therefore, in the context of strategic decision-making, a negative mood may be less instrumental than a positive mood (Eisenhardt, 1989). After all, many strategic decisions lack well-structured protocols (Galbraith, 1974).

A negative mood can result from a variety of common hassles. According to the affect and cognition theory of strategic decision-making (Ashton-James & Ashkanasy, 2008), strategic situations that involve an economically relevant external cue, such as negative performance feedback, is likely to promote negative mood reactions. Negative affective states may lead to a highly constrained and rigid response set due to the perception of a threat, this phenomenon is known as “threat-rigidity” (Staw *et al.*, 1981). A negative mood promotes this vigilant approach in the presence of a threat (Roose & Olson, 2007), and the approach is unlikely to have positive effects on strategic decision-making performance since such decision-making usually requires cognitive flexibility (Laureiro-Martínez & Brusoni, 2018).

Moreover, as the affect and cognition theory of strategic decision-making highlights (Ashton-James & Ashkanasy, 2008), negative moods are likely to promote “affect-driven” impulsive behaviors, which may be detrimental to performance. Examples of such behaviors include emotional outbursts (Ashkanasy *et al.*, 2002), unproductive impulsive behaviors (Ashkanasy & Daus, 2002), and procrastination (Wohl *et al.*, 2010). In contrast, a positive mood may signal that the situation is not harmful or problematic and hence does not require immediate action (Schwarz, 2000). Perhaps one of the clearest examples of an affect-driven motive is a self-enhancement tendency, which entails effort to preserve a positive self-regard. Overconfident individuals may positively distort the performance feedback they receive, which directly interferes with proper learning (Jordan & Audia, 2012). In fact, self-enhancement may result in a complete re-structuring of divergent or ambiguous performance feedback information as a way to ensure a consistently positive self-image (Audia & Brion, 2007). Moreover, these attempts to restore a positive view of the self may be even more explicit when individuals deliberately attempt to maintain a positive mood –and minimize a negative one– by cognitively engaging in positive thoughts (Grandey, 2000). The use of these types of cognitive strategies can ultimately interfere with task performance

(Erber & Erber, 1994).

Neuro-scientific evidence suggests that overly optimistic individuals, who are inclined to ignore or distort negative news from the environment and instead focus on optimistic elements, have a reduced neural response to unpleasant information about the future (Sharot *et al.*, 2011). In fact, recent neuro-imaging techniques (Citron *et al.*, 2014) have revealed that a positive mood is considered a sign that the present environment is safe (Schwarz, 2000). In contrast, a negative mood indicates the situation is not as it should be, which relates to avoidant behavior to the detriment of performance-oriented behavior (Carver, 2001). In particular, a more rational update seems to occur when processing positive news (Eil & Rao, 2011). When the information to process is negative, the innate tendency of individuals is to avoid this information; this is known as the “ostrich effect” (Karlsson *et al.*, 2009). Paramount to this defensive mechanism is the “alertness effect” that a negative mood promotes and which results in an exaggerated self-focus (Green *et al.*, 2003). In contrast, a positive mood decreases self-defensiveness and encourages openness to the environment and to the ongoing goal-pursuit process. Hence, individuals are more receptive to receive negative feedback when they are in a good mood, which ultimately supports the learning process (Trobe & Pomerantz, 1998). In conclusion, a positive mood enhances learning and active pursuit of goals, while a negative mood may significantly interfere with instrumental coping in threatening situations. Following the same rationale as in Hypothesis 1, I expect to find significant mood effects when the uncertainty about performance information—regarding the competition—is the highest. Therefore, I hypothesize mood differences only in regard to the condition of historical aspirations. Specifically, I hypothesize:

Hypothesis 2: Overconfident individuals in a positive mood perform better than those in a negative mood in the context of historical aspirations.

The moderating role of uncertainty levels: Different types of performance feedback

The previous hypotheses focus explicitly on mood differences in the context of historical aspirations, as this setting complies with the requirement of high uncertainty as a critical factor to determine mood effects on behavior (Ashton-James & Ashkanasy, 2008; Forgas, 2002). If a positive mood indeed leads to enhanced decision-making performance, then it would be interesting to test when this potentially beneficial effect is actually stronger. According to theoretical predictions, this should be the case in the historical aspirations condition, where uncertainty is more pronounced than in the social aspirations condition.

In contrast to highly uncertain situations, which require a substantive amount of information processing, mood-priming is less likely to occur when the decision context clearly highlights a pre-existing goal, such as outperforming competitors (Forgas, 1995a). In this regard, there is empirical evidence to suggest that intention-based thought processes, such as those relating to outperforming competitors are more clearly activated when individuals are exposed to the per-

formance rankings of competitors (Marsh *et al.*, 1998). Thus, the information search is particularly directed towards the specific goal of winning, and it therefore competes with all the rest of the information in the cognitive system, including information that is subject to mood-priming effects (Forgas & George, 2001). As a result, mood-priming is rare in these circumstances, as the information search is highly selective for a specific motivation (Forgas, 1995a) –in this case, outperforming the competitors.

As discussed earlier, when a decision-maker is exposed to the performance of competitors and sets social aspirations accordingly, affect-driven (self-enhancement) motives are expected to significantly drive decision-making behavior (Audia *et al.*, 2015). There is evidence from the psychology literature that being confronted with performance information about competitors will likely lead to perceptions of threat, regardless of the type of information (Muller & Butera, 2007). Therefore, individuals in a positive mood are also likely to engage in self-enhancement as a way to maintain their existing pleasant mood state. Such attempts to prolong the existing mood state (or repair a negative one) comprise a process that drains cognitive resources and eventually impairs performance (Erber & Erber, 1994). While a positive mood may facilitate openness to feedback, exposure to potential threats from the competition may ultimately diminish adaptation to performance feedback (Eil & Rao, 2011).

Prior research has suggested that when circumstances are favorable, people tend to become complacent. Thus, when performance is satisfactory and one is consequently in a good mood, effort may seem unnecessary. This is likely to happen if the decision-maker is directly confronted with a performance outcome that clearly imparts a more advantageous position than competitors. For instance, previous research on learning from performance feedback has demonstrated that firms do not engage in innovative efforts when performance aspirations have been exceeded (Greve, 2003). Similarly, when decision-makers operate in a more success mode than competitors, they are more risk averse (March & Shapira, 1987; Hu *et al.*, 2011). These types of behavior do not ensure a highly consistent effort in the presence of a clear accomplishment (e.g. outperforming competitors), which inevitably leads to a performance decline. Taken together, I formulate the next hypothesis as follows.

Hypothesis 3: Overconfident individuals in a positive mood perform better in the context of historical aspirations than in the context of social aspirations.

STUDY 1 METHOD

Experimental design

This study manipulates two main independent variables, namely mood states and the reference information available (regarding their performance), under two aspiration conditions: historical and social. While all individuals were aware of their own performance (including the control group), only two groups (positive and negative mood conditions) were

additionally exposed to the performance ranking of competitors. The induced mood states could take only two forms: positive (i.e., happy) or negative (i.e., sad). Previous research has commonly induced these specific mood states because they clearly represent both positive and negative moods (Bless *et al.*, 1996; Forgas, 1994). The control group did not receive any mood manipulation. Therefore, the design followed a 2 x 2 matrix or between-subjects design, which resulted in four different treatments from the combination of the two independent variables (i.e., mood states and types of performance aspirations). Every subject could be assigned to only one of the four different experimental conditions. A fifth experimental group (control group), did not receive any mood manipulation or exposure to objective information regarding competitor performance. Table 12 summarizes the treatments. It is important to highlight that all individuals, regardless of treatment, were debriefed by listening to a classical music piece that was intended to create a positive mood (Västfjäll, 2001).

TABLE 12: Summary of the treatments

Treatments	Historical aspirations	Social aspirations
Positive (happy) mood	Treatment 1	Treatment 3
Negative (sad) mood	Treatment 2	Treatment 4
Neutral mood	Control group	-

Sample and procedure

The experimental sessions were implemented as behavioral experiments in a specialized laboratory in Spain (LI-NEEX). This laboratory has extensive experience with developing, running, and testing experiments that have been designed in a variety of universities worldwide. It also offers a large and well-established pool of participants. Many of the recruited subjects were students since the laboratory is located near a university, but the pool was not restricted to a specific type of individual. The laboratory also maintains specific protocols to ensure randomization, avoid possible selection and repetition issues, and ethical compliance. A few weeks before the experiment, social media tools were used to attract individuals to participate in the experiment by highlighting monetary reward. Individuals were also given the option to join the experiment on different dates. The total sample consisted of 300 subjects, from whom 141 were men and 159 were women. The mean age was 22.11 years (SD=6.66). Around 85% of the subjects were within the range of 18 to 25 years old, and the remaining sample was distributed in the range of 25 to 55 years.

After an initial pre-test of the software to ensure it functioned correctly, the first experimental session was performed under fully randomized and controlled laboratory conditions. Each of the five experimental sessions involved 60 subjects.

In each session, 30 subjects were systematically assigned to the positive mood condition, while the remaining 30 subjects were assigned to the negative mood condition. For parsimony in the protocol, the performance ranking of competitors was introduced in the first and the third experimental sessions, while the second and the fourth sessions lacked explicit information regarding competitor performance. The fifth session was scheduled for the control group.

