

**Entrepreneurial Behavior in Social Contexts:  
The Role of Families, Teams, and Employees  
for Entrepreneurial Individuals**

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## Table of contents

Acknowledgements.....	III
List of figures.....	IX
List of tables.....	XI
Abbreviations.....	XIII
1 Introduction.....	1
1.1 Entrepreneurship as a field of research.....	3
1.2 Entrepreneurial individuals and their social contexts.....	5
1.3 Entrepreneurial behavior: What we know and what we do not know?.....	7
1.4 Data sets and methodology of the thesis.....	10
1.5 Structure and scope of this thesis.....	12
2 Intergenerational transmission of entrepreneurial intentions.....	19
2.1 Introduction.....	20
2.2 Theory development.....	22
2.2.1 A model of transmission of entrepreneurial intentions within families.....	22
2.2.2 Culture and intergenerational transmission of entrepreneurial intentions.....	28
2.3 Methodology.....	32
2.3.1 Data collection and sample.....	32
2.3.2 Variables.....	33
2.3.3 Methodological limitations.....	36
2.3.4 Statistical procedure.....	37
2.4 Analysis and results.....	38
2.4.1 Descriptive statistics, correlations, and validity checks.....	38
2.4.2 HLM estimations of within-family effects.....	40
2.4.3 HLM estimations of cross-cultural effects.....	44
2.4.4 Post-hoc analysis.....	48
2.5 Discussion and conclusion.....	52
2.5.1 Theoretical implications.....	52
2.5.2 Directions for future research.....	55
2.5.3 Limitations and conclusions.....	57

## Table of contents

---

3	Team-level entrepreneurial decision making under uncertainty – The moderating influence of team metacognitive knowledge .....	59
3.1	Introduction.....	60
3.2	Team decision making, information uncertainty, and metacognitive knowledge .....	62
3.2.1	Amount of information and team decision quality .....	64
3.2.2	Information uncertainty and team decision quality.....	66
3.2.3	Metacognitive knowledge.....	67
3.3	Methodology .....	72
3.3.1	Participants and design.....	72
3.3.2	Materials.....	73
3.3.3	Procedure .....	75
3.3.4	Variables and measures.....	76
3.4	Results.....	79
3.4.1	Manipulation of information uncertainty.....	79
3.4.2	Descriptive statistics and correlations.....	79
3.4.3	Hierarchical Logistic Regression .....	80
3.5	Discussion and conclusion.....	84
3.5.1	Theoretical implications.....	85
3.5.2	Practical Implications.....	86
3.5.3	Limitations and Future Research .....	87
3.5.4	Conclusions.....	88
4	Relationship conflicts ain't all bad: A multi-level model of the accuracy of self-assessed team performance after an entrepreneurial decision making task .....	89
4.1	Introduction.....	90
4.2	Theory development .....	92
4.2.1	Individuals' assessment of team performance .....	93
4.2.2	Teams' assessment of team performance.....	97
4.2.3	Relationship conflict and accuracy across levels.....	99
4.3	Methodology .....	101
4.3.1	Participants, research setting, and design.....	101
4.3.2	Procedure .....	103
4.3.3	Measures and variables .....	104
4.3.4	Data analysis .....	107
4.4	Results.....	108

## Table of contents

---

4.5	Discussion and conclusion.....	116
4.5.1	Theoretical implications.....	117
4.5.2	Limitations and future research.....	119
4.5.3	Practical implications.....	120
4.5.4	Conclusions.....	121
5	Negative affective reactions to team conflict after an entrepreneurial decision making task: The moderating role of uncertainty and team efficacy.....	123
5.1	Introduction.....	124
5.2	Affective reactions to conflict after an entrepreneurial decision making task..	126
5.2.1	Relationship conflict, task conflict, and affective reaction.....	127
5.2.2	Conflicts, information uncertainty, and affective reaction .....	130
5.2.3	Conflicts, team efficacy, and affective reaction.....	134
5.3	Research methods .....	137
5.3.1	Sample, design, and research setting .....	137
5.3.2	Procedure .....	139
5.3.3	Measures and variables .....	140
5.4	Results.....	145
5.4.1	Manipulation of information uncertainty.....	145
5.4.2	Data analysis .....	146
5.5	Discussion and conclusion.....	151
5.5.1	Theoretical implications.....	152
5.5.2	Limitations .....	154
5.5.3	Practical implications.....	156
5.5.4	Conclusions.....	157
6	Perceptions of entrepreneurial passion and employees' commitment to entrepreneurial ventures.....	159
6.1	Introduction.....	160
6.2	Theory development .....	162
6.2.1	Perceived entrepreneurial passion and employees' positive affect at work.....	164
6.2.2	Perceived entrepreneurial passion and employees' goal clarity .....	166
6.2.3	Indirect effects of entrepreneurial passion on employees' organizational commitment .....	168
6.3	Methodology .....	170
6.3.1	Data collection and sample .....	170

## Table of contents

---

6.3.2	Measures .....	171
6.4	Results.....	173
6.5	Discussion and conclusion.....	177
6.5.1	Theoretical contributions .....	178
6.5.2	Limitations and future research.....	180
6.5.3	Conclusion .....	181
7	Conclusions and avenues for new research.....	183
7.1	Summary of results and contributions .....	183
7.2	Avenues for new research.....	188
8	References.....	195
9	German summary / Deutsche Zusammenfassung.....	237
10	Appendix.....	245
10.1.1	Instructions for team decision making task.....	246
10.1.2	Pieces of information of team members .....	250
	Ehrenwörtliche Erklärung.....	253



## List of figures

Figure 1: The social context of entrepreneurial individuals .....	6
Figure 2: Cross-level interaction between the influence of parents' entrepreneurial activities and in-group collectivism on entrepreneurial intentions .....	46
Figure 3: Cross-level interaction between the interaction of parents' entrepreneurial activities and grandparents' entrepreneurial activities and in-group collectivism on entrepreneurial intentions .....	48
Figure 4: Research model of team decision quality in an entrepreneurial task under information uncertainty.....	63
Figure 5: Hypothetical distribution of information items about four alternatives (A-D) among three team members (X-Z).....	65
Figure 6: Moderating effect of team-level metacognitive knowledge (A) on the relationship of the amount of exchanged unique information and the log odds of finding the best alternative in the team decision making task and (B) on the relationship of information uncertainty and the log odds of finding the best alternative in the team decision making task.....	84
Figure 7: A multi-level model of the role of relationship conflict on the accuracy of self-assessed team performance .....	93
Figure 8: Interaction effect of objective team performance by individual's perceived relationship conflict on individual performance assessment .....	112
Figure 9: Interaction effect of objective team performance by team's perceived relationship conflict on team performance assessment.....	114
Figure 10: Interaction effect of individual's perceived relationship conflict by team's perceived relationship conflict on the relative accuracy of individual's performance assessment over team's performance assessment.....	116
Figure 11: Model of negative affective reaction to team conflict after an entrepreneurial decision making task contingent on information uncertainty and team efficacy .....	127
Figure 12: Cross-level effects of information uncertainty on the relationship between (A) relationship conflict and (B) task conflict and negative affective reaction.....	150
Figure 13: Cross-level effect of team efficacy on the relationship between relationship conflict and negative affective reaction .....	150
Figure 14: Research model and results .....	176



## List of tables

Table 1: Overview of empirical chapters, research questions, and individual contribution.....	13
Table 2: Means, standard deviations, and correlations between focal variables .....	39
Table 3: Results for within-family effects and robustness checks.....	41
Table 4: Results for cross-cultural effects .....	45
Table 5: Results of post hoc analyses for timing of parents' entrepreneurial activities .	50
Table 6: Results of post hoc analyses for gender effect .....	51
Table 7: Means, standard deviations, and correlations (before mean centering) .....	80
Table 8: Hierarchical logistic regression analysis predicting team decision quality .....	81
Table 9: Distribution of information in the hidden profile experiment .....	102
Table 10: Means, standard deviations, Cronbach's alpha, and correlations between focal variables .....	109
Table 11: Hierarchical linear model of individual performance assessment.....	110
Table 12: Ordinary least square regression of team performance assessment .....	113
Table 13: Hierarchical linear model of relative accuracy of individuals' assessment over the team's assessment .....	115
Table 14: Distribution of information in the hidden profile experiment .....	139
Table 15: Means, standard deviations, Cronbach's alpha, and correlations between focal variables .....	147
Table 16: Hierarchical linear model of the prediction of negative affective reaction ..	149
Table 17: Means, standard deviations, Cronbach's alpha, and correlations between focal variables .....	174
Table 18: Indirect effects of perceived entrepreneurial passion (via positive affect at work and goal clarity) on organizational commitment.....	177



## Abbreviations

3DP	Three-Dimensional Printing
cf.	confer
e.g.	exempli gratia (for example)
GLOBE	Global Leadership and Organizational Behavior Effectiveness
GUESSS	Global University Entrepreneurial Spirit Students Survey
HLM	Hierarchical Linear Modeling
ICC	Intraclass Coefficient
i.e.	id est (that is)
n.a.	not available
n.s.	not significant
OLS	Ordinary least squares
SIMOL	Social Identity Model of Leadership
std. dev.	standard deviation
VIF	Variance Inflation Factor
vs.	versus



## 1 Introduction

Entrepreneurs affect our daily lives by exploiting new inventions or ideas and taking them to the market. For example, entrepreneurs develop innovative technical gadgets, lifesaving pharmaceuticals, and new, convenient services. As a consequence, entrepreneurs are essential drivers of economic growth (Audretsch, 2003). Entrepreneurs do not only increase the variety of products and services for, they also increase the competition in a market, crowd out inefficient firms, and create new jobs by founding new firms (Audretsch & Keilbach, 2004; Barrett, 2004; Fritsch & Mueller, 2004).

However, the success of a new venture is everything but certain, and two thirds of all new ventures fail within their first ten years (Shane, 2008). Thus, founding a venture is challenging and entrepreneurs have to bear high levels of uncertainty (Knight, 1946; McKelvie, Haynie, & Gustavsson, 2011; McMullen & Shepherd, 2006), particularly when they are pioneers in a market. Due to their willingness to bear high levels of uncertainty (Knight, 1946), entrepreneurs are often seen as bold and courageous heroes (C. A. Allen & Lee, 1997; S. Cooper, 2000; Dimov, 2007a) who pursue their plans with high levels of energy, optimism, and determination (Smilor, 1997). They are alert for opportunities (Kirzner, 1997) and have a high need for achievement (McClelland, 1961). On the downside, however, being a hero entrepreneur is often associated with feelings of loneliness because inside the firm there are hardly people with the same status and the time for contacts outside the firm is limited (Gumpert & Boyd, 1984).

Because of this strong image of the entrepreneur as the courageous, passionate, and energetic “lonely hero”, research in entrepreneurship has continuously been fascinated by the person of the entrepreneur (Baum, Frese, Baron, & Katz, 2007). For example, researchers have studied individual entrepreneurs’ risk taking and risk perceptions (Palich & Bagby, 1995), the entrepreneurs’ decision making processes (Y. R. Choi & Shepherd, 2004), and their positive affect and creativity (R. A. Baron &

Tang, 2011). However, a substantial part of this research tends to neglect that entrepreneurs do not act in a social vacuum – for example, entrepreneurial individuals are inspired by others in their surroundings, get help and support from others, and sometimes even share the ownership of their firms with other members of an entrepreneurial team (R. A. Baron, 2002; Schindehutte, Morris, & Allen, 2006). Indeed, some studies emphasize the important role of social networks for entrepreneurial decision making (Davidsson & Honig, 2003; Ozgen & Baron, 2007) and success (Burt, 2000; Hite & Hesterly, 2001).

The purpose of this thesis is to contribute to this stream of research by – instead of viewing the entrepreneur as a “lonely hero” – investigating entrepreneurial behavior in social contexts. Specifically, I will investigate entrepreneurial behavior, i.e., entrepreneurs’ cognitive and affective processes (Welter & Smallbone, 2011), in three different social contexts: the (potential) entrepreneurs’ family, the co-founders in an entrepreneurial team, and the employees of an entrepreneurial venture. That is, I will analyze the family’s impact on the development of entrepreneurial intentions, entrepreneurial decision making processes and performance assessments in a team context, the team members’ affective reactions to these decision making tasks, and the impact of the entrepreneurs’ passion on employees of their venture.

The remainder of this introductory part is structured as follows. In section 1.1 I provide a brief overview of the field of entrepreneurship research, highlighting that entrepreneurship research so far mainly focuses on enterprising individuals apart from their social context. Then I explain what an entrepreneur’s social context means in section 1.2. In section 1.3 I summarize existing studies in the field of entrepreneurial behavior and derive the research questions guiding this thesis. This is followed by an overview of the methods applied in the empirical studies presented (section 1.4). Finally, I present the topics and the structure of this thesis in section 1.5.



### 1.1 Entrepreneurship as a field of research

Although entrepreneurship as a rather young field of research still struggles with its definition (Audretsch, 2003), many researchers agree with the basic definition put forth by Venkataraman (1997) that entrepreneurship “seeks to understand how opportunities to bring into existence ‘future’ goods and services are discovered, created, and exploited, by whom, and with what consequences” (p. 120). Thus, the phenomenon of entrepreneurship involves two components – opportunities and people who discover or create them and who are willing to exploit them. According to Shane and Venkataraman (2000) entrepreneurial opportunities refer to “situations in which new goods, services, raw materials, and organizing methods can be introduced and sold at greater than their cost of production” (p. 220). Entrepreneurs introduce these new ideas to the market. Their acts creatively destroy old industry patterns and establish new ones thus promoting economic development and growth (Schumpeter, 1942). Thus, entrepreneurship is a complex phenomenon and includes many different aspects (Audretsch, 2003; Venkataraman, 1997) which have caught the interest of scholars from diverse disciplines such as management (Busenitz et al., 2003; Covin & Slevin, 1989; Stevenson & Jarillo, 1990) economics (Audretsch, Keilbach, & Lehmann, 2006; Baumol, 1968; Fritsch & Mueller, 2004), sociology (Brüderl, Preisendörfer, & Ziegler, 1992; Ruef, Aldrich, & Carter, 2003; Walder & Nguyen, 2008), and psychology (Baum, Frese, & Baron, 2006; Hisrich, Langan-Fox, & Grant, 2007; Obschonka, Silbereisen, & Schmitt-Rodermund, 2010).

One early research stream in entrepreneurship has focused on the individuals who take entrepreneurial action. In the focus of research were characteristic personality traits that distinguish entrepreneurs from non-entrepreneurs. For example, studies have identified creativity (Schumpeter, 1934), risk taking propensity (Knight, 1946), and achievement motivation (McClelland, 1961) as typical characteristics of entrepreneurs. Until today, a substantial part of research has investigated personality traits of entrepreneurs (see for example the meta-analyses by Rauch & Frese, 2007; Zhao & Seibert, 2006). As this research has been criticized for being too static (e.g. Gartner,

1988; Rauch & Frese, 2007), subsequent research on the person of the entrepreneur has started to focus more on their cognitive and affective processes – a stream of research subsumed under the term entrepreneurial behavior (Shaver & Scott, 1991; Welter & Smallbone, 2011).

Another point of criticism of the trait approach in entrepreneurship is that it does not take into account the context the entrepreneur acts in (Gartner, Shaver, Gatewood, & Katz, 1994; Mitchell et al., 2002). Implicitly, research focusing on the individual entrepreneur draws the picture of a lonely hero who bears the challenges of entrepreneurial action. For example, Lazear (2002) states that “the entrepreneur is the *single* most important player in a modern economy” (p. 1; emphasis added)<sup>1</sup>. Further, Baron highlights the importance of the person of the entrepreneur by citing an American senator: “Much of our American progress has been the product of the individual who had an idea; pursued it; fashioned it; tenaciously clung to it against all odds; and then produced it, sold it, and profited from it” (Hubert H. Humphrey cited in R. A. Baron, 2002, p. 226).

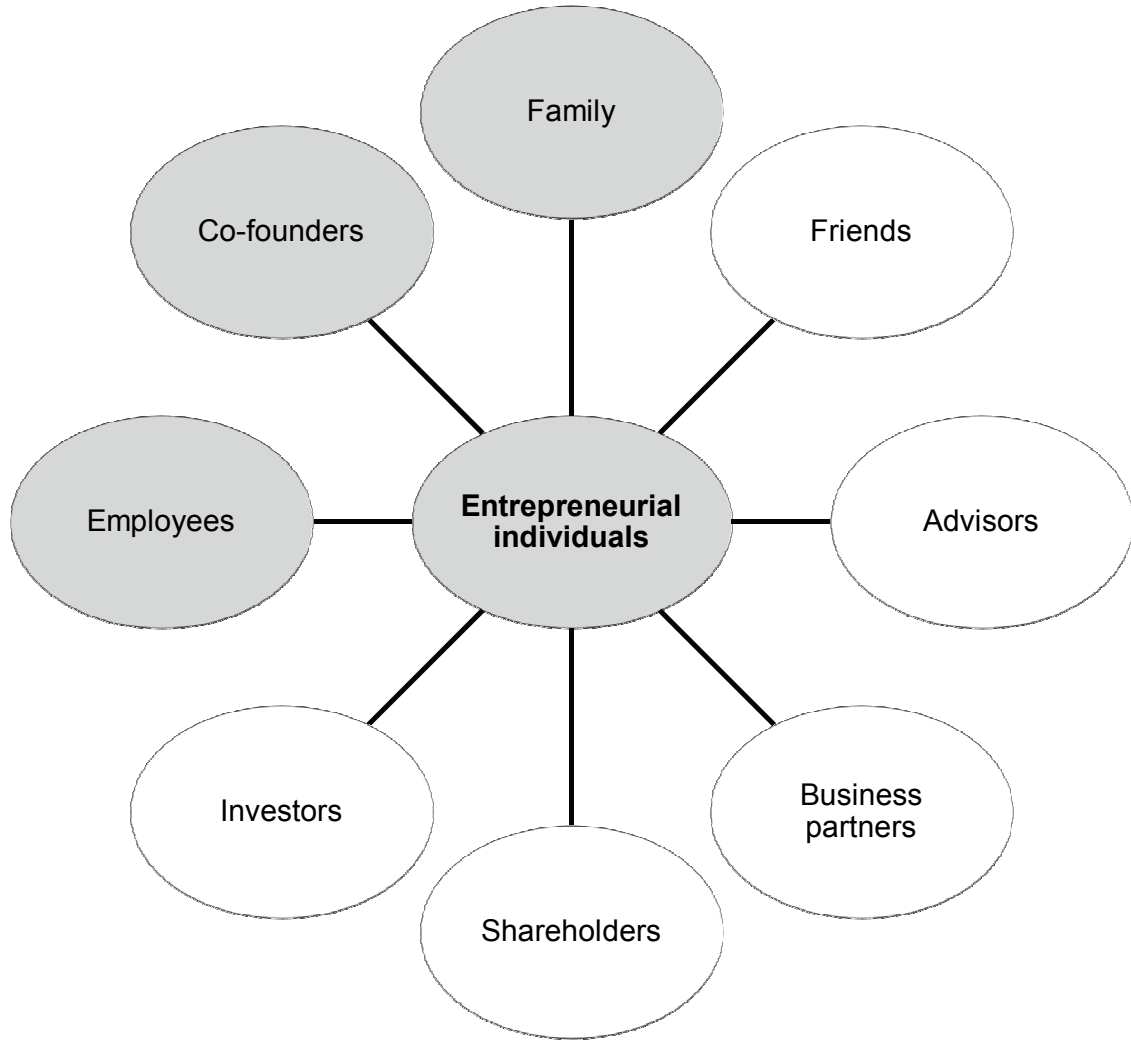
As the examples above illustrate, entrepreneurship research has been highly focused on the individual as the focus of analysis. This thesis does not deny that entrepreneurial individuals are important, but it aims to offer a complementary perspective by highlighting the importance of the social context of entrepreneurial behavior. This perspective acknowledges that some other authors have called for a more explicit inclusion of the social context in entrepreneurship research. For example, Gartner, et al. (1994) emphasize that “[t]he ‘entrepreneur’ in entrepreneurship is more likely to be plural, rather than singular”. For them, entrepreneurship research should include the people around the entrepreneurs who have an influence on entrepreneurs and who are influenced by them. In this thesis I will follow this call and will examine the interplay between entrepreneurs and their social contexts.