Incentives

As mentioned earlier, individuals were aware that their earnings would depend on both their own performance and that of competitors. They would be monetarily rewarded for their participation (attendance fee) with €5 and were informed that they could earn a variable payment ranging from €0 to €20 in addition to the attendance fee. Individuals were informed that five games would be randomly chosen by the software for the calculation of the variable component. Depending on the computed difference between gains and losses for those specific games, the resulting amount (if not zero) would be added to the attendance fee. The inclusion of the random element in the selected games helped ensure that the effort and motivation of participants was consistent throughout all games, as any game could be potentially selected for payment at the end of the experiment. In addition, to ensure that participants would remain focused on the series of games and not lose motivation, they did not have any time limit to make their choices. Only when all participants in the room had finished with a particular game did individuals proceed to the next game. This allowed for synchronizing results and providing updated performance ranking information. The average earnings in the experiment were €12.

Additionally, it was crucial to create a competitive environment that would incentivize individuals to perform better than the others. With this in mind, individuals were informed that the best player in the game (i.e., the number one in the ranking at the end of the experiment) would automatically be rewarded with €40 at the end of the experiment. Thus, the winner would be able to possibly double his or her final earnings. In the specific case that more than one individual was in the first position (i.e., in case they had exactly the same performance scores), the software would randomly choose the actual winner.

The decision-making task

The experimental task chosen for this study was the blackjack card game (also known as “twenty-one”), which is a well-known casino game. There are multiple reasons for this choice. First, it is an already existing game that has received extensive attention in the literature (Griffin, 1988). Second, a highly uncertain combination of cards could be intentionally chosen for the purpose of analyzing behavior under high uncertainty. Third, although blackjack is reasonably free from the influence of intelligence-related aspects, it is a cognitively demanding task that requires memory (Epstein, 2012; Keren & Wagenaar, 1985). The latter aspect is particularly important since the theoretical background of this study heavily relies on the mood-priming principles of human memory.

Although blackjack can involve various players, this study adopts a single-player game of blackjack (Epstein, 2012). In this version, individuals played against an impersonal “dealer”, who in this case was named “the bank”. The player and the bank had two cards each. One of the bank’s cards was always presented faced down to the player. In order to win the game, the player had to manage to surpass the number of card-points that the bank held in its cards or, alternatively, reach 21 points with the obtained cards. If either the player or the bank reached 21 points, that side would automatically win, and the game would end without any need to make a decision. This situation is known as “blackjack”. However, if the cards did not add up to 21 points, the player had three options. He or she could choose to double the amount of the bid (i.e., “double”), request another card from the set of cards (i.e., “hit”), or refuse to take any more cards and play according to the present situation of the cards (i.e., “stand”). After the player’s move, it was the bank’s turn, who was obliged to continue asking for more cards until it reached or surpassed 17 points. Thus, the bank always “hit” until it found the right moment to “stand”.

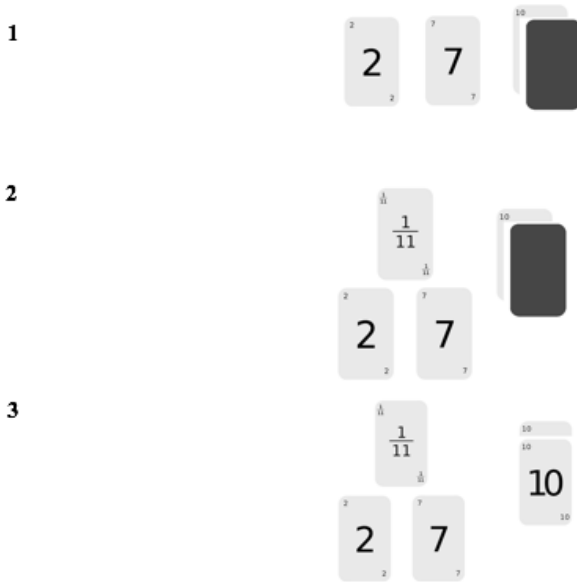
The card set had 52 cards each with different point values ranging from 1 up to 11. There was a wildcard that could adopt the value of either 1 or 11 depending on which value was more beneficial for the player. There were four cards for each value from 2 to 9, 16 cards with a value of 10, and four cards with a value 1 (or 11 in the case of a wildcard). The set of cards was always the same and was based on a pre-selection of cards entailing high uncertainty (see the game composition section for further details). Cards were randomly selected from the established set before every game, and they were completely restituted after each game. The amount that players could choose to bid ranged from €0.10 to €4, so it was a requirement to bid at least €0.10 cents before playing the game (i.e., players are always forced to bid something). Subjects were asked to make their bids once they were presented with their cards and those of the bank.

Figure 7 depicts a graphical illustration of an example blackjack game.

Game composition. After being introduced to the experiment and the main procedure, subjects were requested to answer out a short set of personality and socio-demographic questions (see the measures section). Before starting the game, they were presented with the instructions and rules of the game, which remained available to them throughout the session. They were introduced to the first five games, which were a series of typical game situations that were chosen to facilitate individuals’ comprehension of the game’s rules. Subjects were informed that these games were only for learning purposes and therefore would not be considered in their final payment calculation.

The strategies to follow in order to succeed in the blackjack have been studied from the viewpoint of mathematical and probabilistic calculations. The final selection of the game types for this research was founded on the widely studied “basic strategy” to succeed at the game (Griffin, 1988). Based on the latter, combinations of cards with similar probabilities to winning based on various possible strategies were intentionally chosen to create high uncertainty. Furthermore, a variety of card situation types were included, namely situations where it was best to “hit”, to “stand” or “double”. Six games per

FIGURE 7. A graphical example of the blackjack game.



Note: On the left side, we can see the cards of the player and on the right side the cards of the bank. It can be noted from the three steps represented in the figure, that the player chooses to “hit”(i.e., he or she asks for another card) on the second step and gets a wildcard. The third step shows the result of this decision. This game results in a tie, as both the player and the bank reach the same amount of points (20 points, in this case). The wildcard takes a value of 11, as this number of points is more beneficial for the player.

game situation type were randomly chosen by the software for consistency.

At the end of the experiment participants were presented with their obtained position in the ranking and a calculation of their earnings. The incentives section offers a more detailed explanation of payments.

The mood manipulation

A more effective mood induction is expected when combining multiple techniques as part of the same procedure (Bower, 1981; Clark, 1983). Thus, in order to induce happy and sad moods, a combination of positive or negative performance feedback was included together with background music that individuals could listen to with headphones (Au *et al.*, 2003). Music was selected depending on the mood condition and was intended to intensify and prolong the happy and sad mood states (Västfjäll, 2001).

The manipulation of performance feedback specifically consisted of including a pre-defined performance outcome as a first official game (after the five trial games). In particular, in the happy mood condition, positive performance feedback was provided in the form of a blackjack in favor of the player. In contrast, in the negative mood condition, negative performance feedback was provided through a blackjack in favor of the bank. The outcome of the pre-defined game was also accompanied by a message. In the happy mood induction, the message was, "It seems that luck is on your side! You have just won X", and in the sad mood induction, the message was "Life sometimes is miserable! You did not win anything, on the contrary, you have lost X". Research has previously used messages of these types together with performance feedback manipulations to induce happy and sad moods (Au *et al.*, 2003).

Manipulation of the performance information / Aspiration types

Individuals in the historical aspirations treatment were informed that they would know their performance at every moment until the current game. Specifically, a histogram with absolute performance scores up to the current game was presented to all individuals at the moment of making their decisions. This situation entailed a lack of relevant information regarding the competition and, therefore, a higher uncertainty.

In the social aspirations condition, subjects viewed not only the histogram for their past performance but also a ranking of their performance relative to competitors. This ranking specifically included the performance score of all the players in the room based on their obtained cumulative profit up to the present game.

Measures

Decision-making performance. In every game apart from the five initial trial games, a performance ranking was generated based on the earnings and losses of all individuals up to the current game (regardless of the absence or presentation of this information to the subjects). According to the instructions that individuals received, the best performer would be

chosen based on the ranking position at the end of the experiment. This ranking was updated in a cumulative manner after each game in order to have actualized performance information. The number of the ranking position (in the second official game) was used as the performance measure. This variable ranged from 1 to 60, as there were 60 participants in each experimental session. In the specific case that two individuals in the same session happened to be at the same performance level, they would share the same position number in the ranking.

Overconfidence. Although overconfidence can be measured in a variety of ways, a clear measure should involve extreme certainty about a belief that is ultimately proven false (Fischhoff *et al.*, 1977). Based on this definition, a composite measure of overconfidence was created (Simon & Houghton, 2003). A person was considered overconfident in cases where he or she had expressed maximum certainty about his or her ability to achieve a given performance aspiration (i.e., the answers involved extreme certainty, by stating “definitely can do it” in a scale level of 10 points) *and* if the result for the second game was a loss rather than a victory. For the extreme certainty component, this measure was taken from the question prior to the first (manipulated) official game in order to avoid effects of mood on respondents’ ratings of their subjective ability estimations.