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<sup>1</sup> Lazear does not explicitly exclude that new ventures are founded by entrepreneurial teams nor does he deny the importance of the entrepreneurs’ social context. However, his focus is the individual entrepreneur who works independently from others (Lazear, 2002, 2005).

### **1.2 Entrepreneurial individuals and their social contexts**

Entrepreneurial activity does not take place in a social vacuum, but there are a variety of people inside and outside a venture in contact with the entrepreneur (Schindehutte, et al., 2006). The social context of entrepreneurial individuals involves all people who have an influence on them, on their decisions, and on their potential venture. Moreover, the social context covers those who are influenced by the focal entrepreneur. The connections between entrepreneurial individuals and their social context can be based on familial relationships, friendship, or professional relationships. Interpersonal contacts can be personal, virtual, or indirect (cf. B. S. Lawrence, 2006; Miller, Le Breton-Miller, & Lester, 2011). Thus, the social context of entrepreneurial individuals embraces many different people, such as the their family, co-founders in an entrepreneurial team, shareholders of the venture, investors, advisors, or employees (cf. Gartner, et al., 1994). Figure 1 illustrates examples of social contexts in which entrepreneurial individuals are embedded. For instance, an individual's decision to become an entrepreneur often depends on their family background (Matthews & Moser, 1996; Wang & Wong, 2004), members in a founder team mutually influence entrepreneurs' cognitive processes (West, 2007), entrepreneurs can gain know-how and experience from previous employers or from advisors (Cantner & Graf, 2006; Lerner, Brush, & Hisrich, 1997), or early investors help the entrepreneurs to develop their venture's strategy (Wiltbank, Read, Dew, & Sarasvathy, 2009).



**Figure 1: The social context of entrepreneurial individuals**

This thesis will examine specific social contexts of entrepreneurial individuals along the entrepreneurial process and focus on relevant contextual factors in different stages. These contexts are illuminated in grey in Figure 1. First, as the initial step of an entrepreneurial process, individuals need to decide for an entrepreneurial career. For this decision and the formation of an individual's entrepreneurial intentions his or her family of origin has an important influence (Matthews & Moser, 1996; Wang & Wong, 2004). This thesis will hence examine the parents' and grandparents' impact on the development of individuals' entrepreneurial intentions. Second, before an entrepreneurial venture comes into existence, entrepreneurs need to evaluate potential

business opportunities and to decide to exploit one of them (Y. R. Choi & Shepherd, 2004; Shane & Venkataraman, 2000). In many cases, this key strategic decision is a team process (A. C. Cooper & Daily, 1997; Gruber, MacMillan, & Thompson, 2008), where team members mutually exert impact on each other in a variety of different ways. For example, entrepreneurial team members exchange information, reflect about their performance, and mutually influence their affective experiences. These processes impact entrepreneurial decision making tasks on the team level and will also be investigated in more detail in this thesis. Finally, when ventures grow, entrepreneurs will hire employees (Chandler, McKelvie, & Davidsson, 2009). Employees represent an important social context for entrepreneurs because entrepreneurs can impact their motivation and behavior (Brundin, Patzelt, & Shepherd, 2008; Vecchio, 2003) which in the end determines, partly, the venture's success. Therefore, this thesis will also explore how entrepreneurial affects influences employees' commitment to new ventures.

In summary, this thesis will focus on three important social context factors of entrepreneurial individuals (highlighted in grey in Figure 1) which are reflective of different stages of the entrepreneurial process: the family of origin, the co-founders, and the venture's employees. The purpose of my investigation is to extend our understanding of the intersection between the social context and entrepreneurial behavior. I will now detail the current state of research on this topic.

### **1.3 Entrepreneurial behavior: What we know and what we do not know?**

Whereas the field of organizational behavior aims at understanding people's thoughts, feelings, and actions in a business context (Brief & M.Weiss, 2002; Wilpert, 1995), research in the field of entrepreneurial behavior focuses on people's thoughts, feelings, and actions in an entrepreneurial context (Gartner, et al., 1994; Shaver & Scott, 1991; Welter & Smallbone, 2011). Over the last years entrepreneurship research has emphasized the importance of investigating cognitions and affects in the entrepreneurial process to better understand the people involved in entrepreneurship (R. A. Baron, 2004, 2008; Cardon, Wincent, Singh, & Drnovsek, 2009b; Mitchell et al., 2007). This section provides definitions, highlights important findings in the field of

entrepreneurship, and presents the open research questions that I address in the empirical part of this thesis.

First, cognition is a broad term that comprises mental activities to process information. Thus, cognition includes phenomena such as attention, perception, memory, reasoning, and judgment (Broadbent, 1959; Sternberg, 1999). In the context of entrepreneurship, cognitions have been defined as “knowledge structures that people use to make assessments, judgments, or decisions involving opportunity evaluation, venture creation, and growth” (Mitchell, et al., 2002, p. 97). Previous research on entrepreneurial cognition has mainly focused on the individual (see Shepherd & Krueger, 2002; West, 2007 for notable exceptions). For example, entrepreneurship research has explored cognitive mechanisms motivating individuals to become entrepreneurs (Krueger, Reilly, & Carsrud, 2000), individual entrepreneurs’ decision which opportunity they want to exploit (Y. R. Choi & Shepherd, 2004), the role of decision biases in entrepreneurs’ decision making processes under uncertainty (Busenitz & Barney, 1997), and individual entrepreneurs’ assessments of their own decision making processes (Bryant, 2007). However, the impact of the social context on these entrepreneurial cognitive processes is less clear. For example, research questions that current studies do not answer include:

- How are entrepreneurial intentions transmitted over generations and what role does national culture play in this intergenerational process?
- How do teams deal with uncertainty in an entrepreneurial decision making task and what is the role of a team’s metacognitive knowledge in this process?
- How well are teams able to accurately assess their team’s performance after an entrepreneurial decision making task?

Second, affect is a superordinate concept which consists of state affects and trait affects. First, state affects are rather short term affective experiences, such as emotions and moods. Emotions usually are triggered by a stimulus, are rather intense, and include physiological changes and action tendencies. In contrast, moods usually do not result from a specific cause and are more global and diffuse. Second, trait affects refer to a person's disposition to experience positive or negative moods and emotions and are hence rather stable (see Barsade & Gibson, 2007; Frijda, 1986; Izard, 2009; Watson, Clark, & Tellegen, 1988 for an overview). Research on affects in the field of entrepreneurship is rather limited (Foo, 2011a), and existing studies have usually focused on the individual level (R. A. Baron, 2008). For example, studies have investigated the relationship between entrepreneurs' state affect and their effort put into venture tasks (Foo, Uy, & Baron, 2009), how entrepreneurs' trait affect impacts creativity (R. A. Baron & Tang, 2011), and how negative affect and entrepreneurial status are related (Patzelt & Shepherd, 2011). Finally, an affect that has been repeatedly described as a major motivator for entrepreneurs is entrepreneurial passion (Cardon, et al., 2009b; Cardon, Zietsma, Saporito, Matherne, & Davis, 2005; X.-P. Chen, Yao, & Kotha, 2009; Smilor, 1997). Again, however, the individual has been in the center of previous research and it is unclear how the entrepreneurs' social context impacts their affects and how the social context is impacted by the affective displays of entrepreneurial individuals. This thesis explores entrepreneurial affect in a social context by addressing the following research questions:

- How do team conflicts impact individuals' negative affect after an entrepreneurial decision making task?
- How do these negative affective reactions depend on characteristics of the decision making context and the team?
- How and via which mechanisms do entrepreneurs' displays of entrepreneurial passion affect the employees of new ventures?

To address these research questions this thesis combines research on entrepreneurship with theories from social, affective, and organizational psychology and embeds entrepreneurial behavior in specific social contexts. Thus, this thesis will contribute to a deeper understanding of cognitive and affective processes in an entrepreneurial context, will provide insight into the social contexts of entrepreneurial individuals, and will also have implications for research in organizational behavior as well as for social, affective, and organizational psychology.

### **1.4 Data sets and methodology of the thesis**

As this thesis focuses on entrepreneurial behavior in a variety of different social contexts, it consists of several studies relying on different methodological approaches and data sets. More specifically, I use original and secondary data, and I draw on cross-sectional analyses as well as on an experimental design to address the questions guiding my research.

First, the analysis of the intergenerational transmission of entrepreneurial intentions from parents to the offspring is investigated using a large data set covering information on the entrepreneurial intentions and family background of more than 50,000 students from 15 countries (Chapter 2 of this thesis). Importantly, this international data set, which is based on the 2008 “Global University Entrepreneurial Spirit Students Survey” (GUESSS), also offers the opportunity to analyze the relationship between parents’ and grandparents’ entrepreneurial status and students’ entrepreneurial intentions in different cultural settings. Because in the GUESSS data set individuals are nested within different countries a hierarchical linear modeling approach (HLM; Raudenbush & Bryk, 2002) was applied to test the study’s hypotheses.

Second, to analyze entrepreneurial decision processes in teams a “hidden profile” experiment drawing on social psychology was conducted (cf. Stasser & Titus, 1985). In the experimental task, 52 teams of three students were asked to imagine being an entrepreneurial team and to decide on the exploitation of one out of four potential business alternatives. I planned and designed this experiment and collected all data from



July 2009 to March 2010. The team decision making processes were videotaped, coded, and quantitatively analyzed. Before the team decision task information uncertainty was experimentally manipulated. Pre- and post-experimental questionnaires were applied to collect further data, such as participants' affects, metacognition, and perceptions of conflict. From this data set, I conducted three independent empirical studies focusing on different aspects of team decision making in an entrepreneurial task (Chapters 3-5 of this thesis). Depending on the focus of each study different statistical analyses were applied, such as logistic regression, HLM, and OLS regression.

Finally, to examine a third social context of entrepreneurial individuals 124 employees of entrepreneurial ventures were surveyed from May 2010 to June 2010 (Chapter 6 of this thesis). The participating employees were asked about their perceptions of their supervisor's entrepreneurial passion, their own goal clarity, positive affect at work, and organizational commitment. I applied a bootstrapping procedure (Preacher & Hayes, 2008) that allowed to test the mechanisms how entrepreneurial passion impacts new venture employees.

While each method applied has its benefits, there are also some limitations. For example, whereas the analysis of secondary data in Chapter 2 ensured a high number of observations and provided information on individuals from many countries, I could not influence the variables in the data set and had to rely on proxies for core constructs (cf. Cherlin, 1991; Houston, 2004; E. Smith, 2008). In contrast, in the experiment that I used in Chapters 3-5 I could manipulate and measure core constructs and control for other potential influences on the decision making task. This led to high levels of internal validity – i.e. the differences in the dependent variable can be attributed to experimental factors – but because of the artificial environment the external validity – i.e. the generalization of results to non-experimental real-life situations – is somewhat limited (Schade & Burmeister-Lamp, 2009; Shadish, Cook, & Campbell, 2002). Finally, primary data based on surveys as used in Chapter 6 can be collected in real world settings capturing real world phenomena. Depending on the scales used in surveys construct validity can be rather high. However, survey data is often subject to problems

such as self-report bias, retrospective bias, and problems with causality (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003; Shadish, et al., 2002; Shepherd & Zacharakis, 1999). Thus, each study in this thesis benefits from some of these methodological advantages, but is also connected to some limitations. I will discuss these limitations in more detail for each study separately in the following chapters.

### **1.5 Structure and scope of this thesis**

The five empirical studies of this thesis cover a broad spectrum of topics and constructs such as entrepreneurial intentions, processes during entrepreneurial decision making in teams, and the impact of entrepreneurial passion on employees. Further, this thesis considers three different social contexts of entrepreneurial individuals, i.e. their family, their fellow team members, and their employees. I dedicate a separate chapter to each empirical study which represents one research paper. Each chapter is introduced by a description of the general topic and underlying theories to place it in the context of existing research. I will then present the methodological approaches and the findings of the studies. Further, I will discuss the results, illustrate limitations, and suggest opportunities for future research. Chapter 7 of this thesis will provide a general conclusion and highlight its main results and an avenue for future research.

In the following, I will present an overview over the five chapters which represent five empirical studies. Therefore, I will briefly introduce the general topic and highlight main findings. Further, I will describe my individual contribution to each chapter as four of them are co-authored which is also indicated at the beginning of each chapter. An overview of the empirical chapters, the basic research questions addressed in them, and my individual contribution is also illustrated in Table 1.

**Table 1: Overview of empirical chapters, research questions, and individual contribution**

Chapter	Title	Social context	Research questions	Individual contribution
2	Intergenerational transmission of entrepreneurial intentions	Family of origin and national culture	How are entrepreneurial intentions transmitted over generations? What role does national culture play in this process?	70 %
3	Team-level entrepreneurial decision making under uncertainty – The moderating influence of team metacognitive knowledge	Team members	How does information uncertainty impact entrepreneurial decision making in teams? Can teams benefit from metacognitive knowledge in an entrepreneurial decision making task?	90 %
4	Relationship conflicts ain't all bad: A multi-level model of the accuracy of self-assessed team performance after an entrepreneurial decision making task	Team members	Under what conditions are members and teams able to accurately assess their team's performance after an entrepreneurial decision making task? When are individuals and when are teams more accurate?	80 %
5	Negative affective reactions to team conflict after an entrepreneurial decision making task: The moderating role of uncertainty and team efficacy	Team members	How do different types of conflicts impact team members' negative affects after an entrepreneurial decision making task? How do these negative affective reactions depend on information uncertainty and team efficacy?	100 %
6	Perceptions of entrepreneurial passion and employees' commitment to entrepreneurial ventures	Employees of new venture	How does entrepreneurial passion affect the commitment of the entrepreneurs' employees? What are the mechanisms?	80 %

Chapter 2 provides a model of the transmission of entrepreneurial intentions within families in different cultures. The model is tested with data from the GUESS survey and from the GLOBE (Global Leadership and Organizational Behavior Effectiveness) research program (House, Hanges, Javidan, Dorfman, & Gupta, 2004). Complementing research that emphasizes the parents' role in the formation of offspring's entrepreneurial intentions (Matthews & Moser, 1996; Wang & Wong, 2004), it is shown that over and above the direct transmission of entrepreneurial intentions from parents to children, grandparents – either directly or 'indirectly' via their influence on parents – contribute to the formation of offspring's intentions, and that parents' and grandparents' influences partly substitute for one another. The relative strength of these effects varies across cultures. This chapter hence provides a more detailed picture of the intergenerational transmission of entrepreneurial intentions by taking into account the individual's family of origin and his or her culture.

My contribution to Chapter 2 was the idea to combine the data from the GUESS survey and the GLOBE study, to analyze the data, and to develop the paper's storyline. Further, I wrote main parts of the manuscript. My co-authors also contributed to the writing of the paper and were involved in scientific discussion.

Chapter 3 offers a model of entrepreneurial decision making in teams under information uncertainty. This model is tested on a sample of 52 three-person student teams using a hidden profile experiment (Stasser & Titus, 1985). The teams were confronted with the scenario that they were an entrepreneurial team that should decide for one out of four entrepreneurial opportunities, a decision that is at the core of entrepreneurship (Y. R. Choi & Shepherd, 2004). Information about these opportunities was distributed in a way over the team that the best alternative was hidden to the participants and became only obvious when all information was considered at once during the decision making process. Consistent with the literature on team decision making (cf. Mesmer-Magnus & DeChurch, 2009) the results show that entrepreneurial decisions made by teams can be biased in favor of sharing initially common information. Decision quality increases when initially unique information is shared

among the members in their team discussion, but there is heterogeneity in this relationship which can be explained by team metacognitive knowledge – a team’s ability to understand the cognitive processes, its tasks, and the strategies necessary for them (cf. Flavell, 1979). Team metacognitive knowledge also moderates the relationship between information uncertainty and decision quality. Thus, this study contributes to the literature on entrepreneurial decision making and metacognition from a team perspective.

My contribution to Chapter 3 was the idea for the experiment, its design, and the data collection. Moreover, I analyzed the data, developed the paper’s storyline, and wrote the chapter. My co-authors were involved in scientific discussion and correcting the manuscript.

Chapter 4 focuses on the relationships between the team’s objective performance in the entrepreneurial decision making task and the members’ and the team’s self-assessed performance *after* the task. Understanding these relationships is important because people’s ability to learn depends on their ability to assess their performance (Bol, Hacker, O’Shea, & Allen, 2005). Building on self-enhancement theory (Allport, 1937) and on construal level theory of psychological distance (Liberman & Trope, 2008) this chapter therefore offers a multi-level model of the accuracy of self-assessed team performance. If teams and their members are able to accurately assess team performance, these self-assessments can serve as corrective feedback for subsequent decision making tasks. Using data from the hidden profile experiment described in Chapter 3, the results of the study suggest that a special type of conflict – relationship conflict, i.e. interpersonal tensions, animosities, and frictions between team members (Jehn, 1995)<sup>2</sup> – can be beneficial to assess team performance. Further, I investigate the impact of relationship conflict at the individual level, the team level, and across levels, and examine the accuracy of individual assessments over team assessments and vice versa. Although relationship conflict may be detrimental to performance in a team task

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<sup>2</sup> Relationship conflict can be distinguished from task conflict which describes disagreements about the task and different task-related opinions (Jehn, 1995).