Control variables. Age and gender were included as socio-demographic variables. Furthermore, earnings of the first game were also included as a control variable, as they could have influenced the result of the second game. This variable could assume both positive and negative forms. After each game, individuals were requested to indicate a performance aspiration on a slider ranging from €0 to €8 —the minimum and the maximum amount that the game allowed for. As aspirations are inherently related to actual performance (Lant, 1992), this variable was also included in the regression analyses. In addition, the experiment controlled for risk-taking, which was measured as the amount that had been bid in a particular game. Before every game, individuals were requested to indicate their desired bid on a slider ranging from €0.10 to €4. The inclusion of decimals provided the measure with a continuous nature. Thus, individuals were forced to bid at least a minimum amount. This made the setting more realistic, as a financial risk accompanies most major strategic decisions. Finally, a proxy for cognitive ability was included since performance in blackjack relates to skill, and some subjects could have learned the dynamics of the game more quickly than others (Epstein, 2012). Specifically, the last game of the five initial trial games was selected as a proxy, as this game simultaneously included all the rules of the game that had been learned in the previous games (from the first to the fourth trial games).

STUDY 1: RESULTS

Table 13 presents the correlation matrix and the main descriptive statistics for the variables of interest, including the control variables. The average variance inflation factor (VIF) is 1.64, which conveys that multi-collinearity was not an issue between the independent variables. It can be noted that out of the control variables, only previous performance

(on the first game) and the treatments were significantly related to the dependent variable. This is not strange since the mood induction consisted of manipulating the performance in the first game. The effect of overconfidence had a negative (marginal) effect on performance.

TABLE 13: Descriptive statistics

	Mean	SD	Min	Max	1	2	3	4	5	6	7	8	9	10	11	12
1. Treatment 1	0.2	0.4	0	1												
2. Treatment 2	0.2	0.4	0	1	-.25**											
3. Treatment 3	0.2	0.4	0	1	-.25**	-.25**										
4. Treatment 4	0.2	0.4	0	1	-.25**	-.25**	-.25**									
5. Control group	0.2	0.4	0	1	-.25**	-.25**	-.25**	-.25**								
6. Performance	-29.37	17.52	1	60	.25**	-.24**	.31**	-.31**	-.01							
7. Age	22.11	6.66	18	55	.07	.10†	-.07	-.06	-.03	-.00						
8. Gender	.53	.49	0	1	.03	-.01	.00	-.01	-.01	.03	.02					
9. Previous earnings	-.19	2.49	-4	5	.45**	-.39**	.49**	-.43**	-.12*	.59*	-.00	.08				
10. Cognitive ability	.96	0.18	0	1	.05	-.12*	-.03	.05	.05	-.00	-.02	-.11†	.01			
11. Risk-taking	2.85	1.81	0.1	8	-.05	-.04	.06	-.01	.04	-.05	.00	-.12*	.00	.06		
12. Aspirations	4.17	2.4	0	8	-.08	-.02	.12*	-.01	-.00	-.00	.00	-.03	.07	.07	.48**	
13. Overconfidence	.03	.19	0	1	.02	.06	-.01	-.05	-.01	-.11†	.08	-.04	.02	.03	.12*	.14*

N=300. p<.10† p<.05* p<.01**.

A randomization check was performed in order to ensure the random distribution of all relevant variables across the two treatments (i.e., mood states and types of aspirations) in the sample. The t-tests for all the variables across the four treatments and the control group revealed non-significant differences between the means of the variables. Thus, as Table 14 indicates, there is empirical evidence to support the random distribution of the variables of interest across the treatments.

TABLE 14: Mean differences across treatments (Randomization check)^a

	Treatment 1	Treatment 2	Treatment 3	Treatment 4	Control group
Age	23.13	23.51	21.05	21.21	21.65
Gender	.56	.51	.53	.51	.51
Cognitive ability	.98	.91	.95	.98	.98
Risk-taking	2.65	2.7	3.09	2.79	3.03
Aspirations	3.76	4.05	4.76	4.12	4.16
Overconfidence	.05	.06	.03	.01	.03

^a All mean differences were statistically insignificant.

Proportions t-tests were used for gender and cognitive ability.

Mood manipulation check. The t-test revealed that both positive (M= 9.92 SD=.21) and negative mood (M= 9.48 SD=.23) did not significantly vary in positive mood before the inclusion of the positive mood manipulation. These statistically insignificant results also hold when comparing individuals in the positive mood groups (M= 9.92 SD=.21) and

in the control group ($M=9.48$ $SD=.32$), $t(178)=-1.17$, $p<.24$. However, after the positive mood manipulation, individuals in the positive mood condition indicated that they felt they were in a more positive mood ($M=10.4$ $SD=.24$) than subjects in the negative mood condition ($M=8.7$ $SD=0.29$), $t(238)=-4.46$, $p<0.00$ and the control group ($M=9.13$ $SD=.38$), $t(178)=2.88$, $p<.00$.

Similarly, before the negative mood manipulation, mood scores did not significantly vary across experimental groups for either the positive ($M=3.75$ $SD=.12$) or the negative mood groups ($M=4.11$ $SD=.18$), $t(210.97)=1.59$, $p<0.11$. Furthermore, the negative mood condition did not significantly vary in negative mood scores when compared with the control group ($M=3.68$ $SD=.15$), $t(173.45)=-1.8$, $p<0.07$. In contrast, after the negative mood induction, individuals in the negative mood conditions felt a significantly more negative mood ($M=4.82$ $SD=.21$), $t(168.84)=5.48$, $p<0.00$ than individuals in the positive mood condition ($M=3.5$ $SD=.10$) and the control group ($M=4.08$ $SD=.2$), $t(166.17)=-2.49$, $p<0.01$. In the case of a negative mood, variances were unequal in the two-samples t-test, and this was explicitly taken into account when running the tests. In sum, the results statistically support that the mood manipulation that was introduced in the first game was successful.

Hypotheses testing. Dummy variables were created to represent each of the five experimental groups in the Ordinary Least Squares (OLS) regression analyses. Specifically, these dummies have a value of 1, if a particular treatment is present, versus a value of 0, to indicate its absence. Table 15 presents a step-wise approach that includes seven different models. All of these models are calculated using robust standard errors and aim to predict individuals' decision-making performance in the second game.

Regression models predicting decision-making performance

In particular, Model 1 reflects the single effect of the experimental conditions, including the control group. It can be noted that the effects of all these variables are statistically significant because of the performance manipulation that was used in the previous (first) game to induce the desired mood states. Therefore, this result is not surprising and is in line with the information that was gathered from the correlation matrix. Model 2, however, includes the effects of the treatments in addition to the effect of previous performance in the first game, which on this occasion was included as a control variable. The main effects of the treatment dummies were not significant anymore, as they had no direct influence on performance. This is consistent with the theoretical approach of this study since the different manipulations were expected to *moderate* the relationship between overconfidence and performance rather than directly affect it. Model 3 also includes age, gender, cognitive ability, and risk-taking as control variables. None of the latter variables are statistically significant. Model 4 includes the effect of overconfidence. This model further improves the overall R^2 and illustrates how overconfidence has a substantially significant negative effect on performance, $\beta=-10.5$, $p<.00$. Model 5 includes the first interaction term corresponding to Hypothesis 1 and the simple contrast between a positive and a neutral mood, both of which correspond to

TABLE 15: OLS regression models for decision-making performance

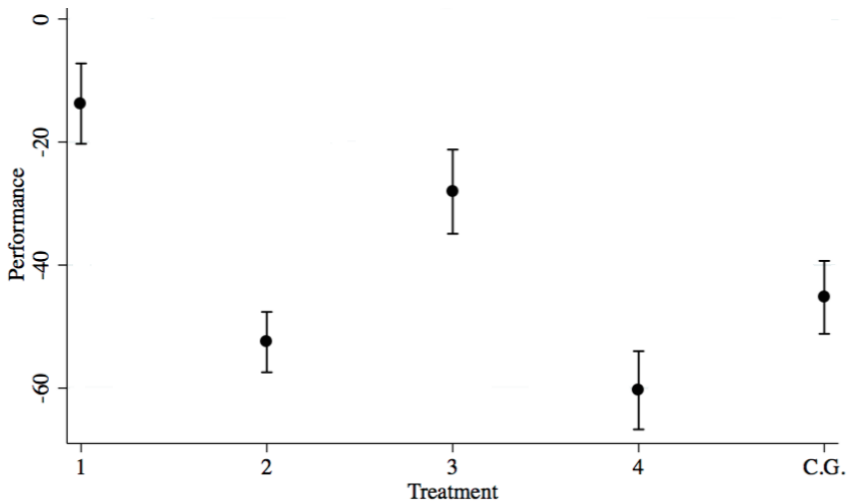
DV: Performance	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Treatment 1	9.45**	-1.56	-1.96	-1.86			
Treatment 2	-8*	-2.84	-3.06	-2.63	-2.67		-2.74
Treatment 3	11.63**	-.13	-.09	-.24	.07	2.74	
Treatment 4	-10.43**	-4.63†	-4.71†	-4.79†	-4.98†	-2.31	-5.05
Treatment 5						2.67	-.07
Previous earnings		3.8**	3.84**	3.88**	3.78**	3.78**	3.78**
Age			.01	.03	.04	.04	.04
Gender			-.69	-.83	-.74	-.74	-.74
Cognitive ability			-.71	-.17	-.08	-.08	-.08
Risk-taking			-.55	-.47	-.46	-.46	-.46
Aspirations			-.22	-.13	-.15	-.15	-.15
Overconfidence				-10.5**	-13.51**	-13.51**	-13.51**
Overconfidence x Treatment 1					10.08*	12.75*	10.01*
Constant	-29.9**	-26.78**	-23.27**	-24.47**	-24.72**	-27.39**	-24.65**
Adjusted R ²	0.25**	0.36**	0.36**	0.38**	0.38**	0.38**	0.38**
ΔR^2		0.11	0	.02	0	0	0

N=300, p<.10†, p<.05*, p<.01**.