(Jehn, 1995; Langfred, 2007; Mohammed & Angell, 2004), the results show that it improves the accuracy of performance assessments on both the member's and the team's level. When performance assessments are compared across levels, the individual's perception of relationship conflict and the team's collective perception of relationship conflict interact in such a way that the individual's accuracy in team performance assessment benefits from perceived relationship conflict only when the team's collective perception of relationship conflict is low. These findings help understand the accuracy of self-assessment of team performance and the associated role of relationship conflict in an entrepreneurial team decision making task.

My contribution to Chapter 4 was the idea for the experiment, its design, and the data collection. Moreover, I analyzed the data, developed the paper's storyline, and wrote the chapter. My co-authors were involved in scientific discussion and correcting the manuscript.

In Chapter 5 I focus on team members' affective processes connected to an entrepreneurial decision making task and analyze their negative affective reaction to the team task. This is an important research topic since the development of negative affect can be particularly detrimental to entrepreneurial team performance because it limits creativity (Hirt, Levine, McDonald, Melton, & Martin, 1997), cooperative behavior (George, 1990), and performance in decision making tasks (Staw & Barsade, 1993) – aspects that are crucial for the functioning of entrepreneurial teams. I build on the literature of intragroup conflict and distinguish between relationship and task conflict – the first one relates to tensions and frictions about personal issues, the latter one relates to disagreements about the team task (Jehn, 1995). I postulate that relationship conflict will enhance and task conflict will reduce team members' negative affective reaction. Drawing on the literature on team interaction and appraisal theories of emotion variance in these relationships is explained based on characteristics of the decision context and the team, i.e. the level of information uncertainty connected to the team task and team efficacy – the collective belief of the team to be able to perform effectively (Gibson, 1999). I again use data from the hidden profile experiment and find that higher levels of

uncertainty buffer the negative impact of relationship conflict and decrease the positive impact of task conflict. Further, higher levels of team efficacy increase the negative affective reaction to relationship conflict, but team efficacy does not moderate the impact of task conflict. This study contributes to both research on decision making under uncertainty and research on team efficacy in entrepreneurship. While usually uncertainty is seen as threatening for new venture performance (Chandler, et al., 2009; McMullen & Shepherd, 2006), the results show potentially positive affective consequences in team interactions. Further, team efficacy, which was previously found to trigger new venture success (Ensley, Carr, & Sajasalo, 2004), intensified negative affective reactions to conflict.

This chapter is single-authored. I planned the study, collected the data, and analyzed it. Further, I developed the paper's storyline and wrote the chapter.

Chapter 6 also focuses on affective processes, but in a different social context – the employees in entrepreneurial ventures. I analyze how employees' perceptions of three different types of entrepreneurial passion (cf. Cardon, et al., 2009b) impact their commitment to entrepreneurial ventures. Understanding what causes employees to stay in an entrepreneurial venture is relevant for entrepreneurship research and practice because employee commitment is crucial for the success of new firms (J. N. Baron & Hannan, 2002). Drawing on the social identity model of leadership (SIMOL, van Knippenberg & Hogg, 2003) I propose two mechanisms how perceptions of entrepreneurial passion influence employees' commitment to entrepreneurial ventures. These mechanisms are tested with survey data from 124 employees. Results show that employees' perception of passion for inventing, founding, and developing impact their commitment in different ways. While perceptions of entrepreneurs' passion for inventing and developing enhance commitment, perceived passion for founding has the opposite effect. Employees' experiences of positive affect at work and their goal clarity mediate these effects. This study extends the literature on entrepreneurial passion and on leadership in entrepreneurial firms.

Although one of my co-authors had the initial idea for this study and another one collected the data, I was involved in designing the questionnaire. I independently analyzed the data and developed the paper's storyline by identifying the mediators in the perceived passion – commitment relationship and by integrating SIMOL as global framework. Further, I wrote the paper, but my co-authors were involved in scientific discussion and correcting it.

Finally, Chapter 7 briefly summarizes the results of this thesis and its contributions. I will present final conclusions resulting from the previous chapters and highlight avenues for future research. In particular, I will develop research suggestions in the field of entrepreneurial behavior and with respect to the social contexts of entrepreneurial individuals that result from the findings of this thesis.



## 2 Intergenerational transmission of entrepreneurial intentions<sup>3</sup>

This chapter focuses on the first step of the entrepreneurial process – the formation of entrepreneurial intentions. I draw on cross-cultural theory and the GLOBE project to develop a model toward the transmission of entrepreneurial intentions within families in different cultures. Using data on more than 50,000 individuals from 15 countries I show that, over and above the direct transmission of entrepreneurial intentions from parents to children, grandparents – either directly or ‘indirectly’ via their influence on parents – contribute to the formation of offspring’s intentions. Moreover, I find that parents’ and grandparents’ influences partly substitute for one another. The relative strength of these effects varies across cultures. These results provide a more detailed picture of the intergenerational transmission of entrepreneurial intentions. In Section 2.1 an introduction to the manuscript’s topic is provided. In Section 2.2 I review literature on the formation of entrepreneurial intentions, family influences on occupational choice, and cross-cultural research and derive the study’s hypotheses. Section 2.3 presents an overview of the data set and the methods used. In Section 2.4 the results are presented. Finally, in Section 2.5 I discuss the results and the study’s limitations and highlight future research opportunities.

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<sup>3</sup> This section is based on Laspita, Breugst, Heblich, and Patzelt (2011) and is under revision (2<sup>nd</sup> round) for the *Journal of Business Venturing*. It has also been accepted for presentation in a refereed paper session at the Babson College Entrepreneurship Research Conference (BCERC), June 8-11, 2011 in Syracuse, NY, USA

### 2.1 Introduction

Family influences during childhood and adolescence are crucial for the development of young people's occupational intentions (Jodl, Michael, Malanchuk, Eccles, & Sameroff, 2001; Middleton & Loughead, 1993; Sandberg, Ehrhardt, Mellins, Ince, & Meyer-Bahlburg, 1987). Entrepreneurship scholars acknowledge that self-employed parents can trigger entrepreneurial intentions of their offspring (Dyer, Gibb, & Handler, 1994; Hundley, 2006; Matthews & Moser, 1996; R. F. Scherer, Adams, Carley, & Wiebe, 1989; Wang & Wong, 2004). For example, scholars argue that exposure to a family business can predispose the offspring's entrepreneurial intentions by increasing their feasibility perceptions of self-employment as a career option (Krueger, et al., 2000; Sorensen, 2007). Moreover, evidence suggests that, to some extent, entrepreneurial intentions can be inherited because there is a genetic disposition for entrepreneurship (Aldrich & Kim, 2007; Nicolaou & Shane, 2010; Nicolaou, Shane, Cherkas, Hunkin, & Spector, 2008).

While the above and other studies (Schmitt-Rodermund, 2004; Scott & Twomey, 1986; Wang & Wong, 2004) suggest that self-employed parents play an important role in the development of entrepreneurial intentions of the offspring, however, little is known about different paths of the transmission of entrepreneurial intentions across more than one generation. For example, most existing studies have neglected that grandparents also substantially influence the development and behavior of children (cf. R. L. Simons, Whitbeck, Conger, & Chyi-In, 1991; Van Ijzendoorn, 1992). Furthermore, the structures of, and communication patterns within, families differs substantially across cultures (House, et al., 2004), suggesting that there is variance in the paths how entrepreneurial intentions are transmitted between generations. An exploration of this variance is important because it can advance our understanding of family influences on the development of entrepreneurial intentions in different contexts. In this paper, we use a large data set on the occupational intentions of more than 50,000 students from 15 countries and data from the GLOBE project to explore how entrepreneurial intentions are transmitted within families across

generations in different cultures. In doing so, we make the following contributions to existing literature and research.

First, we provide a more detailed picture of how family members motivate children to become entrepreneurs later in their lives (Dunn & Holtz-Eakin, 2000; Sorensen, 2007) by showing that besides a direct influence of parents' entrepreneurial status on children there is an additional effect arising from grandparents' entrepreneurial status. Our finding that parents' entrepreneurial status partly mediates grandparents' influence, and that the influences of grandparents and parents can, partly, substitute for one another, emphasizes the complexity of how entrepreneurial intentions are transmitted within families across more than one generation.

Second, we provide one of the first studies examining cross-cultural variance in the transmission of entrepreneurial intentions within families. Our finding that this transmission is culture-dependent adds to the literature on cultural influences on entrepreneurship (Hayton, George, & Zahra, 2002; Steensma, Marino, Weaver, & Dickson, 2000; Taylor & Wilson, in press). This literature explains variance in entrepreneurship across countries by differences in the cultural values that are conducive or detrimental to developing entrepreneurship intentions. While we also believe in this explanation, we provide an additional one – part of the cross-cultural variance in entrepreneurship appears to be due to differences in family structures and values and the subsequent transmission of entrepreneurial intentions from parents and/or grandparents to children.

Finally, existing studies rarely acknowledge that the impact of entrepreneurial parents on offspring's entrepreneurial intentions may change from childhood to adolescence. One exception are Aldrich and Kim (2007) who draw on a life course perspective and argue that there are strong parental influences from genetics and parenting practices during childhood, moderate influences from work values during adolescence, and weak influences from financial support during adulthood, which might trigger offspring's entrepreneurial intentions. Surprisingly, and contrarily to Aldrich and Kim's (2007), we find that the influence of parents is stronger during adolescence than

during childhood. This finding challenges research that highlights the transmission of values (e.g., risk-taking, independence) as crucial for forming offspring's entrepreneurial intentions and indicates that the transmission of sophisticated business knowledge later during adolescence may be more crucial in this process.

We structure this article as follows. First, we derive our theory and hypotheses. Second, we detail the research method and present the results. Finally, we discuss our findings, state the limitations and the implications of our study, and outline recommendations for future research.

### **2.2 Theory development**

#### *2.2.1 A model of transmission of entrepreneurial intentions within families*

Intentions are immediate antecedents of actual behavior and capture the degree to which people show the motivational factors of, and are willing to put effort into, executing that behavior (Ajzen, 1991). According to Crant (1996, p. 43) entrepreneurial intentions refer to “one's judgements about the likelihood of owning one's own business” and can also include the general plans to become self-employed. Intentions are a strong indicator of actual behavior (Armitage & Conner, 2001). In the field of entrepreneurship they were found to be a more powerful predictor than other individual variables, such as attitudes, beliefs, demographics, or personality traits and situational influences, such as employment status (Kolvereid, 1996b; Krueger & Carsrud, 1993; Krueger, et al., 2000).

In the entrepreneurship literature two intention models have been used to explain the formation and outcomes of entrepreneurial intentions. First, according to Shapero's (1984) model of the entrepreneurial event, intentions develop if an individual experiences a positive or negative displacement event that leads to a change in behavior. In this model, entrepreneurial intentions derive from individuals' perception of desirability and feasibility of exploiting an entrepreneurial opportunity which determine the propensity of entrepreneurial action (Kolvereid, 1996a; Krueger, et al., 2000). Second, according to Ajzen's (1991) theory of planned behavior, an individual's

intention is shaped by three attitudinal antecedents: attitude toward behavior, subjective norms, and perceived behavioral control.

While both models vary in their underlying concepts, they overlap to some extent. As Krueger et al. (2000) argue, Shapero's perceived desirability and perceived feasibility correspond to Ajzen's attitudes and perceived behavioral control, respectively. Thus, many studies in the entrepreneurship literature have used perceptions of feasibility and desirability to explain the formation entrepreneurial intentions (Fitzsimmons & Douglas, 2011; Kolvereid, 1996b; Krueger, et al., 2000). This concept also helps understand how entrepreneurial intentions are transmitted within families across generations. Consistent with existing entrepreneurship research, we propose four ways how entrepreneurial intentions are transmitted inter-generationally: genetic inheritance, provision of resources, education, and socialization.

First, offspring's tendency to develop entrepreneurial intentions can be influenced by genetic factors that children inherit from their entrepreneurial parents (Aldrich & Kim, 2007; Nicolaou & Shane, 2010; Nicolaou, et al., 2008). Genes can affect chemical mechanisms in the brain that drive people to develop specific psychological characteristics (e.g., willingness to take risks, locus of control) increasing their perceptions that entrepreneurship is a desirable career option. Furthermore, people may carry a genetic disposition that makes them more sensitive than others to attend to environmental stimuli representing entrepreneurial opportunities (Nicolaou & Shane, 2009). Thus, as attitudes towards entrepreneurship are to some extent heritable, "[t]he association between positive attitudes toward entrepreneurship and entrepreneurial intentions make entrepreneurial intentions likely to have a genetic component" (Nicolaou & Shane, 2010, p. 5).

Second, there are several types of financial and non-financial resources that entrepreneurial parents can provide to the offspring (Aldrich, Renzulli, & Langton, 1998; Dunn & Holtz-Eakin, 2000). For example, parents owning a successful business can pass on wealth, provide capital or loans, or offer collateral for bank loans for their offspring. Further, children may access the social capital of entrepreneurial parents

including suppliers, customers, business partners, and consultants, and they may profit from parents' entrepreneurial reputation when building their own networks. Parents' social capital could also enable their children's exposure to information about new market opportunities (Sorensen, 2007). An offspring with access to all these resources likely perceives that entrepreneurship is a feasible endeavor thus triggering the development of her or his entrepreneurial intentions.

Third, entrepreneurial parents' education can trigger offspring's entrepreneurial intentions through specific child rearing practices and knowledge provided about entrepreneurship (Dyer, et al., 1994; Kuratko & Hodgetts, 1995; Sorensen, 2007). For example, the choice of specific toys, the fairy tales that children listen, and the TV programs that they are allowed to watch may influence offspring's entrepreneurial skills and thought (Mauer, Neergaard, & Linstad, 2009). Further, entrepreneurial parents may encourage their children to participate in competitive sports where they face uncertainty, improve themselves, are challenged, and must cope with stressful situations, which can help develop an entrepreneurial mindset (Neergaard & Krueger, 2005). Finally, children can observe entrepreneurial parents in the family business (and perhaps assist them after school or during holidays). By this observation, the offspring can gain knowledge how to run a business (Aldrich, et al., 1998; Carr & Sequeira, 2007; Lentz & Laband, 1990) leading to the development of entrepreneurial self-efficacy. Thus, both education through child rearing practices and (active or passive) participation in the family business can trigger offspring's perception that entrepreneurship is a feasible and, to the extent she or he starts to like the activities mentioned, desirable career (Krueger, et al., 2000).

Fourth, socialization refers to "the transmission of skills, attitudes, values, customs, motives, roles, and rules from a diverse array of socialization agents (e.g., parents, teacher, peers, siblings, extended family members, and community leaders) to a target child" (Spera & Matto, 2007, p. 551). Exposure to entrepreneurial role models within the family can create values and attitudes in children that make entrepreneurship a more desirable career option (Aldrich, et al., 1998; Carr & Sequeira, 2007; Hundley,

2006).<sup>4</sup> Further, children can internalize work behaviors of entrepreneurial parents as values and norms for their own behaviors (Carr & Sequeira, 2007; Kohn, Slomczynski, & Schoenbach, 1986; Menaghan & Parcel, 1995). For example, entrepreneurial parents tend to use parenting styles that value control over one's own life, hard work for accomplishing one's goals, sacrificing leisure activities, and independence and self-reliance more than other parents (Aldrich, et al., 1998; Morris & Lewis, 1995; Sorensen, 2007). Finally, entrepreneurial parents tend to encourage the development of new ideas and their realization through trial and error (Kuratko & Hodgetts, 1995). Thus, "entrepreneurial" socialization by family members and role modeling (Dyer, et al., 1994; Krueger & Carsrud, 1993; Matthews & Moser, 1996; R. F. Scherer, et al., 1989; Scott & Twomey, 1986; Tkachev & Kolvereid, 1999) can have a substantial effect on developing offspring's entrepreneurial intentions.

In sum, our arguments suggest that entrepreneurial parents can influence the entrepreneurial intentions of the offspring via genetic inheritance, provision of resources, education, and socialization. While it is beyond the purpose of this study to directly observe each of these mechanisms, they provide the theoretical justification for the "baseline hypothesis" of our model (which has been theorized and tested by others before):

*Hypothesis 1: There is a positive relationship between parents' entrepreneurial status and offspring's entrepreneurial intentions.*

Current trends and changes in family patterns such as dual-worker households and higher rates of parental separation and divorce suggest that, in addition to parents,

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<sup>4</sup> Importantly, it appears that this effect is relatively independent of the performance of the role model (Van Auken, Stephens, Fry, & Silva, 2006). When parental role models are successful entrepreneurs, children are likely to form entrepreneurial intentions because of (i) a positive evaluation of their own entrepreneurial competencies ("if my parents can do it so can I"), and (ii) a positive attitude towards entrepreneurship because it yields positive outcomes (Carr & Sequeira, 2007; R. F. Scherer, et al., 1989). When parental role models are less successful entrepreneurs, children may nevertheless learn from the mistakes of their parents and develop the intention to run their business in a different and more successful way. According to Scherer et al. (1989), children of less successful entrepreneurs may "...have compared themselves with their parents and have higher perceptions of their own self-efficacy because they vicariously learned some of the pitfalls to avoid through the example of the parent entrepreneur who did not perform so well" (p.66).

grandparents play an increasingly important role in the upbringing, caregiving, development, and socialization of their grandchildren (Attar-Schwartz, Tan, & Buchanan, 2009; Bengtson, 2001; King & Elder, 1997; Whitbeck, Hoyt, & Huck, 1993). This involvement of grandparents becomes even more important when parents work long hours (Tan, Buchanan, Flouri, Attar-Schwartz, & Griggs, 2010) – an observation often made for entrepreneurs (Boyd & Gumpert, 1983). Through their involvement in family processes it appears that grandparents' own entrepreneurial status – either currently or before they retired – can influence the development of offspring's entrepreneurial intentions in several ways.

First, similar to the impact of parents, there may be a direct influence through the interaction of grandparents with their children. For example, research shows that grandparents can play an important role in children's education and socialization (Coall & Hertwig, 2010) and that they talk with their grandchildren about their occupational choices (Whiston & Keller, 2004). This effect is particularly strong when grandparents are engaged in day care and “replace” parents when those are at work (Tan, et al., 2010). For example, when taking care of the offspring during the day or evening, grandparents with a former (or perhaps still ongoing) entrepreneurial career likely choose toys, fairy tales, and TV programs for the offspring that may trigger an entrepreneurial skillset and mindset (Mauer, et al., 2009). Further, grandparents' narratives about their former business may provide the offspring with knowledge about entrepreneurship and lead to the development of entrepreneurial self-efficacy. Finally, like parents, grandparents may directly provide the offspring with financial and non-financial resources needed to start a business.

Second, grandparents can influence their grandchildren indirectly through their relationship with their own children, i.e. the offspring's parents (mediating effect) (Tinsley & Parke, 1984; Whitbeck, et al., 1993). For example, while grandparents and grandchildren share parts of the genetic pool, this transmission of genes is not direct but mediated by the parents. Further, “the transmission of genes from one generation to the next may shape the next generation predispositions and proclivities toward experiencing



the social and physical environment, and therefore its parenting style.“ (Van Ijzendoorn, 1992, p. 76). That is, when parents inherit genes from their own entrepreneurial parents that predispose them to develop entrepreneurial values and attitudes, these values and attitudes can impact their childrearing practices and socialization in a way that the offspring develops entrepreneurial intentions. Furthermore, the parent-child interaction is influenced by the way parents have been brought up themselves (P. K. Smith, Cowie, & Blades, 2003), and therefore the child rearing practices (Ruoppila, 1991; R. L. Simons, et al., 1991; P. K. Smith & Drew, 2002) and values (Bengtson, 1975; King & Elder, 1997) of parents often resemble those of their own (entrepreneurial) parents. Finally, there is also an intergenerational flow of resources (P. K. Smith & Drew, 2004; Tinsley & Parke, 1984), such that wealth or social capital acquired by successful entrepreneurial grandparents may be transferred to parents who further pass it on to the offspring thus enabling her or him to start a business.

Third, entrepreneurial grandparents may influence the effect of entrepreneurial parents on the development of offspring's entrepreneurial intentions by reinforcing the parents' education and socialization practices (moderating effect). This strengthening effect can occur through interacting either with parents or with the offspring. For example, grandparents and parents can mutually reinforce each other during discussions about appropriate rules, toys, child rearing practices, TV programs, and social activities and environments (e.g., school, kindergarden) for the offspring (cf. Whitbeck, et al., 1993). This reinforcement is the stronger the more grandparents and parents overlap in their opinions, values, and attitudes. If both possess an entrepreneurial mindset, grandparents are likely to further encourage parents to select educational and socialization practices that promote entrepreneurial skills and thought in children. Further, grandparents can facilitate the effect of entrepreneurial parents on offspring's entrepreneurial intentions by interaction with the offspring. For example, entrepreneurial grandparents may provide the offspring with the same or similar information and knowledge about entrepreneurship and its benefits as compared to other occupational careers. If children receive similar information from more than one source

they are more likely to attend to it (cf. Weenig & Midden, 1991) and to perceive it as reliable (cf. Hanser & Muchinsky, 1978; Harel & Baruch, 1993). In addition, the persuasiveness of information children receive from family members increases when this information is communicated more often because repetition is assumed to “result in a greater realization of the meaning, interconnections, and implications of the message arguments – that is, greater message elaboration” (Cacioppo & Petty, 1989, p. 4). Thus, grandparents’ additional communication with children can help to make educational and socialization practices of parents triggering an entrepreneurial mindset more effective.

In sum, the effect of grandparents’ entrepreneurial status on children’s development of entrepreneurial intentions can be direct, indirect via their effect on parents, or moderate parents’ influence. Thus, we propose:

*Hypothesis 2: There is a positive relationship between grandparents’ entrepreneurial status and offspring’s entrepreneurial intentions.*

*Hypothesis 3: Parents’ entrepreneurial status (partly) mediates the effect of grandparents’ entrepreneurial status on offspring’s entrepreneurial intentions.*

*Hypothesis 4: There is a positive interaction between parents’ entrepreneurial status and grandparents’ entrepreneurial status in explaining offspring’s entrepreneurial intentions.*

### 2.2.2 Culture and intergenerational transmission of entrepreneurial intentions

While the above arguments suggest that the intergenerational transmission of entrepreneurial intentions across family generations is complex, the strength of the proposed relationships likely varies across culture. Specifically, *culture* is a major determinant of interaction patterns and processes within families (Giuliano, 2007), and it is also an important factor explaining why some societies are more entrepreneurial than others (Hayton, et al., 2002; Mueller & Thomas, 2001). Grandparents’ and parents’ influence on children will likely depend on cultural values prevalent in the society (House, Javidan, & Dorfman, 2001). Thus, culture is likely to explain regional variance in the intergenerational transmission of entrepreneurial intentions.

Over the last decades, several classifications of culture have been introduced in academic research. For example, one of the most often used classifications is Hofstede's (2001) five cultural dimensions (Mitchell, Smith, Seawright, & Morse, 2000). While this classification has also been applied successfully in entrepreneurship research to explain variation in entrepreneurial activity across regions (Hayton, et al., 2002; Mitchell, et al., 2000; Mueller & Thomas, 2001), it has recently been criticized for the narrowness of the initial population surveyed, the research methodology applied, and number of assumptions on which the original analysis is based (Dickson, Den Hartog, & Mitchelson, 2003; Javidan, House, Dorfman, Hanges, & de Luque, 2006; McSweeney, 2002; Sivakumar & Nakata, 2001). In this study, we therefore draw on the GLOBE (Global Leadership and Organizational Behavior Effectiveness) project (House, et al., 2004), which was established recently to provide a more sophisticated classification of cultures at the regional level.

GLOBE is a multi-phase, multi-method research program that focuses on culture and leadership. GLOBE defines culture as "shared motives, values, beliefs, identities, and interpretations or meanings of significant events that result from common experiences of members of collectives and are transmitted across age generations" (House, Javidan, Hanges, & Dorfman, 2002, p. 5). The GLOBE data collected in the mid-1990s from 17,000 middle managers from 931 organizations in 62 countries yielded nine distinct cultural dimensions: in-group collectivism, institutional collectivism, humane orientation, assertiveness, performance orientation, power distance, uncertainty avoidance, gender egalitarianism, and future orientation (House, et al., 2002; House, Quigley, & De Luque, 2010; Javidan, et al., 2006). The GLOBE dimensions have been applied in subsequent cross-cultural research in various fields such as psychology (e.g., Zhao & Seibert, 2006), ethics (e.g., Alas, 2006), and human resource management (e.g., Papalexandris & Panayotopoulou, 2004).

In this article, we focus on in-group collectivism because it describes the interaction patterns between individuals within groups (such as families) in different societies and is thus likely to explain, partly, how the intergenerational transmission of

entrepreneurial intentions varies across cultures. Specifically, within-group collectivism refers to “the degree to which individuals express pride, loyalty and cohesiveness in their organizations or families” (House, et al., 2002, p. 5). For example, countries high in within-group collectivism include India, China and Egypt, while countries low in within-group collectivism include the US, UK, Canada, and Finland (House, et al., 2010). We propose that the effects of grandparents’ and parents’ entrepreneurial status on the offspring’s development of entrepreneurial intentions are stronger in societies high in within-group collectivism than in societies low in within-group collectivism because of the connected higher levels of pride, loyalty, and cohesion.

First, pride arises from accomplishments that can be attributed to one’s skills or efforts (L. A. Williams & DeSteno, 2008). Thus, pride in one’s family develops when skills and efforts of family members lead to extraordinary achievements. These feeling of pride in one’s family can trigger the willingness to comply with the family’s norms and rules (Lea & Webley, 1997; Louro, Pieters, & Zeelenberg, 2005; H. J. Smith & Tyler, 1997; Tracy & Robins, 2004). For example, individuals who are proud of their families’ entrepreneurial achievements are more likely to accept and internalize the family norms and rules related to entrepreneurship (e.g., hard work, taking responsibility) for themselves. That is, in cultures high in in-group collectivism where individuals experience pride in their family, the entrepreneurial status of parents and grandparents is likely more influential on developing offspring’s entrepreneurial intentions than in cultures low in in-group collectivism.

Second, loyalty in families refers to experiencing “a sense of duty, fairness, and justice to one’s family based on familial expectations” (Leibig & Green, 1999, p. 90). Loyalty results from the ethical demand of obligation that families place on each generation of children (Boszormenyi-Nagy, Grunebaum, & Ulrich, 1991) through sanctions, devotion, and commitments that create feelings of guilt (Lumpkin, Martin, & Vaughn, 2008). In families with high levels of loyalty children are expected to have common tasks, values, and interests with their parents (Lumpkin, et al., 2008), including those tasks, values, and interest related to an entrepreneurial career (Kets De Vries,

1993). Thus, in cultures emphasizing loyalty in one's family (high in-group collectivism), entrepreneurial grandparents and parents will play a more important role in motivating the offspring to become entrepreneurs than in cultures where family loyalty is less prevalent.

Third, cohesiveness (cohesion) refers to the degree of connectedness and emotional bonding that family members experience within the family (Lansberg & Astrachan, 1994; Olson & Gorall, 2003). For example, families high in cohesiveness emphasize emotional closeness and intimacy, whereas members of less cohesive families are less attached and less committed to other each other (Lansberg & Astrachan, 1994; Olson & Gorall, 2003). Further, cohesiveness triggers feeling of responsibility for preserving and enhancing family assets (Lansberg & Astrachan, 1994) leading parents to spend considerable time on discussing their expectations about the future with children (Olson & Gorall, 2003) including occupational choices (Whiston & Keller, 2004). For example, children in cohesive families are often more eager to comply with their parents' wishes, to adapt to their values, and to participate in parental dreams about the continuation of the business in the family (Lansberg & Astrachan, 1994). Thus, cultures where families are more cohesive (high in-group collectivism) the (conjoint) influence of parents and grandparents on the offspring' development of entrepreneurial intentions is likely stronger than in cultures low in in-group collectivism. Therefore, we propose:

*Hypothesis 5: The positive relationship between parents' entrepreneurial status and offspring's entrepreneurial intentions is stronger in cultures where within-group collectivism is high than in cultures where it is low.*

*Hypothesis 6: The positive relationship between grandparents' entrepreneurial status and offspring's entrepreneurial intentions is stronger in cultures where within-group collectivism is high than in cultures where it is low.*

*Hypothesis 7: The interaction between parents' entrepreneurial status and grandparents' entrepreneurial status in explaining offspring's entrepreneurial intentions is stronger in cultures where within-group collectivism is high than in cultures where it is low.*

### 2.3 Methodology

#### 2.3.1 Data collection and sample

We use data from “Global University Entrepreneurial Spirit Students Survey” (GUESSS). The GUESSS project was initiated in 2003 by a German and a Swiss university and bi-annually surveys students at universities around the world. GUESSS follows three major goals: a) to systematically record the entrepreneurial intentions and activities of students on a long-term basis across time and geographic regions, b) to provide the participating universities and countries with an assessment of the entrepreneurial spirit of their students and to identify individual and social factors that could help enhancing this spirit, and c) to observe the performance of the start-ups created by students (e.g. turnover, number of employees, innovation degree).

To start the data acquisition process, the project’s core team (consisting of the two initiating universities in Germany and Switzerland) appoints a local country representative who contacts the universities and universities of applied sciences in each country and asks them to participate in the survey. If they agree to participate, the universities directly send a link to an online questionnaire to their students (of all fields of studies and levels). Another email is sent after a few weeks to remind the students to participate in the study. We use data from the 2008 GUESSS survey because the items surveyed are best suited for the purpose of our analysis. In that year, all together 63,527 students in 19 countries participated. This represents a 4.9 % response rate in terms of all students enrolled at the participating universities. Note that this response rate is likely an underestimation of the response rate in terms of students invited to participate because not all universities might have invited all of their students. Unfortunately, the nature of the sampling procedure does not allow us to calculate a more accurate response rate. Further, response rates might vary across universities since, in order to increase participation rates, some (but not all) universities offered students the participation in a lottery as an incentive. We acknowledge the limitations of this sampling procedure, but we believe that the unusually large, international sample enrolled in GUESSS justifies the use of the data for our purposes.

We had to exclude students due to missing data and students from countries for which no cultural scores are available from the GLOBE project. This results in a final sample of 51,324 students from 266 universities in 15 countries (Switzerland, Germany, Austria, France, Ireland, Finland, Hungary, New Zealand, Australia, Republic of South Africa, Singapore, Mexico, Greece, Portugal, and Indonesia). The average student in our sample is 23.80 (SD = 5.43) years old, and 52.6 % are female. Only 24.7 % have attended an entrepreneurship class yet. About 4.6 % of the students report being involved in founding a business currently. Moreover, 47.2 % of the students report that (at least one of) their parents have been entrepreneurs at some point, and 33.1 % report that (at least one of) their grandparents have been entrepreneurs at some point.

### 2.3.2 Variables

*Dependent Variable:* To measure students' entrepreneurial intentions, we used two questions from the GUESS survey instrument and combined them into one measure for *entrepreneurial intentions*. Both questions reflect that intentions are directed to the future, consistent with existing definition of entrepreneurial intentions (Crant, 1996; Krueger, et al., 2000). First, students were asked in which occupation they would you like to work within the next five years and, second, in which occupation they would like to work in more than five years. Students could choose from a variety of possible types of occupations. From these choices, we coded *entrepreneurial intention* as 0 if students indicated that they would like to (i) work in dependent employment, (ii) invest in/buy a stake of an existing company, (iii) continue their already founded business, or (iv) if they did not want to be employed (e.g. because of their family) for both time spans. We consider these types of employment as not related to engaging in new, entrepreneurial activities. If students indicated that they wanted to (i) continue the family/parental business, (ii) take over an existing business, (iii) start up a franchise business, (iv) start up a new business, or (v) work as a self-employed person (e.g. freelance) for only one of the indicated time spans (within the next five years or in more than five years) we coded the variable as 1. If the students indicated that that they wanted to engage in these activities in both time spans we coded the variable as 2. We acknowledge that our

measure is an approximation and does, for example, not distinguish between the underlying constructs of feasibility and desirability perceptions (Krueger, et al., 2000). However, in our opinion it is the best proxy for students' entrepreneurial intentions that can be created from the items in the GUESS survey. Furthermore, it is consistent with existing studies on entrepreneurial intentions (Crant, 1996; Krueger, et al., 2000).

To further validate our findings, we also perform a robustness check using two alternative measures from the GUESS survey reflecting the students' thoughts about engaging in entrepreneurial activities and their actual entrepreneurial activities. Specifically, students were asked if they had ever seriously thought about setting up their own business. The participants were asked to choose one of the following answers: "No, never", "Yes, briefly", "Yes, quite specifically", "Yes, but I dropped the idea", "Yes, I am determined to become self-employed in the future", "Yes, I am just starting to do so", "Yes, I am already self-employed", and "Yes, I was self-employed, but no longer am". Based on these answers we created the variable *thoughts about entrepreneurship* where all answers were coded as 1, besides "No, never" which was coded as 0. Further, we created the variable *entrepreneurial activities* where the answers "Yes, I am just starting to do so" and "Yes, I am already self-employed" were coded as 1 and the other answers as 0. The correlation between thoughts about entrepreneurship and our dependent variable is  $r = .32$ ,  $p < .001$ , and between entrepreneurial activities and our dependent variable is  $r = .12$ ,  $p < .001$ . Since these measures do not reflect the future aspect of intentions, they appear inferior to the measure described above and will only be treated as robustness measures.

*Independent Variables:* We measure the independent variables of our study the following way: First, we use the variable *parents entrepreneurs* which refers to the entrepreneurial activities of the students' parents. In the 2008 GUESS, students were asked whether their parents have been entrepreneurs during the students' entire lifetime, or only before their 15<sup>th</sup> birthday, or only after their 15<sup>th</sup> birthday. Based on this information we created a 5-point variable where 0 denotes that the parents have never been entrepreneurs. 1 denotes that one parent has never been an entrepreneur and one



parent has been an entrepreneur for a limited time span (either before or after students' 15<sup>th</sup> birthday). 2 denotes that one parent has never been an entrepreneur and one parent has been an entrepreneur for the students' entire lifetime or both parents have been entrepreneurs for a limited time span. 3 means that one parent has been an entrepreneur for a limited time span and the other one has been an entrepreneur for the students' entire lifetime. Finally, 4 means that both parents have been entrepreneurs for the students' entire lifetime.

Second, we created the variable *grandparents entrepreneurs* which refers to the entrepreneurial activities of the students' grandparents. Again, the students were asked whether either of their grandparents has been an entrepreneur during the students' entire lifetime, or only before their 15<sup>th</sup> birthday, or only after their 15<sup>th</sup> birthday. We coded this variable as 0 if no grandparent has ever been an entrepreneur, as 1 if either of their grandparents has been an entrepreneur for a limited time span, and as 2 if either of their grandparents has been an entrepreneur for the students' entire lifetime.

Third, to assess cross-cultural differences, we draw on data from the GLOBE project. To ensure maximum validity, we use two alternative operationalizations of *in-group collectivism*. First, we use the societal cultural practice scores as a continuous score based on the values provided by the GLOBE data (House, et al., 2004)<sup>5</sup>. Second, it has been suggested (House, et al., 2004) that countries can be divided into bands based on their scores and that scores within one band do not differ from each other in a meaningful way. There are three bands for in-group collectivism (high, medium, and low) which were used as another, ordinaly scaled, operationalization of it.

*Control Variables:* We use the following control variables in our study: First, *age* measures the age of the participant in years. Several studies show that individuals' entrepreneurial intentions change with age (e.g., Matthews & Moser, 1996). Second,

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<sup>5</sup> For Switzerland, we used the scores for the German speaking part because German speaking Swiss were in the majority in our sample. For Germany we used the scores based on West Germany because young Germans are more likely to have adopted the values of the capitalistic system. For the Republic of South Africa, we used the scores for Whites in this paper, but we also ran all analyses with the scores for the Black population and did not find any differences.

*gender* is a dummy variable, which denotes whether the student is male (0) or female (1). The development of entrepreneurial intentions was found to be gender-dependent in many studies (Kolvereid, 1996b; Kourilsky & Walstad, 1998; Wang & Wong, 2004). Third, *entrepreneurship class* is a dummy denoting whether the student has participated in any entrepreneurship class yet. Entrepreneurship classes may enhance the entrepreneurial knowledge and motivation of students. Fourth, *subject* is a set of three dummy variables denoting the student's field of study. The GUESS survey includes business related fields of study (e.g. management, public administration), natural sciences (e.g. mathematics, chemistry, and physics), social sciences (e.g. humanities, health and social services) and others (e.g. arts, security services, military, and architecture). As the entrepreneurial intentions of individuals differ across educational specializations (e.g., Kristiansen & Indarti, 2004) we also control for the participants' field of study. We use 'others' as the base category for dummy coding. Finally, as a control variable at the country level we use *institutional collectivism* from the GLOBE study. Institutional collectivism refers to "the degree to which organizational and societal institutional practices encourage and reward collective distribution of resources and collective action" (House, et al., 2002, p. 5) and may, to the extent it overlaps with the in-group collectivism measure, influence our results.

### 2.3.3 Methodological limitations

While GUESSSS provides us with a unique opportunity to analyze a large data set covering more than 50,000 young individuals from various countries, we would like to acknowledge some limitations of this data set. First, as mentioned above, we do not have information at the university level of how many students were exactly invited for participation, which diminishes our abilities to calculate exact response rates at the university or country level. Second, as with all secondary data sets, there are some limitations to the measures which cannot be addressed and which we outlined above (e.g., measurement of entrepreneurial intentions). Third, the sampling procedure is not adequate to gain a sample representative for the countries surveyed. It does not allow us to cover countries, universities, and students that did not agree to participate. Since we

do not have information on the participating students' "readiness" to answer, we cannot address the issue of non-response biases. Due to this sample selection bias we cannot claim that the estimated coefficients below are representative for the countries. Despite these issues, however, we believe that the GUESSS project offers some interesting insights that have not been addressed before, and that the unusually large number of participants is a good argument for some robustness and representativeness of our results.