Note: The dependent variable (i.e., position number in the ranking) was reversed-scored multiplying the values by -1. This enabled a simpler interpretation, where lower numbers in the performance ranking position indicated higher performance (and not the other way around).

the historical aspirations treatment. The effect of this contrast is statistically significant, $\beta = 10.08$ $p < .03$, which supports Hypothesis 1. Furthermore, a likelihood-ratio test confirmed that Model 5, which includes the interaction, had a better fit with the data than Model 3, which includes only the main effects of the treatments and the control variables, $p < .01$. Model 6 includes the interaction term that represents the simple contrast between positive and negative moods, both of which correspond to the historical aspirations condition. This interaction is also significant, $\beta = 12.75$, $p < .01$, which supports Hypothesis 2. Lastly, Model 7 includes the interaction term that represents the simple contrast between positive mood in the historical aspiration condition and the same (positive) mood in the social aspiration condition. The interaction is statistically significant, $\beta = 10.01$, $p < .01$, which supports Hypothesis 3. Figure 8 graphically represents the interaction between the different treatments and overconfidence on performance.

FIGURE 8. Interaction of the treatments and overconfidence on decision-making performance.



(1) Treatment 1: Positive mood and historical aspirations. (2) Treatment 2: Negative mood and historical aspirations. (3) Treatment 3: Positive mood and social aspirations. (4) Treatment 4: Negative mood and social aspirations. (C.G.) Control Group.
 Note: Performance scores show mostly negative values because in order to be able to read the graph in a more intuitive way, and in consistency with the statistical modeling, the values from the dependent variable (ranking position) were reverse-scored multiplying them by -1. This enables a simpler interpretation, where lower numbers in the performance ranking position indicate higher performance (these are represented as higher dots in the graph).

Interpretation of the coefficients. In order to elaborate on the interpretation of the coefficients, the average marginal effects of the various treatments were calculated in post-estimation analysis (see Table 16) that maintained the effect of

overconfidence at a constant of 1 to indicate its presence. Specifically, when comparing the average performance of the first treatment ($M = 15.33$, $SD = .68$) (i.e., positive mood and historical aspirations context) with that of the control group ($M = 47.6$, $SD = .57$) (i.e., neutral mood and historical aspirations), there is a clear 32 performance difference in ranking positions (around the middle of the 60 ranking positions), in favor of the first treatment. Therefore, if an overconfident decision-maker was in a good mood and ignored information about current competitors, he or she would be around 31 positions higher in the performance ranking compared to compared to a person who does not feel any particular (positive or negative) mood state. In addition, when comparing the beneficial effect of first treatment (positive mood and historical aspirations) ($M=15.33$, $SD= .68$) with that of the second treatment (negative mood and historical aspirations) ($M=53.18$, $SD = 7.6$), the average loss in ranking position for overconfident individuals in a negative mood was around 38 ranking positions. In other words, in the historical aspirations condition, experiencing a positive mood rather than a negative one prompted an increase in performance around 38 positions above the middle ranking. Thus, in terms of mood effects, the largest difference in performance occurred when in comparing positive and negative moods in the historical aspirations condition. In contrast, when comparison corresponds to a positive mood versus a neutral mood (control group) in the same condition, the net average differences in the performance ranking were lower, but still significant. Lastly, in the analyses of the impact of the first treatment ($M= 15.33$, $SD = .68$) as compared with the third treatment ($M= 26.34$, $SD = 0.52$) –representing positive mood in the historical and social aspirations treatments respectively —there was an evident average loss of around 11 positions in the ranking for positive mood individuals in the historical aspirations condition—as compared to the social aspirations condition.

TABLE 16: The average effects of the treatments on decision-making performance (when overconfidence=1)

	Historical aspirations	Social aspirations
Positive mood	15.33 (.68)	26.34 (0.52)
Negative mood	53.18 (7.6)	59.37 (-)
Control group	47.6 (.57)	

Note: Standard deviations are reported in parenthesis.

Robustness checks

A less conservative measure of overconfidence was tested in the regression analyses. Specifically, the same composite measure was used, but this time considered a high confidence degree (one standard deviation above the mean) instead of an extreme confidence (i.e., the highest possible value on the scale). With the use of this new measure, the same results hold for all the hypothesized interaction contrasts.

At the beginning of the procedure, individuals were requested to fill out the PANAS scales (Watson *et al.*, 1988) to

measure positive and negative affective traits. These scales assess the stable tendency of every individual in regard to feeling a more positive or negative mood across various situations. The preliminary regression analyses also included the effects of these variables, which did not have any significant effect. However, they were finally removed from the models in order to prevent over-fitting the models as a result of too many variables. This result indicates that the intended mood effects entirely derived from the mood manipulation and not from the influence of stable affective traits.

STUDY 2: METHOD

Study 1 found support for a substantial beneficial effect of positive mood in comparison to a negative mood for overconfident individuals. According to the affect and cognition theory of strategic decision-making and other research on affect, strategic decisions usually are highly complex and facilitate mood effects on cognition and behavior (Ashton-James & Ashkanasy, 2008; Forgas, 1995a). Therefore, uncertainty can emerge from the characteristics of the task. Complex or atypical tasks, which have higher cognitive demands, are especially likely to enhance mood-priming and, accordingly mood effects on behavior (Forgas, 1999, 2002; Forgas & George, 2001). Therefore, similar findings should address contexts in which uncertainty derives from the complexity of the task rather than the availability of reference information regarding the performance of competitors (i.e., in the context of historical aspirations). Interestingly, previous literature has indicated that overconfidence may be particularly salient in tasks that heavily depend on the subject's ability (Camerer & Lovo, 1999). When competition is absent, the task performance relies more extensively on the individual decision-maker. If making decisions in the context of high uncertainty is by itself a sufficient condition for the results of Study 1, then similar results should be found in the context of a high complexity task without any intervening competitive element.

Sample

A total of 120 individuals (113 men and 127 women) with a mean age of 22,9 years participated in this study. The recruitment process and experimental sessions were conducted identically to those in Study 1, as the experimental sessions were performed in the same laboratory. A positive mood was induced in 60 individuals for the positive mood condition, while a negative mood was induced in 60 participants for the negative mood condition.

Subjects were informed at the beginning of the experiment that they would solve a variety of puzzles and receive a monetary reward depending on their performance on the puzzles. Additionally, they were informed that they would have the chance to form a virtual partnership with someone else in the room (with whom they could not have any direct contact) after completing the task (in order to be remunerated as a partnership). Alternatively, they could be rewarded on an individual basis. This allowed for a (potentially) collaborative environment rather than a competitive one. Prior to making the decision to join a partnership, however, individuals solved all the puzzles individually. Only the number

of correct puzzles in the task (and not their posterior decision to collaborate with a partner or not) was considered as a performance measure for this study.

Incentives

Every correct puzzle was rewarded with 2.75 experimental units (each unit was equivalent to €1). In a similar fashion to Study 1, subjects were informed that two randomly selected puzzles would be chosen for the final payment, which would be added to their participation fee. Individuals would be rewarded depending on their performance on these specific puzzles and regardless of their choice to be remunerated as an individual or as a partnership. This measure ensured a constant engagement in and effort toward the task, and the final monetary reward therefore depended entirely on individual performance on the puzzles.

Experimental procedure

In total, 10 puzzles were presented to participants in two rounds of five puzzles each. The first round contained puzzles from mixed difficulty levels. The second round, however, contained only the most complex puzzles, as these have been demonstrated to require a more extensive use of cognitive resources (Carpenter *et al.*, 1990) and therefore are likely to enhance the mood-priming potential (Forgas, 1999).

Both the mood induction and the manipulation of the task difficulty were intentionally included in the second round of puzzles. Allowing subjects to be acquainted with both easy and difficult puzzles in the first round safeguarded the design against possible stronger emotional reactions (such as anxiety or fear) in response to the highly difficult puzzles in the second round, as such reactions differ from mild mood states. At the end of the experiment, a debriefing technique was applied so that individuals could restore their mood states. Specifically, they were requested to solve three highly difficult puzzles toward the end of the experiment, as such cognitively demanding tasks have been evidenced to help restore manipulated mood states by naturally decreasing negative thoughts as a result of the concentration on the task (Kim & Kanfer, 2009).

The problem-solving task. The selected problem-solving task is part of the Raven test, which was developed to measure general cognitive ability (Raven, 2000b). The Raven test consists of a set of puzzles. Each puzzle has various figures that relate to each other based on a shared pattern that the decision-maker must discover. One figure is missing in every puzzle, and subjects need to select which of the presented options follows the pattern. There is only one correct answer per puzzle. The Raven test has two different versions; one is the Raven's Progressive Matrices version from low- to moderate-difficulty puzzles, and the other one is the Raven's Advanced Progressive Matrices version. For the first round, a combination of both tests was randomly generated for each participant, whereas for the second round, all the puzzles were randomly chosen from the set of advanced puzzles, as this is in line with the theory that more complex and

atypical tasks increase uncertainty as well as potential mood effects on decision-making (Forgas, 1999). At the start of the experiment, all individuals were presented with an example of a puzzle that they could try to solve without any time limit. To solve the next puzzles, they had 13 minutes in total. A pilot test was performed to estimate the average time that participants needed to solve the puzzles. Including (a reasonable) time limit is a common procedure, especially when measuring performance in the Raven task and other tasks related to cognitive ability (Raven, 2000a; Czibor *et al.*, 2017).

The mood manipulation. Since the selected task for this study was highly sensitive to individuals' actual cognitive abilities, the manipulation of performance feedback was not considered a valid or ethical way to induce a mood (see the subsequent section on the mood manipulation procedure). As part of the primary technique, subjects were asked to consider an event in their lives that made them feel particularly happy or sad and to remember it in detail and as vividly as possible. In addition, background music was included that has been evidenced to elicit positive and negative affective states (Västfjäll, 2001). As in Study 1, classical music selections depended on the condition and were expected to enhance the mood effects that were generated by the written story-recall task. The primary written exercise was introduced to subjects as a memory task (Forgas & Ciarrochi, 2001), in order to avoid demand characteristics. Subjects used individual headphones to listen to the music upon commencement of the written exercise and continued listening to it throughout the whole second round of puzzles.

A cognitively demanding task can alter mood states (Kim & Kanfer, 2009). Therefore, to ensure that their mood was the intended one throughout the task, two mood refreshers were included after the second and the fourth puzzles. Specifically, individuals were requested to recall and spend a minute writing a summary of the feelings generated by the written-story exercise that they had completed at the beginning of the second round. In order to ensure that the mood manipulation was the intended one during the task, subjects were requested to answer a short self-reported mood scale at the beginning and the end of the second round.

Measures

Decision-making performance. This measure considered the performance on the puzzles in both rounds. The total number of correct puzzles throughout the problem-solving task was specifically taken as a performance measure.

Overconfidence. A composite measure that resembles the one developed in Study 1 was used to measure overconfidence. However, Study 2 improved the measure of Study 1 by analyzing performance perceptions over a set of different items rather than just a single one (Moore & Healy, 2008). For this purpose, a self-efficacy scale was established according to Bandura's guidelines, and it was presented to the subjects before the problem-solving task. They were asked to estimate their certainty of their ability to achieve various hypothetical numbers of correct puzzles (from 10% to 100% in intervals of 10%). An individual was considered overconfident if the confidence in his or her ability to achieve a particular item was extreme (i.e., the maximum punctuation was selected, namely a 10 on a 10-point Likert scale) but the goal was

not achieved.

Control variables. The socio-demographic variables that were included in the regression analyses were gender, age, and years of achieved education. Age and education are usually considered important variables to include when analyzing performance on the Raven puzzles (Rushton *et al.*, 2003). Furthermore since subjects were informed of the possibility to eventually form a team after the real-effort task, it was necessary to control for their subjective estimations regarding their own as well as their potential partner's performance, which could have altered individual engagement and subsequent performance on the task. Specifically, they were asked —before the inclusion of the mood treatment in the second round of puzzles— to guess their number of correct puzzles that the potential partner had correctly solved, as well as the number of puzzles that they may had solved.

STUDY 2: RESULTS

As in Study 1, I checked that all relevant variables were randomly distributed across the treatments. Table 17 contains the results of this test, which supports a successful randomization. Furthermore, Table 18 presents the descriptive statistics of the variables and the correlation matrix. Multi-collinearity is not an issue, as the average (VIF) was 1.27.

TABLE 17: Mean differences between treatments (Randomization check) (Study 2)^a

	Positive mood condition	Negative mood condition
Age	23.22	23.15
Gender	1.54	1.51
Years of Education	10.85	11.3
Own competence beliefs	3.4	3.36
Beliefs about the partner's competence	3.55	3.63
Overconfidence	.20	.14

^a All mean differences were statistically insignificant.

Proportions t-tests were calculated for gender and overconfidence.

Mood manipulation check. According to expectations, mood scores did not vary across experimental groups before the mood manipulation for either positive ($t[236.41] = -0.05, p < 0.95$) or negative moods ($t[238] = 0.55, p < 0.57$). In contrast, after the mood manipulation, subjects in the positive mood condition reported a significantly more positive mood compared to subjects in the negative mood condition (10.47 vs 8.39, $t[238] = 6.28, p < 0.00$), and those in the negative mood condition accordingly experienced a more negative mood compared to subjects in the positive mood condition (5.59 vs 4.1, $t[219.26] = -5.77, p < 0.00$). Therefore, the mood manipulation was successful.

OLS regression models predicting decision-making performance. As Table 19 illustrates, I estimated three different models. Model 8 includes only the effect of the mood condition (i.e., negative versus positive mood) and the control

TABLE 18: Descriptive statistics (Study 2)

	Mean	SD	Min	Max	1	2	3	4	5	6	7
1. Mood condition	1.5	.5	0	1							
2. Performance	5.31	1.89	2	10	-.00						
3. Age	22.95	4.42	18	43	-.09	-.11					
4. Gender	.51	.5	0	1	.06	-.151†	-.07				
5. Years of Education	11.03	2.57	4	18	.03	.07	.21*	.02			
6. Own competence beliefs	3.35	.99	1	5	-.04	.57**	.03	.03	.01		
7. Beliefs about the partner's competence	3.56	.88	1	5	.09	.23**	.07	.22*	.05	.54**	
8. Overconfidence	.25	.43	0	1	-.13	-.24**	.03	.03	-.00	-.02	-.01

N=120, $p < .10$ †, $p < .05$ *, $p < .01$ **.

variables. In Model 9, I added the main effect of overconfidence, which is negative and statistically significant, $\beta = -.93$, $p < .00$. Finally, Model 10 leaves intentionally out the main effect of overconfidence, in order to calculate the simple effect of overconfidence depending on the mood condition. Indeed this model demonstrates that the simple (negative) effect of overconfidence on performance in the positive mood condition, $\beta = -.83$, $p < .02$, is lower than in the negative mood condition, $\beta = -1.07$, $p < .00$. These results reveal that the detrimental effect of overconfidence is higher in the negative mood condition than it is in the positive mood condition. Thus, in the context of high uncertainty without any competition this result further supports the finding that corresponds to the second hypothesis in Study1, namely that a positive mood as opposed to a negative mood, buffers the negative impact of overconfidence on performance. The three models are presented in Table 19.

Ethical considerations. In the first study, I used a form of deception in relation to performance in order to induce the desired mood state in individuals. To this end, individuals were not given any real chance to perform well or poorly in the first game, as the manipulation consisted of an immediate blackjack in their favor (in the positive mood condition) or in the bank's favor (in the negative mood condition). The main reason for choosing such an approach was theoretical. To study of the interplay between cognition and affect, this type of deception has been suggested to be an appropriate and useful tool (Hsu *et al.*, 2017) and has extensively been used to induce positive and negative moods in the previous literature (Lyubomirsky *et al.*, 2005). In this regard, it has been argued that studying the affective and cognitive foundations of overconfidence requires that the setting includes negative information, such as negative performance feedback, as a way to incentivize individuals to “ignore, discount or misinterpret the news” (Bénabou, 2015: 8). This is clearly in line with the aim of the study. It is important to note that the appearance of a blackjack implied that the decision-maker did not have to make any decision (i.e., it is a direct win or loss). This type of manipulation was intended to minimize (to some extent) the threat to individuals' self-esteem regarding their own competence or controllability in the game. This is

TABLE 19: OLS regression models for decision-making performance (Study2)

DV: Performance	Model 8	Model 9	Model 10
Mood condition	.05	-.06	-.00
Age	-.07*	-.07*	-.07*
Gender	-.67*	-.63*	-.63*
Years of Education	.08	.08	.08
Own competence beliefs	1.16**	1.15**	1.15**
Beliefs about the partner's competence	-.11	-.11	-.10
Overconfidence		-.93**	
Overconfidence x Positive mood condition			-.83*
Overconfidence x Negative mood condition			-1.07**
Constant	2.89**	3.15**	3.05**
Adjusted R ²	.39**	.44**	.44**
Δ R ²		.05	.00

N=120, p<.10†, p<.05*, p<.01**.

clearly different from studies that have defeated participants by directly affecting their self-confidence (Baumrind, 1985). In fact, the messages that accompanied the lost and the won games, intentionally alluded to uncontrollable or external factors (bad luck) instead of personal or ability-related ones. Furthermore, the results of the manipulated games were not considered for the final payment in order to maintain fairness in payments to all individuals, regardless of the mood condition. Furthermore, it is necessary to follow negative mood manipulations with an appropriate debriefing technique. Both Study 1 and Study 2 applied debriefing techniques in order to restore the moods of participants.