### 2.3.4 *Statistical procedure*

The structure of our data is hierarchical because our participants attend different universities which are in different countries. Thus, the observations are not independent from each other because of potential similarities of students in particular countries or universities. To account for this nested structure and to be able to focus on cross-level interactions (i.e., explaining variance in the effect of parents/grandparents on students' intentions across cultures), we use a hierarchical linear modeling approach (HLM; Raudenbush & Bryk, 2002). HLM is a regression based method which enables us to separate the variance components of each level: the student (level 1), the university (level 2), and the country (level 3). The total variance in our participants' entrepreneurial intentions is distributed over the levels in the following way: 93.81 % of the variance is between individuals, 1.60 % is between universities, and 4.59 % is between countries. Because the variance in entrepreneurial intentions between universities is rather low and our hypotheses focus on cross-level effects between the individual and the country level, for reasons of simplification we report results from two-level models where the students represent level 1 and the country represents level 2. However, we also ran all our analyses as three level models and found basically identical results (see robustness checks in Table 3 and 4).

The dependent variable in our study is ordinally scaled and has three levels to represent the level of the students' entrepreneurial intentions. In the following we mainly report results based on analyses approximating the dependent variable as continuous. This enables us to compute the variance components of entrepreneurial

intentions explained by the specified models and to draw graphs with more meaningful y-axis (since there is no ‘defined distance’ between the categories of ordinal scaled variables). However, as robustness checks we also run the models with ordinal outcomes and we additionally report them in the following.

### **2.4 Analysis and results**

#### *2.4.1 Descriptive statistics, correlations, and validity checks*

Table 2 presents the descriptive statistics and correlations of our variables. Since bivariate correlations between variables are small, it appears that multicollinearity is not a major problem in our data set.

To check the validity of our data, we make use of our access to the 2006 GUESSSS data set. While for the current study the 2008 data set has the advantages of (i) being considerably larger and (ii) entailing questions that fit our purpose better than the 2006 data set, the fact that some participants took part in both the 2006 and 2008 survey allows for some check of reliability. To identify these participants, we matched the (voluntarily provided) email addresses at the end of each survey between participants. This yielded 902 students who participated in both surveys. Since the dependent variable of our model (students’ entrepreneurial intentions) likely changes over the timeframe of their studies, we focused on parents’ entrepreneurial status to assess reliability (grandparents’ entrepreneurial status was not measured in 2006). Unfortunately, the 2006 question differed from the 2008 questions reported above. Specifically, in 2006 students were asked “Have you grown up in an entrepreneurial family (i.e., your father and/or mother are or have been self-employed)?” and they could choose one of the following four answers: (i) yes, the business is still run by my parents, (ii) yes, the business was run until a maximum of five years before now, (iii) yes, but the business was run more than five years ago, and (iv) no, my parents have never been entrepreneurs. To compare this question to our 2008 variable we constructed a variable for parents’ entrepreneurial status in 2006 with 3 levels: 0 means that the parents have

**Table 2: Means, standard deviations, and correlations between focal variables**

	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13
(1) Entrepreneurial intentions	0.45	0.62													
(2) Parents entrepreneurs	1.00	1.27	0.144												
(3) Grandparents entrepreneurs	0.49	0.75	0.068	0.352											
(4) Age	23.80	5.43	0.006	-0.071	-0.018										
(5) Gender <sup>a</sup>	0.53	0.50	-0.043	0.006	-0.028	-0.021									
(6) Entrepreneurship class	0.25	0.43	0.123	0.097	0.068	-0.049	-0.039								
(7) Subject (dummy natural sciences)	0.26	0.44	-0.077	-0.048	-0.019	-0.057	-0.276	-0.061							
(8) Subject (dummy social sciences)	0.28	0.45	0.003	-0.013	-0.038	0.069	0.208	-0.125	-0.368						
(9) Subject (dummy business)	0.24	0.43	0.043	0.053	0.043	-0.044	-0.021	0.230	-0.339	-0.352					
(10) Subject (dummy others)	0.16	0.37	0.064	0.032	0.036	-0.013	0.024	0.000	-0.260	-0.270	-0.249				
(11) Thoughts about entrepreneurship	0.74	0.44	0.322	0.118	0.063	0.050	-0.132	0.169	-0.049	-0.043	0.096	0.048			
(12) Entrepreneurial activities	0.05	0.21	0.119	0.053	0.025	0.132	-0.074	0.063	-0.012	-0.014	0.025	0.005	0.130		
(13) In-group collectivism <sup>b</sup>	4.49	0.65	0.150	0.035	-0.070	-0.108	0.056	0.190	-0.007	0.012	-0.012	0.006	0.151	0.053	
(14) Institutional collectivism <sup>b</sup>	4.05	0.47	0.037	0.119	0.179	0.004	-0.037	0.061	-0.005	-0.081	0.102	0.048	0.060	0.034	-0.214

Notes:

 $n = 51,324$ <sup>a</sup>0 = "male," 1 = "female."<sup>b</sup>These variables (country level) were assigned down to the individual participants.

Correlations larger than |0.009| are significant on a 5 % level, correlations larger than |0.012| are significant on a 1 % level, and correlations larger than |0.015| are significant on a 0.1 % level

never been entrepreneurs, 1 means that the parents have been entrepreneurs at some time, but are not now, and 2 means that the parents still run their own business. The Pearson correlation of the 2006 and 2008 measure was 0.72,  $p < .001$ , which is relatively high given the different original questions asked referring to different points in time of the parents' entrepreneurial activities. Thus, with the limitation of the data at hand, we believe that there is some indication that the respondents of the GUESS survey answered with sufficient reliability.

### 2.4.2 HLM estimations of within-family effects

We estimate the effect of parents' and grandparents' entrepreneurial status on students' entrepreneurial intentions using two-level HLM as described earlier and control variables at the individual level of analysis (level 1). Table 3 lists the individual-level results (models I to V) and additional robustness checks (models VI to VIII) which are explained below. Model I is the base model where we enter only the control variables age, gender, entrepreneurship class, and the dummy variables for the participants' subject. In model II, we add parents' entrepreneurial status. Model III contains the control variables and grandparents' entrepreneurial activities. Model IV entails controls, parents' entrepreneurial activities, and grandparents' entrepreneurial activities. Finally, in model V we add the interaction term between parents' and grandparents' entrepreneurial activities. We calculate the explained variance (Pseudo  $R^2$ ) of each model using the procedure described for HLM analysis by Snijders and Bosker (1999). This statistic is based on the reduction of level 1 and level 2 error variances because of the inclusion of the independent variables.

**Table 3: Results for within-family effects and robustness checks**

	Model I	Model II	Model III	Model IV	Model V	Model VI (ordinal)	Model VII (3-level)	Model VIII – Thoughts about ent.	Model IX – Ent. activities
Constant	0.515*** (0.037)	0.500*** (0.032)	0.508*** (0.036)	0.498*** (0.033)	0.498*** (0.033)	-2.592*** (0.185)	0.499*** (0.031)	1.228*** (0.145)	-3.116*** (0.157)
Age	0.002 (0.002)	0.003† (0.002)	0.002 (0.002)	0.003 (0.002)	0.002† (0.002)	0.007 (0.006)	0.003† (0.002)	0.035*** (0.003)	0.078*** (0.013)
Gender	-0.093*** (0.009)	-0.093*** (0.009)	-0.092*** (0.009)	-0.093*** (0.009)	-0.093*** (0.009)	-0.327*** (0.053)	-0.089*** (0.008)	-0.755*** (0.042)	-0.806*** (0.091)
Entrepreneurship class	0.102*** (0.010)	0.093*** (0.009)	0.098*** (0.009)	0.092*** (0.009)	0.092*** (0.009)	0.325*** (0.043)	0.085*** (0.009)	0.689*** (0.047)	0.395*** (0.089)
Subject (dummy natural sciences)	-0.133*** (0.013)	-0.127*** (0.012)	-0.130*** (0.012)	-0.126*** (0.012)	-0.126*** (0.012)	-0.457*** (0.056)	-0.131*** (0.013)	-0.318** (0.092)	-0.162** (0.058)
Subject (dummy social sciences)	-0.038** (0.013)	-0.036** (0.012)	-0.036** (0.013)	-0.036** (0.012)	-0.036** (0.012)	-0.123** (0.041)	-0.018 (0.011)	-0.137† (0.073)	-0.109 (0.077)
Subject (dummy business)	-0.019 (0.016)	-0.020 (0.015)	-0.018 (0.016)	-0.019 (0.015)	-0.019 (0.015)	-0.054 (0.053)	-0.015 (0.013)	0.283*** (0.071)	0.128** (0.039)
Parents entrepreneurs		0.056*** (0.004)		0.052*** (0.005)	0.053*** (0.005)	0.180*** (0.011)	0.053*** (0.005)	0.167** (0.015)	0.168*** (0.029)
Grandparents entrepreneurs			0.052*** (0.005)	0.022*** (0.004)	0.025*** (0.004)	0.094*** (0.012)	0.024*** (0.004)	0.109*** (0.025)	0.062* (0.027)
Parents × grandparents					-0.006 (0.005)	-0.028* (0.013)	-0.007 (0.005)	-0.052*** (0.010)	-0.036† (0.019)
Pseudo R <sup>2</sup>	2.61 %	4.95 %	3.37 %	5.08 %	5.08 %	n.a.	4.53 %	n.a.	n.a.

Notes:

$n = 51,324$  (51,279 for Model VII) nested in 266 universities nested in 15 countries. Unstandardized estimates (based on grand-mean centering) are reported, robust standard errors are in parentheses. Pseudo  $R^2$  indicates the amount of total variance in the dependent variable explained by the predictors.

\*\*\*  $p < .001$ ; \*\*  $p < .01$ ; \*  $p < .05$ ; †  $p < .10$

In terms of our hypothesis, first, we find that there is a positive, significant relationship between parents' entrepreneurial status and students' entrepreneurial intentions (model II,  $b = 0.056$ ,  $p < 0.001$ ). This effect is stable across other model specifications (models IV and V). As compared to the base model, the explained variance increases from 2.61 % to 4.95 %. This increase suggests that parents have a small to medium-sized effect (J. Cohen, 1988) on the development of offspring's entrepreneurial intentions, providing support for Hypothesis 1. We acknowledge that this effect is not large, but this is consistent with previous research that found similar effects for entrepreneurial family members on individuals' entrepreneurial intentions (Carr & Sequeira, 2007; Chlosta, Patzelt, Klein, & Dormann, 2010; Wang & Wong, 2004).

Second, we find a positive, significant relationship between grandparents' entrepreneurial status and students' entrepreneurial intentions (model III,  $b = 0.052$ ,  $p < 0.001$ ). Again, the effect is stable across model specifications (models IV and V). However, as compared to the base model, this model explains only 3.37 % ( $\Delta$ Pseudo  $R^2 = 0.76$  %) of the total variance. Thus, grandparents' effect is small, suggesting only weak support for Hypothesis 2.

Third, in model V we add an interaction term between parents' and grandparents' entrepreneurial status. This interaction is not significant ( $b = -0.006$ , ns), and no additional variance is explained over and above the main-effects only model (model IV). This shows that there is no support for Hypothesis 4.

Regarding the mediating relationship of parents on grandparents' impact, we compare models III and IV. A mediating effect is indicated when, first, the effect of grandparents' entrepreneurial status on offspring's intentions clearly and significantly diminishes when parents' entrepreneurial status is added as an independent variable to the model (cf. R. M. Baron & Kenny, 1986). A comparison of the coefficient for grandparents' entrepreneurial status between model III ( $b = 0.052$ ,  $p < .001$ ) and model IV ( $b = 0.022$ ,  $p < .001$ ) shows that the coefficient drops by more than 50 %. The difference between both coefficients is significant ( $z = 4.69$ ,  $p < .001$ ). Second, for a



mediation effect the mediator has to be significantly related to the dependent variable which is given in our case ( $b$  for parents entrepreneurs = 0.052,  $p < .001$ ). Third, the independent variable has to be significantly related to the mediating variable (cf. R. M. Baron & Kenny, 1986). Thus, we additionally specified a model where the grandparents' entrepreneurial status predicted the parents' entrepreneurial status. The coefficient was positive and significant ( $b = 0.567$ ,  $p < .001$ ) and grandparents' entrepreneurial status explained 13.85 % of the variance of the parents' entrepreneurial status. Thus, although the effect of grandparents' entrepreneurial status on offspring's entrepreneurial intentions is already small, it is even significantly smaller when accounting for a potential mediating effect of parents' entrepreneurial status. This indicates support for Hypothesis 3.<sup>6</sup>

We test the robustness of our results of within-family effects in various ways. First, as described earlier, strictly speaking the dependent variable of our model is not continuous. While the continuous model has advantages regarding calculation of explained variance and our further analysis below, to be conservative we also run a model with all variables and interactions where we classify the dependent variable as ordinal instead of continuous (model VI). When the coefficients for the independent and interaction variables are compared to those of the continuous model (model V), they do not differ in terms of sign. However, the interaction term between parents and grandparents is negative and significant in the ordinal model. This is contrary to Hypothesis 4 which also has to be rejected on the basis of the ordinal model.

Second, we use a three-level HLM estimation procedure (model VII) where universities represent an additional level between the individual level and the country level (students are nested in universities which are nested in countries). The results of this model are almost identical to those of the two level model (model V) reported above.

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<sup>6</sup> Additionally, we tested the mediating effect of parents' entrepreneurial status on the grandparents' impact in different bands for in-group collectivism and institutional collectivism. For all subsamples we found that the inclusion of parents' entrepreneurial activities reduced the coefficient of grandparents' entrepreneurial activities by more than 50 %. This finding suggests that the mediating effect is universal across cultures.

Third, we use an alternative specification of entrepreneurial intentions from our data set – thoughts about entrepreneurship – which we described earlier (model VIII). We ran a model with a binary outcome and the results of this alternative model are again consistent with our original operationalization of entrepreneurial intentions in terms of sign and significance of coefficients for independent variables (compare model V and model VIII). Similarly to the ordinal model (model VI), however, we do find a significant and negative interaction between grandparents' and parents' entrepreneurial status.

Finally, we used the participants' actual entrepreneurial activities as binary dependent variable (model IX). Again, we found very similar results to the original model with the participants' entrepreneurial intentions as dependent variable (compare model V and model VIII). Taken together, these findings support the notion that our results are quite robust across alternative operationalizations of our dependent variable.

### *2.4.3 HLM estimations of cross-cultural effects*

To investigate the effects of culture on the intergenerational transmission of entrepreneurial intentions, we add in-group collectivism as a level two variable to our level 1-only model. Further, as a control, we add institutional collectivism at level 2. We use two different operationalizations of these variables. First, we use the actual scores provided by House et al. (2004) for each country (model X, XI, and XIII). Second, we draw on the bands (model XI) that group countries with similar scores in cultural dimensions (House, et al., 2004). There are three possible bands for in-group collectivism and four possible bands for institutional collectivism. Further, we provide two robustness checks: We run the same model with our dependent variable as an ordinal variable (model XII) and we run a three-level model where students represent level 1, universities level 2, and countries level 3 (model XIII). The results for these different models are consistent in sign and significance and are displayed in Table 4.

**Table 4: Results for cross-cultural effects**

	Model X Culture – scores	Model XI Culture – bands	Model XII (ordinal)	Model XIII (3-level)
Constant	0.496 <sup>***</sup> (0.024)	0.494 <sup>***</sup> (0.024)	-2.589 <sup>***</sup> (0.079)	0.498 <sup>***</sup> (0.020)
Age	0.002 <sup>**</sup> (0.001)	0.002 <sup>*</sup> (0.001)	0.003 (0.002)	0.002 <sup>**</sup> (0.001)
Gender	-0.087 <sup>***</sup> (0.007)	-0.087 <sup>***</sup> (0.007)	-0.289 <sup>***</sup> (0.022)	-0.084 <sup>***</sup> (0.007)
Entrepreneurship class	0.089 <sup>***</sup> (0.007)	0.088 <sup>***</sup> (0.007)	0.305 <sup>***</sup> (0.024)	0.080 <sup>***</sup> (0.007)
Subject (dummy natural sciences)	-0.130 <sup>***</sup> (0.009)	-0.128 <sup>***</sup> (0.009)	-0.441 <sup>***</sup> (0.031)	-0.131 <sup>***</sup> (0.010)
Subject (dummy social sciences)	-0.053 <sup>***</sup> (0.010)	-0.049 <sup>***</sup> (0.010)	-0.171 <sup>***</sup> (0.032)	-0.038 <sup>***</sup> (0.010)
Subject (dummy business)	-0.035 <sup>***</sup> (0.009)	-0.031 <sup>**</sup> (0.009)	-0.097 <sup>**</sup> (0.031)	-0.027 <sup>**</sup> (0.010)
Parents entrepreneurs	0.054 <sup>***</sup> (0.003)	0.055 <sup>***</sup> (0.003)	0.173 <sup>***</sup> (0.009)	0.054 <sup>***</sup> (0.003)
Grandparents entrepreneurs	0.028 <sup>***</sup> (0.005)	0.028 <sup>***</sup> (0.005)	0.095 <sup>***</sup> (0.016)	0.026 <sup>***</sup> (0.005)
Parents × grandparents	-0.009 <sup>***</sup> (0.003)	-0.010 <sup>**</sup> (0.003)	-0.030 <sup>**</sup> (0.010)	-0.009 <sup>**</sup> (0.003)
<b>Effects of culture</b>				
Institutional collectivism	0.091 <sup>†</sup> (0.049)	0.036 (0.027)	0.330 <sup>†</sup> (0.157)	0.072 <sup>†</sup> (0.040)
In-group collectivism	0.123 <sup>**</sup> (0.034)	0.115 <sup>**</sup> (0.032)	0.418 <sup>**</sup> (0.111)	0.124 <sup>**</sup> (0.029)
In-group collectivism × parents	0.011 <sup>**</sup> (0.004)	0.010 <sup>**</sup> (0.004)	0.006 (0.012)	0.012 <sup>**</sup> (0.004)
In-group collectivism × grandparents	0.009 (0.006)	0.006 (0.006)	0.011 (0.021)	0.006 (0.006)
In-group collectivism × (parents × grandparents)	-0.012 <sup>**</sup> (0.004)	-0.012 <sup>**</sup> (0.004)	-0.027 <sup>**</sup> (0.013)	-0.012 <sup>**</sup> (0.004)
Pseudo R <sup>2</sup>	7.54 %	7.28 %	n.a.	6.81%

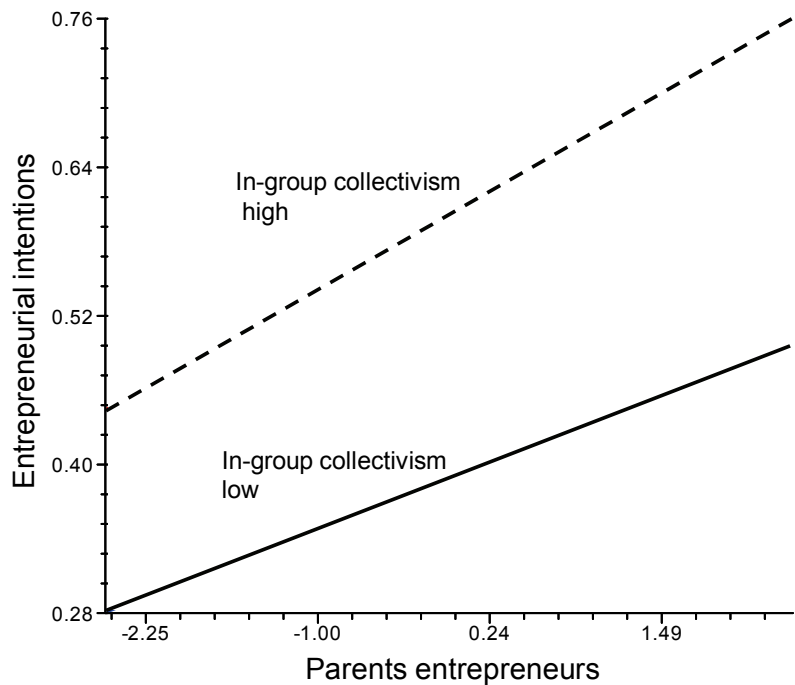
Notes:

 $n = 51,324$  (51,279 for model XIII) nested in 266 universities nested in 15 countries.