GENERAL DISCUSSION AND CONCLUSION

In this paper, I offer insight into the yet-underexplored, affective implications for decision-making performance in uncertain as well as competitive tasks in which strategic decisions usually unfold. The results evidence a clearly benign effect of maintaining a positive mood, rather than a negative or neutral mood, when approaching a decision-related task with overconfidence. Consistent with both judgement-driven and affect-driven accounts, the findings demonstrate that a positive mood increases decision-making performance in both competitive and non-competitive high-uncertainty settings, while a negative mood decreases such performance. An additional contribution of the paper is clarification of the specific conditions in which a positive mood may become a beneficial psychological state. Specifically, these mood effects are more likely to affect performance in situations where comparative feedback is not explicitly available and decision-makers

consequently rely fully on their own abilities and performance information.

Limitations and future research

This study was performed under laboratory conditions. While this approach has clear internal validity advantages and the potential to make causality claims (Colquitt, 2008), it is also more vulnerable to external validity concerns. Thus, future research could extend these findings in the field context and complement these insights (Simon & Houghton, 2003). Nevertheless, the competitive setting that was created realistically mirrors successes and stumbles of actual decision-makers. If individuals in this study did react emotionally to performance feedback, it is likely that actual strategic decision-makers, who are particularly sensitive to performance feedback, would have reacted in a likewise or more affectively intense way. Furthermore, exposure to performance information in terms of rankings does resemble the reality of many organizations (Bothner *et al.*, 2007). Since competition usually occurs between organizations, and therefore at the team level, individual-level results can inspire future research at the team level (Barsade & Gibson, 2012). Such studies could analyze team-level affective reactions to various types of performance feedback in the context of team competition. However, many studies have focused on the individual level in order to study overconfident behavior of CEOs (Li & Tang, 2010; Chatterjee & Hambrick, 2011) as well as entrepreneurs in market entry decisions (Moore *et al.*, 2007; Hogarth & Karelaia, 2012).

Additionally, this study operationalizes overconfidence as the difference between one's belief in self-ability and the actual performance score. This is usually the case in economics (Clark & Friesen, 2009) and in many other studies in behavioral decision-making (Moore & Healy, 2008). This study does not cover different conceptualizations of overconfidence, such as the better-than-average effect of superiority beliefs in terms of performance ability as compared to competitors (Anderson *et al.*, 2012). It would be interesting to test affective mechanisms in the context of overplacement (Moore & Healy, 2008). The theory suggests that affect has the potential to shape a variety of behaviors, especially socially oriented ones (Forgas, 1995a). For instance, the use of a socially constructed measure of overconfidence, such as the view of oneself as better than the others, could involve the role of specific emotions, both positive and negative. For instance, negative affect does not always lead to non-adaptive consequences (Van Knippenberg *et al.*, 2010). It would be interesting to study emotional reactions to competitors, such as envy (Smith & Kim, 2007) or anger (Lerner *et al.*, 2015). Some negative affective states may have positive implications in some cases (Forgas, 2013). For instance, anger may encourage risk-taking (Lerner & Keltner, 2001), which can be advantageous to cope with the competition and sustain a leading position (Wiklund & Shepherd, 2011).

Theoretical implications

Strategic decision-makers and entrepreneurs have been consistently characterized as extremely narcissistic, egocentric and chronically overconfident (Hiller & Hambrick, 2005; Chatterjee & Hambrick, 2011). However, overconfidence must be comprehensively understood in the context of a specific situation and its temporary contingencies. This notion is supported by the adaptive function of affectivity, which includes overconfident beliefs as protective of one's affective state (Blanton *et al.*, 2001). As with other animals who respond quickly to potential predators, humans usually have a short window of time to respond to potential threats in the social environment, such as those posed by the competition. This is an adaptive way to maintain a healthy affective balance and well being when contending with adversity (Taylor, 1983). A logical explanation for these asymmetric reactions to positive and negative news from the environment is that the potential losses can become more devastating and extreme than the ephemeral joys of triumph.

Similarly, optimistic biases exist partly because aspirations are more quickly altered in the upward direction than regulated downward (Lant, 1992). Furthermore, a higher mismatch between the current mood or goal state, leads to more attention and desire to counter-balance the present affective state (Rothermund *et al.*, 2011). Based on this idea, overconfident individuals are likely to experience higher disappointment in response to the mismatch between the current and ideal personal states in response to performance-related information (Ringuest & Graves, 2017). Furthermore, the reported results also resonate with the finding that decision-makers, when evaluating the potential for success, rely more heavily on the evaluation of their own abilities and weaknesses as opposed to those of the competition (Windschitl *et al.*, 2003). This suggests that subjective interpretation of performance may have greater impact on subsequent behavior than objective performance information. For instance, it has been found that CEOs who are unsatisfied with firm performance are more inclined to engage in reactive or problem-driven strategic changes, while satisfied CEOs prefer to engage in expansive, opportunity-driven changes (Villagrasa *et al.*, 2017). Consequently, the incorporation of affective lenses is critical to fully understand the performance implications of executive overconfidence, as this can have important implications for firm performance. Overall, this study contributes to the literature on overconfidence with a more specific focus on the role of affect in strategic decision-making.

The results of the reported studies suggest that a positive mood may help to keep performance outcomes on track. A self-fulfilling prophecy seems present in that a false (overconfident) initial expectation, when accompanied by a positive mood, facilitates decision-making performance and somehow manages to find reality-based support for it (Merton, 1948). In fact, positive illusions can sometimes promote genuine success by contributing the development of necessary skills as well as self-affirmation (Bandura, 1986), which is a basic human need (Sherman & Cohen, 2006). For instance, overly optimistic self-image and idealization of romantic partners may support the maintenance of more satisfactory relationships in the long term (Murray *et al.*, 1996). Similarly, overconfident executives effectively persuade and socially

attract followers by signaling status, which has a clear utility (Anderson *et al.*, 2012).

The previous literature has highlighted that overconfidence does not support learning from failure (Dunlosky & Rawson, 2012) and accepting personal responsibility in the face of business failure (Mantere *et al.*, 2013). Learning from one's own failure as well as others' failure is an important mechanism (Aranda *et al.*, 2017). This study adds the important explanatory role of affect on this phenomenon. A positive mood has been cognitively related to more efficient and flexible learning and behavioral repertoires (Fredrickson, 2001). Furthermore, it enhances motivation and drive (Lyubomirsky *et al.*, 2005). In contrast, in the context of an anticipated or potential threat (to one's self-evaluation), a negative mood may provoke impulsive behavioral reactions (Ashkanasy *et al.*, 2002). For instance, when encountering the potential for failure, decision-makers are likely to drastically change the course of actions and continue engaging in exploratory activities, which have a high potential to fail (Levinthal & March, 1993). While learning from failure may yield more concrete and explicit lessons about a given experience, affective accounts—especially in short time spans, such as in present dynamic business environments—may help to ensure appropriate cognitive and behavioral adaptation (Hodgkinson & Healey, 2011), which ultimately benefits performance (Roese & Olson, 2007). This is crucial since executives often receive few possibilities to update their ability beliefs in the context of major strategic decisions (Bollaert & Petit, 2010).

Practical implications

There is an ongoing interest in the possible solutions for overconfidence, and the literature has generally been interested in identifying possible ways to attenuate this bias. For instance, while the use of explicit warnings has not been considered to be appropriate (Plous, 1995), new types of warnings that increase attention to the message, seem to instill promise in these techniques (Schall *et al.*, 2017). Similarly, there are advocates for the use of objective and statistical performance information that is intended to reduce overconfidence (Russo & Schoemaker, 1992; Kahneman & Lovallo, 1993; Kahneman, 2011). Strategic behavior can be more comprehensively understood when considering both perceptual as well as objective performance data (Villagrasa *et al.*, 2017). Following this idea, the results of the reported study, justify some caution in the application of debiasing techniques that directly confront individuals with objective performance information. If this information is potentially threatening or directly relates to absolute performance feedback, then it seems appropriate to pay attention to the accompanying affective state of individuals and not only to the reduction in overconfidence.

A more promising and comprehensive approach would be to train executives to regulate their own affect in accordance with the particularities of the strategic situation at hand (Healey & Hodgkinson, 2017). The results of this study suggest that adequate regulation of mood states is more important in the context of personal ability evaluations than in situations where relative performance feedback (based on the competition) is directly available. Research has illustrated that

decision-makers have a tendency to myopically focus on themselves and their achievements (Camerer & Lovallo, 1999), even when performance rankings are explicitly available (Moore & Cain, 2007). This is apparently the case because of the connection of absolute performance scores to self-esteem (Moore & Klein, 2008). In sum, upward-regulating affective states may be particularly important in competitive contexts, especially in the face of failure, as well as in circumstances where the performance information of competitors is not readily available.

CONCLUSIONS AND CONTRIBUTIONS

Summary

The primary objective of this dissertation was to contextualize, by studying different psychological antecedents and mechanisms, three distinct strategically relevant behaviors of practical importance to a firm's competitive advantage: risk-taking, performance and the willingness to join a brand-new partnership. Specifically, this dissertation contributes to enhancing our understanding of the role of affective variables (i.e., moods) and efficacy beliefs across various forms and levels of analysis (i.e., collective efficacy and overconfidence –at the team and individual levels– and their relationship to strategically relevant behavioral consequences. By proposing and testing the effect of what type of information is attended to and how this is generally processed by decision-makers, the dissertation contributes to insights into context-specific informational cues. Specifically, the dissertation showed that informational cues are important moderators in the different relationships that emerge between cognition and the different types of behavior in strategic decision-making contexts where there is a high level of uncertainty and competition.

Prior research has mainly focused on the impact of cognitive and affective antecedents on strategic outcomes in general (Hayward & Hambrick, 1997; Delgado-García *et al.*, 2010); however, recent research has begun to analyze the specific characteristics of the contexts where decision-making unfolds, such as different tasks or performance-feedback environments (related to different types of aspirations). In these studies, various difficulty and structure levels of a task have been shown to differentially influence strategically relevant behavioral outcomes (Cain *et al.*, 2015; Laureiro-Martínez & Brusoni, 2018). For instance, research has shown that acquisition behavior can significantly vary depending on the decision-makers' and firms' aspiration types (historical or social) (Kim *et al.*, 2015) and recent performance cues (Chatterjee & Hambrick, 2011). Finally, by focusing on strategic decision-making at the individual level (Chapters 1 and 3) as well as the team-level (Chapter 2), this dissertation also contributes to further our understanding of team-level cognitive phenomena.

The importance of the informational context: what information is available and how is it processed?

This dissertation presented two critical contextual moderators related to information: what type of performance information decision-makers or teams focus on, and how information is processed when making decisions. While cognition's effect on a variety of organizational (Hodgkinson & Healey, 2008) and strategic behaviors (Hodgkinson & Healey, 2011; Ocasio, 1997; Greve, 2013) has been investigated, the subtle processes and mechanisms by which cognition translates into action are less well-understood.

Chapter 1 of the dissertation showed how positive mood (in comparison to a negative one) is predictive of higher

willingness to join a brand-new partnership in situations with very high uncertainty and complete anonymity. This is particularly important against the backdrop of higher autonomy in work settings and self-selecting staffing (Petriglieri *et al.*, 2018). Furthermore, teams nowadays operate in new ways, including with less-clear boundaries and more temporality (Mortensen & Haas, 2018). While the relationship between mood and social behavior in general has been studied in many different settings within psychology (Forgas, 2002; Forgas & George, 2001), the influence of positive mood on the willingness to join a brand-new partnership as opposed to working individually remains largely underexplored. The results discussed in Chapter 1 show that positive mood (in comparison to a negative one) is a significant driver for the willingness to join a partnership, but only when task difficulty is high. In other words, problems that require deliberate or analytical information processing, i.e., the active role of Type 2 processes, facilitate mood effects on the willingness to join partnerships. This is not the case if tasks are easier to solve and require, to a larger extent, automatic or Type 1 processes (and less Type 2 processes). This contingency perspective, based on the type of cognitive processes required to solve the problem itself, helps to reconcile previous inconsistent findings. Furthermore, the empirical setting of the study in Chapter 1 focused on potential collaborations in a high-uncertainty setting, which mirrors current online partnerships and problem-solving platforms. In this sense, the willingness to share knowledge by contributing to a community has been shown to be influenced by a variety of social motives. It is, however, increasingly more common to contribute to partnerships or embark on collaborations with strangers, a phenomenon that is known as “the kindness of strangers” (Constant *et al.*, 1996). In these types of situation with high levels of uncertainty and anonymity, it seems convenient to place the emphasis on the interplay between the individual and the problem itself rather than on the characteristics of a previously non-existing social interaction (Haas *et al.*, 2015). Chapter 1 contributes to this theoretical approach by gaining insight on knowledge-sharing partnerships that emerge in extremely uncertain conditions. In light of the results, how individuals feel when cognitively processing information significantly impacts their willingness to collaborate with someone that they do not really know. According to the clear conditional interaction effect that arose from the results, mood effects seem to be tightly related to the types of problems that individuals confront when deciding whether to join a partnership or not under such circumstances. Mood is therefore better understood in the context of specific cognitive processes rather than as a main effect; this is consistent with earlier literature (Forgas, 1994; Hertel *et al.*, 2000; Weiss & Cropanzano, 1996).

Efficacy beliefs were analyzed in Chapters 2 and 3. In particular, Chapter 2 focused on collective efficacy and its relationship to risk perception and risk-taking in start-up teams. As in Chapter 2, in Chapter 3 I adopted a contextual perspective and studied the moderating effect of different types of performance aspirations (i.e., historical and social) on the relationship between collective efficacy and risk perception and behavior. This study contributes to our knowledge of the motivational role of collective efficacy in start-up teams that make early-stage strategic decisions. The results showed that only when teams focus on their own past performance (vs. competitor teams’ performance)—and thus have different

types of performance aspirations— does collective efficacy have a motivational effect, affecting perceptions of risk and risk-taking. There does not seem to be, however, any effect by collective efficacy under the social aspirations condition, i.e., when teams are exposed to the performance ranking of the competition. As in the first study, the informational context played a critical role in explaining how psychological antecedents (i.e., mood states and efficacy beliefs) relate to the dependent (behavioral) variables. This study has important implications for strategic entrepreneurship. On the one hand, it enhances our understanding of the motivational effects of efficacy beliefs at the team level and therefore contributes to the literature on entrepreneurship in general and on team entrepreneurship in particular. Specifically, this study provides a better understanding of the role of collective efficacy in the early entrepreneurial stages. On the other hand, it provides a contingency perspective that helps to comprehensively integrate relevant variables from literature on strategic management and competitive dynamics into the same theoretical framework.

While being self-confident and willing to take risks by pursuing new business avenues is inherently related to entrepreneurial behavior and performance (Wiklund & Shepherd, 2011), sometimes excessive confidence can have negative performance implications. This is the case with overconfident assessments of one's ability, which have been related to negative performance (Hayward *et al.*, 2006; Malmendier *et al.*, 2011). While Chapter 2 focused on (collective) efficacy beliefs in general, Chapter 3 focused on extreme forms of self-confidence (i.e., overconfidence). Specifically, I analyzed the affective underpinnings of overconfident individuals when making decisions in highly uncertain and/or competitive situations. In particular, I proposed and found support for the benign effect of positive mood on the negative performance implications of overconfidence. In other words, maintaining a positive mood, rather than a negative one, may help to overcome the detrimental effects of overconfidence on performance. Chapter 3, similarly to Chapter 2, considered the distinction between aspiration types an important one for differentiating between contexts with higher and lower levels of uncertainty. In light of the results from Chapters 2 and 3, this idea is important, as I find consistent evidence regarding the moderating role of the informational environment in explaining both risk-taking and decision-making performance. Furthermore, Chapter 3 analyzed the interactive processes between efficacy beliefs and mood, showing that both together explain performance differences among overconfident individuals. In sum, Chapter 3 helps to advance literature on cognition, affect and strategic decision-making (Ashton-James & Ashkanasy, 2008), and it also resonates with current endeavors to differentiate between historical and social aspirations (Kim *et al.*, 2015).

Understanding motivated action within strategy

In the introduction to this dissertation, I already provided the reader with argumentation regarding the motivation behind the selection of the dependent variables. All three of them have been related to competitive advantage in previous literature and are important for strategic management (Greve, 2013). Moreover, the findings of this dissertation—that is, that the informational context provides a relevant framework for studying the connections between cognitive, affective,

and behavioral variables—also suggests important complementarities among the outcome variables.

The fact that cognitive and affective variables are translated into different forms of action (e.g., the willingness to join brand-new partnerships, risk-taking and decision-making performance) depending on the informational context suggests that motivational processes underlie the relationships studied here. Moreover, it can be noted that the three dependent variables selected for this dissertation require a great deal of motivation and effort to crystallize into action.

When individuals and teams have a clear goal, such as maximizing competitive advantage through partnerships, risky projects or direct performance goals, consistent effort or motivation becomes necessary (Locke, 1996). While both mood states and efficacy beliefs can generally be important sources of motivation by themselves (Bandura, 1986; Forgas & George, 2001; Ashkanasy *et al.*, 2002), specific contextual variables can reveal important contingencies. Previous research based on upper-echelons theory has found that the stable personality variables of the actors (and teams) involved in strategic decision-making have more weight in explaining behavioral strategic outcomes when the business environment in general is very uncertain and allows for managerial discretion (Hambrick, 2007; Simsek *et al.*, 2010). In contemporary environments, however, uncertainty is commonplace. Situation-specific psychological factors may therefore become more relevant than stable trait characteristics as actors change their thoughts, feelings and actions depending on the prevailing conditions.