Unstandardized estimates (based on grand-mean centering) are reported, standard errors are in parentheses. Pseudo  $R^2$  indicates the amount of total variance in the dependent variable explained by the predictors. Interactions between the culture variables with all level 1 variables were also included but are not displayed in the table to keep it at a manageable size.

\*\*\*  $p < .001$ ; \*\*  $p < .01$ ; \*  $p < .05$ ; †  $p < .10$

First, our results indicate that the cross-level interaction between in-group collectivism and parents' entrepreneurial status is significant (model X,  $\gamma = 0.011$ ,  $p < .01$ ). To better understand the nature of this interaction, we plot this relationship in Figure 2. The y-axis represents students' entrepreneurial intentions and the x-axis is the parents' entrepreneurial status. We plot separate lines for high and low levels of in-group collectivism. Figure 2 shows that the line for higher levels of in-group collectivism is steeper which indicates that the influence of parents on their children's entrepreneurial intentions is higher in countries where in-group collectivism is high. This finding is consistent finding with Hypothesis 5.



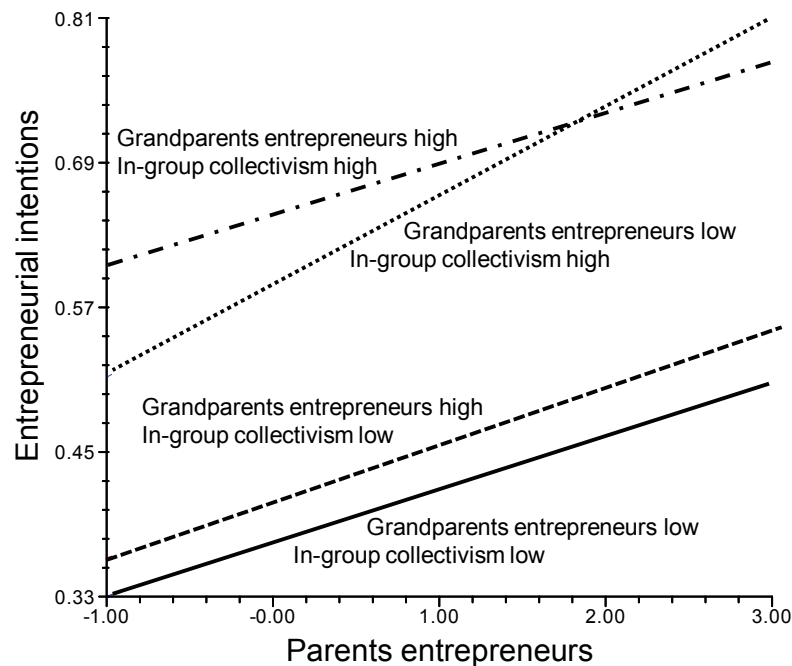
**Figure 2: Cross-level interaction between the influence of parents' entrepreneurial activities and in-group collectivism on entrepreneurial intentions**

Second, our results in Table 4 do not indicate a significant interaction between in-group collectivism and the grandparents' entrepreneurial status. Thus, there is no support for Hypothesis 6 in our data set.

Third, Hypothesis 7 focused on the effect of in-group collectivism on the relationship of the interaction between grandparents and parents and the participants'

entrepreneurial intentions. We find a negative and significant coefficient for this cross-level effect ( $\gamma = -0.012, p < .01$ ). Figure 3 shows a plot of this relationship. Again the y-axis depicts the students' entrepreneurial intentions and the x-axis is the parents' entrepreneurial status. We plot four separate lines for higher levels of the grandparents' entrepreneurial activities and high and low levels of in-group collectivism and for lower levels of the grandparents' entrepreneurial activities and high and low levels of in-group collectivism. When in-group collectivism is low, the lines for lower and higher levels of the grandparents' entrepreneurial status (dashed and solid line) are almost parallel. This indicates that, although grandparents' entrepreneurial status has a direct effect on students' entrepreneurial intentions (the dashed line is above the solid line), there is basically no (or very small) interaction between grandparents' and parents' entrepreneurial status in low in-group collectivism cultures. However, when in-group collectivism is high (dotted line and dotted-dashed line), the slope for lower levels of grandparents' entrepreneurial activities (dotted line) is steeper than for higher levels of grandparents' entrepreneurial activities (dotted-dashed line). This result shows, first, that the interaction between parents' and grandparents' entrepreneurial activities is stronger in high in-group collectivism than in low in-group collectivism cultures. This is consistent with Hypothesis 7. On the other hand, Figure 3 also illustrates what we report earlier regarding the nature of the interaction between grandparents' and parents' entrepreneurial status. Specifically, the figure shows that the link between parents' entrepreneurial status and students' entrepreneurial intentions is stronger when grandparents have not been entrepreneurs than when they have been entrepreneurs. This finding suggests a 'substitution' effect between parents' and grandparents' entrepreneurial status in the development of offspring's entrepreneurial intentions, which is in contrast to Hypothesis 4 postulating a complementary effect. Further, interestingly, while for lower levels of parents' entrepreneurial activities (left part of Figure 3) participants' entrepreneurial intentions are higher when the level of grandparents' entrepreneurial activities is high than when it is low, for higher levels of parents' entrepreneurial activities (right part of Figure 3) participants' intentions are

lower when the level of grandparents' activities are high than when they are low. We will discuss this effect of crossing lines below.



**Figure 3: Cross-level interaction between the interaction of parents' entrepreneurial activities and grandparents' entrepreneurial activities and in-group collectivism on entrepreneurial intentions**

#### 2.4.4 Post-hoc analysis

In order to further exploit the uniqueness of the GUESSS data set and potentially open up interesting avenues for future studies, we perform additional, exploratory post-hoc analyses. First, our data set provides the opportunity to explore the impact of the timing and extent of parental entrepreneurship on the development of offspring's entrepreneurial intentions. This is an interesting exploration because studies show that the influence of parents on the occupational choice of their children changes over the children's life course (Vollebergh, Iedema, & Raaijmakers, 2001), and that for adolescents the importance of peers, close friends, and other socialization sources increases (Aldrich & Kim, 2007; Felsman & Blustein, 1999). Based on the GUESS survey questions if each parent has been an entrepreneur during the students' entire lifetime, or before or after the students' 15<sup>th</sup> birthday, we created three variables. *Always*

*parents entrepreneurs* is a dummy variable where 1 denotes that one or both of the parents have been entrepreneurs during the students' entire lifetime and 0 denotes that no parent has been an entrepreneur during the students' entire lifetime. *Early parents entrepreneurs* is a dummy variable where 1 denotes that one or both of the parents have been entrepreneurs before the participants' 15<sup>th</sup> birthday and 0 denotes that no parent has been an entrepreneur before the participants' 15<sup>th</sup> birthday. *Late parents entrepreneurs* indicates if the parents have been entrepreneurs after the participants' 15<sup>th</sup> birthday. 0 denotes that no parent has been an entrepreneur after the participants' 15<sup>th</sup> birthday and 1 denotes that at least one parent has been an entrepreneur in that time. To be able to compare the importance of parents' entrepreneurial status at different points in life we run three different models in which we include besides our control variables (i) only continuous parental entrepreneurship, (ii) only early parental entrepreneurship, and (iii) only late parental entrepreneurship. These models are shown in Table 5.

All types of parental entrepreneurial status are significant. The coefficient for always parents entrepreneurs is the highest ( $b = 0.142$ ,  $p < .001$ ), late parents entrepreneurs has the second highest coefficient ( $b = 0.071$ ,  $p < .001$ ), and early parents entrepreneurs has the lowest coefficient ( $b = 0.019$ ,  $p < .05$ ). All differences are significant (always vs. late:  $z = 4.013$ ,  $p < .001$ , late vs. early:  $z = 3.606$ ,  $p < .001$ , and always vs. early:  $z = 8.058$ ,  $p < .001$ ). Further, continuous entrepreneurial activities of the parents explain more than 1.5 times of the variance in participants' entrepreneurial intentions (pseudo  $R^2 = 4.40\%$ ) than their late (pseudo  $R^2 = 2.91\%$ ) or their early (pseudo  $R^2 = 2.68\%$ ) entrepreneurial activities. This indicates that parents who are entrepreneurs during the offspring's lifetime have a pronounced effect on the development of his or her entrepreneurial intentions. When parents are only entrepreneurs during a particular time of their children's life, the parents' influence is more pronounced if they are entrepreneurs at a later period than if they are entrepreneurs at an earlier period.

**Table 5: Results of post hoc analyses for timing of parents' entrepreneurial activities**

	Always parents entrepreneurs	Early parents entrepreneurs	Late parents entrepreneurs
Constant	0.502 <sup>***</sup> (0.034)	0.514 <sup>***</sup> (0.037)	0.514 <sup>***</sup> (0.037)
Age	0.003 <sup>†</sup> (0.002)	0.002 (0.002)	0.002 (0.002)
Gender	-0.093 <sup>***</sup> (0.009)	-0.093 <sup>***</sup> (0.009)	-0.093 <sup>***</sup> (0.009)
Entrepreneurship class	0.096 <sup>**</sup> (0.009)	0.102 <sup>***</sup> (0.010)	0.101 <sup>***</sup> (0.010)
Subject (dummy natural sciences)	-0.129 <sup>***</sup> (0.012)	-0.133 <sup>***</sup> (0.013)	-0.133 <sup>***</sup> (0.012)
Subject (dummy social sciences)	-0.037 <sup>**</sup> (0.012)	-0.038 <sup>**</sup> (0.013)	-0.038 <sup>**</sup> (0.013)
Subject (dummy business)	-0.020 (0.015)	-0.019 (0.016)	-0.020 (0.016)
Always parents entrepreneurs	0.142 <sup>***</sup> (0.013)		
Early parents entrepreneurs		0.019 <sup>*</sup> (0.008)	
Late parents entrepreneurs			0.071 <sup>***</sup> (0.012)
Pseudo R <sup>2</sup>	4.40 %	2.68 %	2.91 %

Notes:

$n = 51,324$  (individuals) nested in 15 countries.

Unstandardized estimates (based on grand-mean centering) are reported, robust standard errors are in parentheses. Pseudo  $R^2$  indicates the amount of total variance in the dependent variable explained by the predictors.

<sup>\*\*\*</sup>  $p < .001$ ; <sup>\*\*</sup>  $p < .01$ ; <sup>\*</sup>  $p < .05$

Second, the GUESS data also allow us to study the impact of offspring's gender on their development of entrepreneurial intentions within families. This is an insightful exploration given the ongoing debate and findings in the literature showing that fathers and mothers may have different effects on the occupational choice of their children (Dunn & Holtz-Eakin, 2000; Mancuso, 1974) and the different roles of fathers and mothers that still persist in today's societies (Eddleston, Veiga, & Powell, 2006). To perform the analysis, we split our data set in female and male participants and compared the influence of parents' entrepreneurial activities on them distinguishing between fathers and mothers. Table 6 displays the results of the different models.



**Table 6: Results of post hoc analyses for gender effect**

	Female participants		Male participants	
	Parents model I	Father and mother model I	Parents model II	Father and mother model II
Constant	0.471 <sup>***</sup> (0.038)	0.471 <sup>***</sup> (0.038)	0.530 <sup>***</sup> (0.029)	0.529 <sup>***</sup> (0.029)
Age	0.003 (0.003)	0.003 (0.003)	0.002 <sup>*</sup> (0.001)	0.002 <sup>*</sup> (0.001)
Entrepreneurship class	0.072 <sup>***</sup> (0.008)	0.072 <sup>***</sup> (0.008)	0.116 <sup>***</sup> (0.010)	0.115 <sup>***</sup> (0.010)
Subject (dummy natural sciences)	-0.148 <sup>***</sup> (0.019)	-0.148 <sup>***</sup> (0.019)	-0.120 <sup>***</sup> (0.015)	-0.120 <sup>***</sup> (0.016)
Subject (dummy social sciences)	-0.021 (0.015)	-0.021 (0.015)	-0.073 <sup>***</sup> (0.018)	-0.073 <sup>***</sup> (0.018)
Subject (dummy business)	-0.025 (0.017)	-0.025 (0.017)	-0.016 (0.022)	-0.017 (0.022)
Parents entrepreneurs	0.054 <sup>***</sup> (0.006)		0.059 <sup>***</sup> (0.005)	
Father entrepreneur		0.055 <sup>***</sup> (0.007)		0.075 <sup>***</sup> (0.008)
Mother entrepreneur		0.053 <sup>***</sup> (0.007)		0.038 <sup>***</sup> (0.009)
Pseudo $R^2$	4.28 %	4.28 %	5.02 %	5.08 %

Notes:

$n$  for female participants = 26,985;  $n$  for male participants = 24,339; participants are nested in 15 countries.

Unstandardized estimates (based on grand-mean centering) are reported, robust standard errors are in parentheses. Pseudo  $R^2$  indicates the amount of total variance in the dependent variable explained by the predictors.

<sup>\*\*\*</sup>  $p < .001$ ; <sup>\*\*</sup>  $p < .01$ ; <sup>\*</sup>  $p < .05$

First, we focused on a potentially differing impact of both parents on male and female participants' entrepreneurial intentions (compare parents model I for female and parents model II for male participants). However, the coefficients for females ( $b = 0.054$ ,  $p < .001$ ) and for males ( $b = 0.059$ ,  $p < .001$ ) did not differ significantly ( $z = 0.693$ , ns). But when we split parents into fathers and mothers and include them separately in our models, it becomes obvious that fathers and mothers influence their sons and daughters differently. Whereas it does not make a significant difference for a daughter's entrepreneurial intention ( $z = 0.202$ , ns) if the father ( $b = 0.055$ ,  $p < .001$ ) or the mother ( $b = 0.053$ ,  $p < .001$ ) has been an entrepreneur (see father and mother model

I for female participants), it does make a difference for sons' entrepreneurial intentions ( $z = 3.073, p < .001$ ) if it has been the father ( $b = 0.075, p < .001$ ) or the mother ( $b = 0.038, p < .001$ ) who has been an entrepreneur (see father and mother model II for male participants). This indicates that sons are more influenced by their fathers' entrepreneurial status, whereas daughters are similarly affected by their mothers' and fathers' entrepreneurial status.

### **2.5 Discussion and conclusion**

The goal of this paper was to gain a better understanding of how entrepreneurial intentions are transmitted within families across generations. Drawing on data from more than 50,000 individuals we find that there is a direct transmission from parents to the offspring and a (albeit weak) transmission from grandparents to the offspring. Moreover, there is an indirect effect from grandparents to the offspring via parents. Importantly, there is significant variation in these effects across cultures. Our results have implications for entrepreneurship theory on family and cross-cultural aspects of entrepreneurship and they suggest a number of interesting avenues for future research.

#### *2.5.1 Theoretical implications*

Our finding that exposure to parental entrepreneurship has a positive effect on offspring's entrepreneurial intentions is consistent with prior research on the link between parents' and offspring's entrepreneurial activities (e.g., Carr & Sequeira, 2007; Matthews & Moser, 1996; Wang & Wong, 2004). While this impact has received considerable attention in the literature, less is known about the influence of grandparents. This is surprising given that grandparents also substantially influence the development and behavior of children (R. L. Simons, et al., 1991; Van Ijzendoorn, 1992), and that this effect has even increased over the last years due to more dual-career households, longer working hours, and higher rates of parental separation (Attar-Schwartz, et al., 2009; Bengtson, 2001; King & Elder, 1997; Tan, et al., 2010; Whitbeck, et al., 1993). Our model covers the effect of grandparents' entrepreneurial status on offspring's entrepreneurial intentions. While we find that the direct effect is

significant, however, it appears to be relatively weak and explains only 0.76 % of the explained variance. Additionally, we find that the effect of grandparents is partly mediated by the parents – an observation consistent with literature on genetic inheritance (Nicolaou & Shane, 2009; Nicolaou, et al., 2008; Van Ijzendoorn, 1992) and education/socialization within families (Bengtson, 1975; King & Elder, 1997; Ruoppila, 1991; R. L. Simons, et al., 1991; P. K. Smith, et al., 2003).

More interestingly, our data show that for cultures high in in-group collectivism (but not for cultures low in in-group collectivism) grandparents' and parents' entrepreneurial status can substitute for another in triggering offspring's entrepreneurial intentions. This observation is in contrast to some studies in developmental psychology emphasizing that both may reinforce each other in the development of children (suggesting a complementary effect; cf. Attar-Schwartz, et al., 2009; Kaptijn, Thomese, van Tilburg, & Liefbroer, 2010). It appears that for the specific context of entrepreneurship, this observation does not necessarily hold. Perhaps the nature of the attitudes, values, and knowledge conducive to entrepreneurship explains why this effect is substitutive and not complementary. For example, perhaps the offspring perceives business knowledge transferred from entrepreneurial grandparents and parents as overlapping and at the same time highly trustworthy so that she or he will incorporate this information into their value set and decision policies as long as received by either party. We hope that future research will shed more light on how different types of knowledge, attitudes, and values conducive to entrepreneurship are transmitted within families. Our results suggest that such analyses can provide important insight for both entrepreneurship and developmental psychology.