With this dissertation, I contribute to the existing literature on strategic management by adopting a moment-to-moment basis (in contrast to trait theories) to understanding two situationally constrained variables (mood states and efficacy beliefs) in specific informational contexts. When the task at hand is highly complex, requiring extensive use of cognitive effort (Type 2 processes), situational uncertainty is arguably higher, more strongly affecting strategic choices (Ashton-James & Ashkanasy, 2008). In addition, when important information regarding performance competition is absent (i.e., in the presence of historical rather than social aspirations), the informational context also has a larger margin of uncertainty. This seems to facilitate the motivational processes related to mood states and efficacy beliefs, as shown by the stronger link between cognition and behavior under such circumstances. These findings are in line with recent theoretical predictions regarding higher executive job demands, which can stem from either higher performance aspirations or from task difficulty. Under such conditions, executives' psychological characteristics may play a greater role in strategic behavior (Hambrick *et al.*, 2005).

Limitations

While I found support for the importance of informational aspects related to uncertainty and competition as moderating factors of key situational psychological variables, the study can be considered a preliminary step toward understanding strategic decision-making. The complex interdependencies that exist between cognition, affect, the environment and behavior should not be neglected. Furthermore, an informational approach is only one of the many possible ways in which

environmental or contextual aspects can be comprehensively incorporated into our understanding of strategic decision-making. Other possible moderators include the level of power held by a particular actor or decision-maker in the larger social or organizational context. This relates to different team compositions in terms of cognitive and affective characteristics (Barsade & Gibson, 2012; Barsade *et al.*, 2000) and the leader-follower distinction (Crossan *et al.*, 2008; Hodgkinson & Healey, 2011). Usually, strategic leaders are in direct contact with the external business environment, but they must also share a common commitment with their own team and organization (Doz & Kosonen, 2008). In fact, organizational design is a critical mechanism in exploring and exploiting strategic opportunities arising from external knowledge sources that should be considered (Foss *et al.*, 2013).

In addition, research embedded in organizationally relevant contexts, such as studies carried out directly in the field, constitute an important aspect that is somewhat neglected in this dissertation. Experimental studies within strategy may threaten external validity (Daniels, 1999), but it enhances the internal validity and controllability of the studied relationships. I opted for the use of an experimental methodology as my theory-driven research questions aimed to test specific causal mechanisms. I was particularly interested in testing a variety of behavioral reactions under different informational conditions. Furthermore, artificially manipulating the decision context allowed me to compare the same psychological antecedents under different contextual conditions. The use of experiments enables the generalization of the studied relationships to a field setting, while it also offers the opportunity to create ad hoc artificial settings which can be realistic (Colquitt, 2008). Experiments therefore do not systematically suffer from external validity problems (Berkowitz & Donnerstein, 1982). For instance, the strategic decision-making simulation used in Chapter 2 provided a realistic virtual decision-making context. In contrast, the first and third study suffer from a less realistic setting, but they were developed in a controlled laboratory context, which increases their internal validity and provides the opportunity to test causality.

Future research directions

In this dissertation, I focused on different types of strategic behaviors, providing a more generalist perspective on the study of the behavioral underpinnings of strategic decision-making. A focus on more specific strategic choices (e.g., on entrepreneurial decisions, market-entry decisions, major investments such as mergers and acquisitions) would, however, be an interesting approach. In this respect, a contextual perspective similar to the one adopted here seems a promising approach. Similarly, future studies can shed more light on more specific environmental catalysts related to an uncertain and/or competitive environment. For instance, uncertainty can stem from different sources, not just from the task characteristics or the performance information in competitive settings. There are also many possible ways to operationalize specific competitive conditions. The study of different cognitive, affective, and behavioral mechanisms in response to a particular competitive environment seems likely to reveal different strategies (Miles *et al.*, 1978). In this regard, dyadic approaches—that is, strategic actions in response to other firms' competitive moves—seem like promising avenues for

future research (Chen & Miller, 2012). Relatedly, social aspirations may also play a crucial role in competitive environments, as there may be based on multiple reference points related to competitors that decision-makers can rely on (the average competitor, a worse vs. a better performer, the best performer, etc.) (Audia *et al.*, 2015; Hu *et al.*, 2011).

Lastly, this dissertation serves to highlight the importance of both “cold” and “hot” (i.e., affective) cognition in strategy research (Hodgkinson & Healey, 2011; Healey & Hodgkinson, 2017). While mood is an important affective variable that has the potential to widely shape strategic behavioral outcomes (Ashton-James & Ashkanasy, 2008; Delgado-García *et al.*, 2010), specific emotions are also likely to affect outcomes related to strategy (Huy, 2011). One topic with clear potential is the study of specific threats that the competition or other environmental jolts may cause (Meyer, 1982) and how strategic leaders react to these by adapting their decision-making (Ashton-James & Ashkanasy, 2008). In sum, the research field of affect and strategy seems to be fertile ground, both for individual and team-level studies.

Practical implications

One of the strengths of this dissertation is its focus on psychological variables that are potentially malleable and can therefore be trained and/or intentionally shaped. Moods, as well as other affective states, can be intra-individually regulated by means of different emotion-regulation techniques at the workplace (Newman *et al.*, 2009). These types of affective regulation strategies, which usually consist of changing the way one frames a particular strategic situation, have great potential to help managers make better strategic decisions (Healey & Hodgkinson, 2017; Kahneman, 2011). For instance, coaching sessions both at the individual or the team level have the potential to strengthen positive affective states and to help individuals develop their self-confidence (Donaldson & Ko, 2010). In addition, more generic training protocols can also be used to build up spirit. For instance, the use of background music is one simple way to allow people to feel more comfortable at work (Västfjäll, 2001). Similarly, specific training protocols aim to promote positive affective states as well as self-efficacy in organizations (Gist *et al.*, 1989; Frayne & Latham, 1987). It is worth mentioning that other, specific techniques, such as the use of meditation, can help to improve positive affective states (Fredrickson *et al.*, 2008). Learning about the kinds of situations (e.g., complex tasks requiring Type 2 processes) where these techniques may be worth applying in order to promote specific types of behaviors may help inform better practices in the work setting.

Furthermore, the contextual aspects presented in this dissertation (i.e., informational aspects) are under many circumstances subject to managerial control. In some cases, enabling an individual or a team in a particular moment to develop self-confidence may be a key priority. When this is the case, leaders may deliberately decide to omit telling a team how competitors are performing. In contrast, if an individual or team is constantly showing overconfident or risky behavior, then it may be practical to expose these individuals or teams to objective performance indicators as a way to prevent the negative performance outcomes related to unrealistic efficacy beliefs. However, this should be done with caution and always preserving the affective well-being of the individuals. Additionally, authentic leaders may promote personal

self-awareness in their followers and help them regulate their personal strengths, including positive affective states and self-confidence (Gardner *et al.*, 2005).

Implications for the maritime sector. While the implications discussed above are general and informative across a variety of industries and sectors, it is interesting to illustrate and show their relevance with regard to a specific industry. The maritime sector is a global and complex industry, subject to constant environmental shocks and policy changes. As a concrete example, the tanker-shipping industry is expected to face significant challenges in the coming years because of changes in the oil market. Both trade flows and oil prices are expected to experience dramatic changes, partly due to the threat of a powerful competitor such as the U.S. (Fattouh, 2014). This highly uncertain and competitive situation will promote a more challenging environment where entrepreneurially-oriented action, such as risk-taking, or new partnerships with other maritime firms, will be important. Surviving under such volatile conditions may require extensive entrepreneurial action and investment in new vessels and infrastructure. However, since the financial investments involved are very large, finding the right balance between being aware of the competitors' performance and adopting an inward-looking approach seems appropriate for preventing overconfident decision-making. Maritime executives may need to focus on their own (and their teams') psychological strengths in order to cope with the dynamic business environment and to behaviorally respond in the best possible way. Specifically, preserving collective efficacy beliefs and maintaining a positive mood may be useful managerial tools for strategic decision-makers within this sector.

When appropriately used, both efficacy beliefs and mood states can be important psychological resources to help executives reduce excessive overconfident decision-making while at the same time maintaining an entrepreneurial spirit. If collective efficacy is not ensured within maritime companies, responsiveness to future environmental opportunities and willingness to take the necessary risks to overcome the competition may be more limited. Exposure to the performance benchmarks of the competition is likely to promote defensive responses and negative affective states, which may impair decision-making performance. In contrast, teams that are overconfident by nature may benefit from being exposed to this information. When coping with situations that impose obvious threats, self-regulatory skills such as collective efficacy become essential. Preserving healthy levels of collective efficacy without it resulting in overconfidence can thus help executives adapt to a new situation. As such, efficacy beliefs may be particularly important in hyper-competitive environments where adjustment to performance aspirations is slower (Greve, 2002). Based on the results of this dissertation, however, it is important to find ways to counterbalance excessively confident behavioral patterns. One way in which executives can attenuate the negative impact of excessive self-confidence on decision-making performance is to regulate their own affect and to enhance positive mood states. Finally, strategic decision-makers should be aware that both collective efficacy and positive mood states have higher chances of influencing strategic decision-making when information about the competitors' performance is largely missing (as opposed to situations where this information is explicitly available).

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