There are a number of studies that have examined how entrepreneurial intentions of individuals vary across cultures and societies (Hayton, et al., 2002). For example, differences in psychological characteristics (Mueller & Thomas, 2001) and values (Mitchell, et al., 2000) across cultures, and differences in infrastructure and public policies (Acs & Szerb, 2007) explain variance in entrepreneurial activity. In this study we provide another, perhaps less obvious explanation for (part of) this variance, namely

cross-cultural differences in the intergenerational transmission of entrepreneurial intentions from parents and/or grandparents to the offspring. We find that in cultures characterized by low in-group collectivism, those individuals who grow up in an entrepreneurial family appear to absorb less of the knowledge and values conducive to entrepreneurship from their parents and/or grandparents than those who live in societies with high in-group collectivism. This finding suggests that the literature on cross-cultural entrepreneurship can gain additional insights by exploring “indirect” effects – e.g., how culture influences the behavior of groups (like families) – which then translate into entrepreneurial behavior.

The results of our substantial post-hoc analysis provide additional insights. First, the strength of parental influences on offspring’s entrepreneurial intentions appears to depend on when and for how long parents have been entrepreneurs (consistent with Aldrich & Kim, 2007; Sorensen, 2007). We find that parents have a stronger influence if they have been entrepreneurs throughout the entire life course of the children than if they have been entrepreneurs only during childhood (before the 15<sup>th</sup> birthday) or adolescence/adulthood (before the 15<sup>th</sup> birthday). An explanation for this finding is that the longer parents are entrepreneurs, the more knowledge about entrepreneurship children can accumulate from their parents and the higher their perceptions of feasibility will be (Krueger & Carsrud, 1993). Second, the development of values and attitudes begins in early childhood and continues in adolescence and adulthood in the parental home (Feij, 1998). Even though during adolescence children are influenced substantially from socialization forces outside the family (e.g. friends, peers, teachers), parental influences on the work values and attitudes of young people continue – at least to some extent – during adolescence and adulthood (Levine & Hoffner, 2006).

We also find that the influence of parents is stronger when they are entrepreneurs during the offspring’s adolescence than during early childhood. This is in contrast to studies arguing and finding that as children get older the influence of parents on the development of occupational orientations becomes weaker (Vollebergh, et al., 2001; Whiston & Keller, 2004), for example because their relationship focus shifts

away from their parents toward peers, close friends, and other socialization sources (Aldrich & Kim, 2007; Felsman & Blustein, 1999). For the specific context of entrepreneurship, however, our data support the notion that parents are more influential later in the offspring's life. We offer two possible explanations. First, adolescence is a period when people seriously explore their vocational choices and in that period they develop their vocational identity (Middleton & Loughhead, 1993; Whiston & Keller, 2004) – an entrepreneurial identity is central to developing entrepreneurial careers (Hoang & Gimeno, 2010). Second, when children enter adolescence and develop their knowledge and intellectual skills they might realize more and more that they can make use of the parents' human, physical, financial, and social capital to set up their own company or to take over the family business. During childhood the offspring will only have a limited understanding of their parents' occupation and the capital resources it demands, whereas adolescents are likely to spend more time in their parents' business and gain knowledge and a deeper indulgent of entrepreneurship as a potential career path for themselves (Aldrich, et al., 1998).

Finally, our post-hoc analysis provides some insight on the role of fathers and mothers in motivating the offspring to become entrepreneurs. We find that sons are more influenced by their fathers' entrepreneurial status, whereas daughters are similarly affected by their mothers' and fathers' entrepreneurial status. The findings also supports Dunn and Holtz-Eakin (2000), who found that sons of entrepreneurial fathers more often enter self-employment than sons of self-employed mothers, and Mancuso (1974) who argued that the entrepreneurs' fathers represent a main motivator for their need for achievement. Further, the stronger role of the father in developing offspring's entrepreneurial intentions is consistent with Chlosta, et al. (2010) who found that fathers', but not mothers', entrepreneurial status explains variance in offspring's decision to become entrepreneurs.

### 2.5.2 *Directions for future research*

As illustrated earlier, from our results and theoretical implications a number of opportunities arise to further advance our understanding of entrepreneurial individuals,

families, and cultures. Further, we hope that our research stimulates additional research along different trajectories. We offer a few ideas below.

First, much can be learned when scholars acquire and explore data sets which provide more detailed information on the CV of individuals than our data set. According to cognitive developmental psychology, specific critical life experiences and events can trigger the development of entrepreneurial intentions because these events can create new knowledge structures (Krueger, 2007). For example, the successful exit of an entrepreneur in the student's social environment could make entrepreneurship a desirable endeavor for that student, or the bankruptcy of the family business could diminish his or her desirability perceptions. Perhaps these effects are different contingent on when in their life these events are experienced. Unfortunately, our data set does not provide such information.

Further, we would again like to emphasize that our data set does not allow us to provide a more fine-grained measurement of entrepreneurial intentions and its underlying constructs. For example, our data set does not provide a distinction between the constructs of feasibility and desirability perceptions, which are basic to the formation of entrepreneurial intentions (Fitzsimmons & Douglas, 2011; Krueger, et al., 2000). Similarly, closely connected to feasibility perceptions is the construct of entrepreneurial self-efficacy, that is, one's belief that they can successfully found and run a business (C. C. Chen, Greene, & Crick, 1998). Data sets that (in contrast to ours) can measure these variables can provide more detailed insight which facets and elements of entrepreneurship individuals most perceive as feasible, desirable, or both, and which contribute to the development of entrepreneurial self-efficacy.

Finally, an interesting way to continue our research would be to focus on people that have moved between cultures. While our data set covers information on students' nationality, it does not tell us whether students have also lived in this country or whether they were born and raised in the country where they study and their immigrant parents passed on their own nationality to the offspring. A more detailed data set on individuals' life trajectory (including the countries where they lived) could answer

interesting question about immigrant entrepreneurship and whether there are differences in the development of entrepreneurial intentions between individuals moving, e.g., from more individualistic to more collectivistic cultures and vice versa.

### *2.5.3 Limitations and conclusions*

In interpreting our results, some limitations of the study should be taken into consideration besides the methodological issues mentioned earlier. First, the cross-sectional nature of our study offers only a snapshot of the situation. In order to fully understand the transmission of entrepreneurial intentions over people's life course, longitudinal studies are required and future research could fill this gap (Aldrich & Kim, 2007). Second, student samples as in this study are often used in studies examining the formation of entrepreneurial intentions (e.g., Krueger, et al., 2000) because students are on the verge of choosing a career and are of an age typical of people who start-up a new venture (Lévesque & Minniti, 2006; Reynolds, 1997). Nevertheless, the debate whether student samples are representative of "people in general" continues (P. B. Robinson, Huefner, & Hunt, 1991). Future research should investigate non-student samples to test the generalizability of the results presented here (cf. C. C. Chen, et al., 1998). Finally, our dependent variable does not acknowledge that there are different ways of becoming an entrepreneur. For example, in contrast to starting up their own business, individuals also intend to take over the family business or existing firms owned by others. These different "types" of entrepreneurial intentions are not covered in our study.

To conclude, our study highlights that the intergenerational transmission of entrepreneurial intentions within families is complex and involves more than one generation. Further, the impact of entrepreneurial parents and grandparents on the offspring is not alike in all families and all regions; the influences are particularly strong in high in-group collectivism cultures. Further, we find that the extent and timing of parents' entrepreneurial activities over the life course of the offspring matters, and that there are different effects for father and mother entrepreneurs on sons and daughters. We hope that our findings stimulate future research on the mechanisms how entrepreneurial intentions are transmitted within families.





### **3 Team-level entrepreneurial decision making under uncertainty – The moderating influence of team metacognitive knowledge<sup>7</sup>**

Research on entrepreneurial teams suggests that teams are more beneficial for new venture performance than single entrepreneurs. However, there is initial evidence that entrepreneurial decision making in teams can be connected to difficulties. In this study, I present concrete mechanisms how team decisions in an entrepreneurial context can lead to suboptimal outcomes. Consistent with research in social psychology I show that team decision quality depends on the exchange of the team members' initially unique information. The team decision is embedded in a characteristic entrepreneurial context by experimentally manipulating information uncertainty. Drawing on metacognitive theory I theorize and find that team metacognitive knowledge is particularly beneficial for decision quality when low amounts of information are exchanged and when information is uncertain. In Section 3.1, the topic is introduced. Section 3.2 reviews the literature on team decision making, decision making under uncertainty, and metacognitive knowledge and the hypotheses are derived. I explain the method used in Section 3.3 and present my results in Section 3.4. In Section 3.5, I discuss the results, their implications, and the limitations of this study.

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<sup>7</sup> This section is based on Breugst, Shepherd, and Patzelt (2011). An earlier version of the paper was presented in a refereed paper session at the 2010 Babson College Entrepreneurship Research Conference (BCERC), June 10-12, 2010 in Lausanne, Switzerland and at the 2011 Interdisciplinary European Conference on Entrepreneurship Research (IECER), February 16-18, 2011 in Munich, Germany.

#### **3.1 Introduction**

Both entrepreneurship research and practice emphasize the importance of entrepreneurial teams in the process of creating and running a venture (Amason, Shrader, & Tompson, 2006; Gartner, 1985; Timmons, 1994). Entrepreneurial teams are seen as a determining factor for the success of new ventures because teams of founders will enhance a new ventures' human capital (Colombo & Grilli, 2005) and because they will be better able to acquire additional resources (Brush, Greene, & Hart, 2001). Previous research also suggests that entrepreneurial teams will be more capable than single entrepreneurs to deal with complex decisions in the new venture context (Chowdhury, 2005; Forbes, Borchert, Zellmer-Bruhn, & Sapienza, 2006). In fact, in new ventures often teams make key strategic decisions (West, 2007). However, research on entrepreneurial team decision making and their information exchange is limited. West (2007) suggests that collective decisions in entrepreneurial teams are not effortless. Further, Chandler and Lyon (2009) found that the adding of new team members to the entrepreneurial team does not enhance knowledge acquisition and does hence not lead to a better performance of the venture.

This indicates that the exchange of information in entrepreneurial teams can be sometimes limited which parallels research in social psychology that has already shown teams' difficulties to exchange information effectively. In particular when team members possess pieces of information unknown to other members, these unique pieces of information are rarely shared in a team discussion (Mesmer-Magnus & DeChurch, 2009). Previous studies have focused on the quantity of information exchanged, but they have not taken into account the nature of information that teams need to process, i.e. how reliable it is. In particular in the entrepreneurial context, this can limit our understanding of team decision processes. Due to the substantial uncertainty that surrounds entrepreneurial decision making (McKelvie, et al., 2011; McMullen & Shepherd, 2006) information which an entrepreneurial decision is based on can be more or less uncertain. It is known that individual decision makers are strongly affected by information uncertainty (Grether, 1978; M. D. Lee & Dry, 2006; van Dijk &

Zeelenberg, 2003), but we do not know how teams are affected by it. Further, it is unclear whether some teams will be less affected by information uncertainty than others.

To address these questions we build on the social cognition and metacognition literatures and offer a model of team-level entrepreneurial decision making under information uncertainty. We test our model on a sample of 52 three-person teams using a hidden profile experiment (Stasser & Titus, 1985). Our teams were confronted with the scenario that they were an entrepreneurial team that should decide for one out of four entrepreneurial opportunities, a decision that is at the core of entrepreneurship (Y. R. Choi & Shepherd, 2004). Information about these opportunities was distributed in a way over the team that the best alternative was hidden to the participants and became only obvious when all information was considered at once. Before the team interaction we experimentally manipulated information uncertainty. Further, we collected additional information using a pre- and a post-experimental questionnaire.

Consistent with the literature decision quality was higher for teams that shared initially unique information. However, we found heterogeneity in this relationship which can be explained by team metacognitive knowledge – a team’s ability to understand the cognitive processes, its tasks, and the strategies necessary for them (cf. Flavell, 1979). We also found that team metacognitive knowledge moderated the relationship between information uncertainty and decision quality.

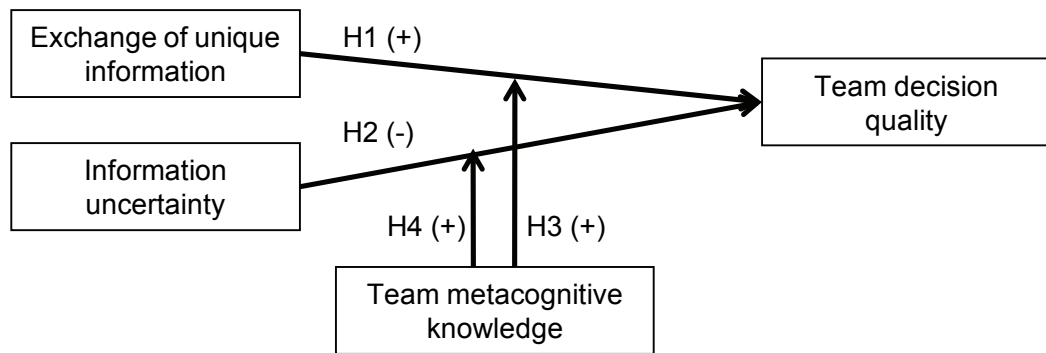
With this study we make three primarily contributions to the literature. First, research on entrepreneurial decision making mainly takes into account the individual level and emphasizes that a single entrepreneur’s decision processes can be affected by cognitive biases (R. A. Baron, 2004; Busenitz & Barney, 1997). We show concrete mechanisms how entrepreneurial decision processes in teams can be biased as well. Understanding these team-level biases is important because they can lead to a suboptimal decision quality which is detrimental for new ventures. Second, we take into account the entrepreneurial context of the team decision, i.e. information uncertainty. We address why some teams deal better with information uncertainty than others.

Consistent with reasoning at the individual level (Haynie, Shepherd, Mosakowski, & Earley, 2010) we show that metacognitive theory provides additional insights into entrepreneurial team-level outcomes. Teams vary in their level of metacognitive knowledge which helps explain variance in the information uncertainty-team performance relationship. Finally, we contribute to research on team decision making. Although team research has acknowledged the importance of sharing initially unique information for team performance (Mesmer-Magnus & DeChurch, 2009), it has not sufficiently addressed why some teams are better able to use information when it has been exchanged than other teams. By taking a metacognitive perspective we theorize and find that those teams higher in metacognitive knowledge are better able to translate unique information that has been shared into superior team performance. Thus, we provide initial evidence that infusing models of team performance with metacognitive theory can be insightful.

This paper proceeds as follows. In the next section we will formulate our theory and derive the hypotheses. Then we will explain the research method of this study, the sample, design, variables, and the analyses we used. Afterwards we will present and discuss the results. Before our conclusion we address the study's limitations and point out future research opportunities.

#### **3.2 Team decision making, information uncertainty, and metacognitive knowledge**

We draw on the literature on team decision making, uncertainty, and metacognitive knowledge and develop a model of team decision quality in an entrepreneurial task under information uncertainty. We propose that team decision quality depends on the exchange of unique information and on information uncertainty. Further, we suggest that team metacognitive knowledge moderates these two relationships. Figure 4 illustrates this model. Next, we investigate each of the postulated relationships in greater detail.



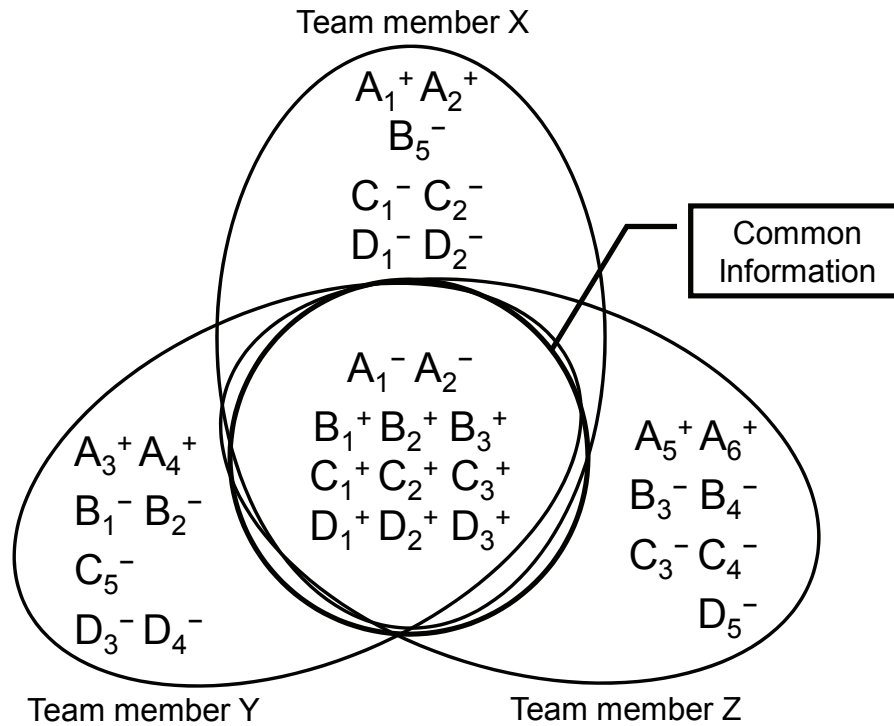
**Figure 4: Research model of team decision quality in an entrepreneurial task under information uncertainty.**

In this study we define teams<sup>8</sup> as “a distinguishable set of two or more people who interact, dynamically, interdependently, and adaptively toward a common and valued goal/objective/mission, who have each been assigned specific roles or functions to perform, and who have a limited life-span of membership” (Salas, Dickinson, Converse, & Tannenbaum, 1992, p. 4). Teams are complex and dynamic as they develop while interacting and adapting to their current situation (Kozlowski & Ilgen, 2006). During interactions teams share ideas, cognitive processes, and knowledge among the members in order to process information at a team level (Hinsz, Tindale, & Vollrath, 1997). Team processing of information needs to be applied during team decision-making which has been defined as “the processes involved in moving from a diverse set of individual positions or preferences to agreement on a consensus choice for the group” (Kerr & Tindale, 2004, p. 632). Depending on the team type and its assigned task, S. G. Cohen and Bailey (1997) propose different measures of team performance, such as satisfaction, subjective perceptions of performance, adherence to budgets, productivity, sales growth, and decision quality. Consistent with other studies on team decision making (e.g., Alge, Wiethoff, & Klein, 2003; Schulz-Hardt, Brodbeck, Mojzisch, Kerschreiter, & Frey, 2006), we focus on decision quality as the outcome of team interaction.

<sup>8</sup> We will use the term team, but following previous work in the field of team and small group research (G. Chen & Kanfer, 2006; S. G. Cohen & Bailey, 1997) we do not make an explicit distinction between teams and groups.

#### 3.2.1 Amount of information and team decision quality

When several individuals come together as team members, there is likely to be some information that these team members have in common – *shared information* – but there may also be some information that is uniquely possessed by a single team member – *unshared information* (Stasser & Titus, 1985). In such a situation, team members can only receive a complete picture of a situation when they exchange unshared information. Sometimes the initial information set of an individual team member can even be misleading because his or her information may indicate a “best” solution different from the best solution revealed when considering the complete information distributed among the team members. Only when team members exchange their unique information, can the team recognize the (objective) best solution. In Figure 5 we illustrate such a decision making situation. There are three team members (X, Y, and Z) that are asked to choose one out of four alternatives (A, B, C, and D), e.g. different candidates for a job, different ideas how a team can spend some money, or – as in the current study – different entrepreneurial opportunities arising from a technological invention. As illustrated in the figure, there are eight pieces of information per alternative. Some pieces of information speak in favor of the alternative (marked with a plus sign (+) in Figure 5) and some pieces of information speak in disfavor of it (marked with a minus sign (–) in Figure 5). Assuming that each information item has approximately the same importance for decision quality, alternative A (6 positive vs. 2 negative items) is superior to the alternatives B, C, and D (3 positive vs. 5 negative items). Each team member has a specific information set (depicted as an ellipse in Figure 5) with several – but not all – information items about the decision alternatives. Because of the distribution of information over the team, the superiority of alternative A is initially not evident to the individual team members. In their sets of information the actual suboptimal alternatives (B-D) have more benefits and less (or equal) drawbacks than the optimal alternative (A). To benefit from the dispersed information and to make high quality decisions, team members need to come together and focus the team discussion on members’ unique information.



**Figure 5: Hypothetical distribution of information items about four alternatives (A-D) among three team members (X-Z)**

Indeed, heterogeneous teams often encounter such decision making situations. For example, in an entrepreneurial decision making task where opportunities need to be evaluated, there might be one member who is an expert in finance and another who is expert in marketing. Both know that they will not be able to file a patent for the potential venture’s product. But the expert in finance knows that there are already potential investors for the new venture (which the marketing expert does not know) and the marketing expert has already identified a potential key customer (which the finance expert does not know). Thus, a neutral observer with all pieces of information will assess the venture’s situation as more positive than do the individual team members.

Even if the sharing of initially unique information is beneficial, teams usually fail to exchange it effectively; instead they focus on common information (e.g., Schulz-Hardt, et al., 2006; Stasser & Titus, 1985). Two reasons can help to explain this phenomenon: First, common information is part of all information sets and thus all team

members can introduce it during team interaction whereas unique information can only be introduced by an individual member (Stasser & Titus, 1987). Second, in the course of the discussion teams will adhere to the common information (Schulz-Hardt, et al., 2006). The exchange of common information is rewarding for the team members because the others can validate this information whereas they cannot validate a team member's unique information (Wittenbaum, Hubbell, & Zuckerman, 1999).

Given the decision situation described above a high proportion of time and energy dedicated to exchanging common information during the team interaction prevents the team from coming to a high quality decision (Cruz, Boster, & Rodriguez, 1997) because team members do not learn new information important to the decision (Brodbeck, Kerschreiter, Mojzisch, & Schulz-Hardt, 2007). In contrast, the amount of unique information exchanged during team discussion has been found to be positively related to team's decision quality (Larson, Christensen, Franz, & Abbott, 1998; Winquist & Larson, 1998). Although this main effect relationship has already been established in the literature we offer it here to establish a baseline for subsequent hypotheses:

*Hypothesis 1: Teams that share more unique information have higher decision quality than those that share less unique information.*

#### *3.2.2 Information uncertainty and team decision quality*

The entrepreneurial decision making context is associated with high levels of uncertainty (Venkataraman, 1997). Although there are different conceptualizations of uncertainty (Gifford, Bobbit, & Slocum, 1979) we rely on Milliken's (1987) definition of uncertainty "as an individual's perceived inability to predict something accurately. An individual experiences uncertainty because he/she perceives himself/herself to be lacking sufficient information to predict accurately or because he/she feels unable to discriminate between relevant data and irrelevant data" (p. 136). Thus, we focus on the team members' perception that adequate information is not available for making a decision among alternatives.



McMullen and Shepherd (2006) argue that entrepreneurial action is inherently uncertain because it takes place in an unknowable future and because it is connected to high levels of novelty. Thus, entrepreneurs often have to deal with these high levels of uncertainty in their decision making. Entrepreneurs acting under uncertainty are prone to biases (Busenitz & Barney, 1997). Decision makers rely less on uncertain information (van Dijk & Zeelenberg, 2003) than on certain information. Further, under conditions of uncertainty, people tend to use available information inefficiently, find it difficult to understand information that is verbally presented by others (Grether, 1978), and, as a result, have lower decision accuracy (Keller & Staelin, 1987; Remus, O'Connor, & Griggs, 1995).

At the team level, Cordery, Morrison, Wright, and Wall (2010) found that the higher the uncertainty under which teams work, the worse they perform in their tasks. Further, uncertainty increases team members' identification with the team and motivates them to stick together as a social entity (Hogg, Sherman, Dierselhuis, Maitner, & Moffitt, 2007) because individuals have a higher need for confirmation and validation by other team members in more uncertain conditions (Mullin & Hogg, 1999). Because of this need teams under uncertainty can be expected to search for a compromise based on team members' initial preferences and to focus on common information for validating each others' views. In contrast, teams making decisions under low information uncertainty do not need to focus on social validation to the same extent and can try to reach a high quality decision. Thus,

*Hypothesis 2: Teams that face lower information uncertainty have higher decision quality than those that face higher information uncertainty.*

#### 3.2.3 Metacognitive knowledge

Metacognition is cognition about cognition, i.e. the thoughts about thinking and cognitive processes (Clarkson, Hirt, Jia, & Alexander, 2010). It entails approaches that allow people to choose from and to control cognitive strategies and to understand and to reflect on their thinking (Flavell, 1979; Schraw & Dennison, 1994). Recently, the

importance of metacognition in the entrepreneurial context has been emphasized because of the dynamism and uncertainty connected to it (Haynie & Shepherd, 2009; Haynie, et al., 2010).

Metacognition consists of different components (Flavell, 1979; Haynie & Shepherd, 2009). Flavell (1979) distinguishes between metacognitive knowledge, metacognitive experiences, goals or tasks, and actions. Consistent with cognitive approaches to team performance which focus on the team members' knowledge (Gigone & Hastie, 1993; Okhuysen & Eisenhardt, 2002) we focus on the knowledge dimension of metacognition. Metacognitive knowledge refers to comprehension of the psychological functioning of people (others and the self), of tasks, and of strategies (Flavell, 1979; J. V. Wright, 1992). This means that individuals high in metacognitive knowledge, first, have clear beliefs how other people think and they also understand and evaluate their own cognitive strategies. Second, they know how to approach tasks, which information to use for the task, and how to assess task progress. Third, individuals with high levels of metacognitive knowledge can better decide which strategy is appropriate and which strategy they should follow. Therefore, metacognitive knowledge involves a combination and integration of one's understanding of people, tasks, and strategies (Flavell, 1979).

Even though research on metacognitive knowledge has focused at the level of the individual in learning and entrepreneurial decision making tasks (Efklides, 2009; Haynie, Shepherd, & Patzelt, in press; Schmidt & Ford, 2003), it likely also exists at the team level. We define team metacognitive knowledge as *a team's ability to understand the cognitive processes of the other team members, to understand its tasks, and the strategies necessary for them*. We propose that a high level of team metacognitive knowledge is particularly valuable for teams in decision making tasks because it helps teams to benefit better from the unique information exchanged and to deal with uncertain information.

*Unique information, metacognitive knowledge, and team decision quality.*  
Although there is variability in the amount of unique information a team exchanges,

there is also likely variability in a team's ability to benefit from the exchanged information. Team metacognitive knowledge can help to explain why some teams are better at making the most out of available information.

First, metacognitive knowledge helps people to better understand cognitive processes (Mevarech & Kramarski, 2003). Therefore, teams with greater metacognitive knowledge will be better able to control their processing of the new information brought up during team interaction. Metacognitive knowledge is closely connected to the ability to communicate with other people and to convey a potential solution in different ways (Markauskaite, 2007). For example, after metacognitive training students are better able to take others' perspective and are more responsive to their audience (Englert, Raphael, Anderson, Anthony, & Stevens, 1991). Thus, team metacognitive knowledge will help the members to "tune in" to each other. This will facilitate the team's information processing and increase its ability to make sense out of the situation even if there is minimal information available. In contrast, teams lower in metacognitive knowledge have more difficulty in understanding their cognitive processes. Therefore, it will be more difficult for them to arrange and rearrange the pieces of the puzzle to obtain the most coherent "big picture" of the situation.

Second, metacognitive knowledge increases the understanding of tasks (Flavell, 1979), which appears particularly beneficial when there is only sparse information related to the task. Individuals higher in metacognitive knowledge check to make sure that they thoroughly understand the nature of the task rather than automatically assuming they do – they ask themselves questions to gain a deep-level of understanding of the task's meaning, its structure, and possible approaches to its resolution (Mevarech & Kramarski, 2003). Thus, even with little information, they can more effectively manage their tasks. Individuals higher in metacognitive knowledge will relate the current task to tasks they have already encountered and integrate this expertise to understand and resolve the issue represented by the task (Kramarski, Mevarech, & Lieberman, 2001). Thus, teams higher in metacognitive knowledge will compare experiences from previous decisions to their current situation and focus on the

similarities and dissimilarities. For example, they will realize in this process that information pooling is as important when it comes to opportunity evaluation as it was in previous tasks (e.g. discovery of opportunities). In contrast, the creative generation of new ideas is less important in their current task than it was when an opportunity had to be discovered. This comparison process helps teams to focus their attention on the unique information when it is introduced in the discussion. In contrast, teams with lower metacognitive knowledge are less clear about their task and need to exchange more information to come to a high quality decision.

Third, metacognitive knowledge facilitates the proficient handling of different strategies and the choice of the most appropriate one (Cardelle-Elawar, 1995). People higher in metacognitive reflect more about their strategy during the task – they continuously ask themselves more questions about the specific difficulties, the appropriateness of their strategies, and their progress (Mevarech, 1999). The answers to these questions can be used as feedback to conduct and correct their decision making process by integrating even low amounts of pooled information into their judgments. In contrast, teams with lower metacognitive knowledge think of fewer alternative strategies (Haynie, et al., 2010). They ask themselves less questions and they obtain less feedback to correct their decision making process. Thus, they have difficulties in flexibly adapting the strategies and in finding an appropriate strategy to benefit from low amounts of pooled information.

In sum, these arguments indicate that high team metacognitive knowledge helps to make the best out of the available information, which is especially important when available information is scarce. But when high amounts of initially unique information are shared in a team, this information is likely sufficient for finding a high quality solution. Teams do not need to integrate this information intensively because the information is self-explanatory. For these teams, better understanding of cognitive processes, tasks, and strategies is hence less essential for a high quality decision. Thus,

*Hypothesis 3: The interaction between sharing unique information and team metacognitive knowledge is positive and teams higher in metacognitive knowledge will outperform those lower in metacognitive knowledge when lower amounts of unique information are shared.*

*Uncertain information, metacognitive knowledge, and team decision quality.*

Team metacognitive knowledge likely moderates the impact of information uncertainty on a team's decision quality because it can buffer its negative effects through a better understanding of people, tasks, and strategies. First, although team members are inclined to confirm and validate each other in uncertain situations (Mullin & Hogg, 1999), those with higher metacognitive knowledge are less likely to engage in such actions. They will better understand how others think (Mevarech & Kramarski, 2003) which will reduce their uncertainty about the other members. Therefore, they will need to engage in less effort to validate each other. With a lesser need for validation, they are more open to explore the pieces of information that have been pooled and are less concerned by the uncertainty surrounding this information. In contrast, teams lower in metacognitive knowledge will have difficulties in understanding how others think. Thus, they have fewer possibilities to reduce uncertainty originating from their information and need to validate each other more. This will result in a limited discussion about the information. In situations with more certain information, teams can draw on the reliable data which do not necessitate a sound validation process.

Second, teams with higher metacognitive knowledge are likely better equipped to handle information uncertainty in their current decision. Under uncertainty it is unclear what steps should be taken to resolve that problem. Higher metacognitive can alleviate some of these challenges (Hogan, 1999). By thinking about whether they have a deep understanding of the problems, teams higher in metacognitive knowledge acknowledge the information uncertainty and try to comprehend the nature of the task. They are also more likely to think in alternative ways about the task to gain a deeper understanding (Mevarech, 1999). The more uncertain the information, the more beneficial it is to consider different analogies that may reveal additional information about the relative importance of information (Trickett & Trafton, 2007). People with

higher metacognitive knowledge have been found to engage in more analogical thinking to understand the nature of a task (Büchel, 2000).

Third, entrepreneurial decision makers higher in metacognitive knowledge better adapt to uncertain situations because they can apply alternative strategies to solve a problem (Haynie, et al., 2010). Under high levels of information uncertainty teams will not know how to address the problem and will need to test several strategies and approaches. Higher team metacognitive knowledge will facilitate a team's flexible adaptation to the requirements with which it is confronted. Teams high in metacognitive knowledge will continuously ask themselves if they are following the most appropriate strategy and how they are progressing in the task (Mevarech, 1999). The feedback obtained from these questions will enable these teams to dynamically adjust their strategies in a situation with uncertain information. Thus,

*Hypothesis 4: The interaction between information uncertainty and team metacognitive knowledge is positive and teams higher in metacognitive knowledge will outperform those lower in metacognitive knowledge under higher levels of information uncertainty.*

### **3.3 Methodology**

#### *3.3.1 Participants and design*

In order to control for effects of previous interactions of the team and for team members' experience in specific fields, we focused on business students as novice entrepreneurs instead of experienced entrepreneurial teams. Thus, our sample consists of 156 undergraduate business students enrolled at a German university. We focused on business students to ensure that they could make sense of the hypothetical venture situation described in the decision experiment (see description below). The students were compensated with 20 € (~USD 25) for participation. We made appointments with volunteers by inviting three students to each session. On average, the participants are 24.31 years old (SD = 2.54). Seventy-three (46.8 %) participants were male.

The design of our study was a 2 (high vs. low information uncertainty)  $\times$  2 (best solution is presented as first alternative vs. best solution is presented as third alternative) between teams factorial design. We assigned the teams randomly to the experimental conditions with the restriction that we wanted to achieve comparable sample sizes in each condition. In the cells there were 12 to 14 teams. We tested for order effects of the presentation of the best solution and there were no significant differences between versions in terms of the variables described below.

#### 3.3.2 Materials

*Decision alternatives.* Hidden profiles are situations where the best solution of a decision task is not initially evident to the team members from their personal information. Alone, a member's information set points toward a suboptimal solution, but when all information across individuals is pooled a best solution becomes obvious (Stasser & Titus, 1985). In our hidden profile approach, participants were asked to put themselves in the role of an entrepreneurial team and choose the best venture opportunity from four alternatives. For the construction of these alternative opportunities we draw on Shane's (2000) eight different business opportunities that arose from one technology, namely the three dimensional printing (3DP) technology. From these eight different opportunities we chose four alternatives that were not medical or pharmaceutical ventures because we did not want the participants to prefer one alternative just because of its philanthropic character. The decision facing the participants was which out of the four alternatives they would exploit when starting a venture based on the 3DP technology.

*Construction of the hidden profile task.* Figure 5 displays the distribution of the information items over the alternative business opportunities (A to D) and over the team members (X, Y, and Z). For the best solution (alternative A in Figure 5) we chose six positive pieces of information ( $A^+_1, A^+_2, \dots, A^+_6$ ) and two negative pieces ( $A^-_1, A^-_2$ ). For the three other suboptimal alternatives we chose three positive pieces (e.g.,  $B^+_1, B^+_2, B^+_3$ ) and five negative pieces (e.g.,  $B^-_1, B^-_2, \dots, B^-_5$ ). We generated the information for the four alternatives drawing on research on entrepreneurial decision making (Busenitz,

1996; Y. R. Choi & Shepherd, 2004) and the entrepreneurial environment (Barney, 1995; MacMillan & McGrath, 2004). Examples of positive items are “You have found a potential investor,” and “The technologies for the production are already well developed.” Negative items were chosen to be clearly negative but no “fatal flaws”. Examples of negative items are “It will take a long time until production will be cost-effective,” and “The target group of your product is unclear.” In total, there are 32 pieces of information available for the whole team, eight for each alternative opportunity.

We distributed the pieces of information before the team discussion in a way that each team member received all negative pieces of information about alternative A and all positive pieces of information about the suboptimal alternatives, B to D. This is the common information which is depicted in the intersection of the ellipses in Figure 5. The unique information that only an individual team member possessed before team discussion is represented by the characters in the ellipses outside of the intersection. Each member received two additional pieces of information about alternative A (e.g.,  $A^+_1$ ,  $A^+_2$  for team member X). For the suboptimal alternatives (B to D) each team member received one or two additional negative pieces of information (e.g.,  $B^-_5$ ,  $C^-_1$ ,  $C^-_1$ ,  $C^-_2$ ,  $D^-_1$ , and  $D^-_2$  for team member X). This distribution of information ensured that (i) no team member had enough information to be likely to initially favor A over B, C, and D, and that (ii) there is likely sufficient heterogeneity in the initial preferences of the team members before entering the team discussion.

*Pre-test on best solution*<sup>9</sup>. To ensure that alternative A can indeed be seen as the best solution we presented the four alternatives in random order with all our constructed pieces of information per alternative (full profile) to 45 students comparable to our actual sample. The participants ranked the alternatives from 1 to 4, which alternative

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<sup>9</sup> We also ran a pretest to preclude that one of these alternatives would be preferred by the participants over another without the information provided in the experiment. In this pretest 24 participants similar to our actual sample were asked to rank the four alternatives only described by elementary information from 1 to 4, in terms of the alternative opportunities they would like to exploit when starting a venture. We ran a Friedman test which did not yield a significant result,  $\chi^2(3) = 4.05$ ,  $p > .20$ , Kendall's  $W = .06$ . Thus, an a priori preference for an alternative business model is unlikely to confound the results.



they would most like to exploit when starting a venture. The mean rank of the best solution was 1.18. The mean ranks of the suboptimal alternatives were 2.89, 2.96, and 2.98, respectively. To check if there were systematic differences in the ranks of the alternatives, we ran a Friedman test which yielded a significant result,  $\chi^2(3) = 63.05$ ,  $p < .000$ , Kendall's  $W = .43$ . This indicates that the pre-test participants significantly preferred our best solution and that we have successfully constructed information sets for the four alternatives with one clear optimal solution and three sub-optimal solutions.

#### 3.3.3 Procedure

We grouped three students and invited them together to our lab. The experimenter welcomed the participants and informed them about the procedure of the study. They were asked to fill out a pre-experiment questionnaire, which collected information about the students' metacognitive knowledge. The students were then asked to imagine they were part of an entrepreneurial team that had just invented the 3DP technology. They were told that they had already identified four potential opportunities to exploit from their technology. As a team they must now decide on one of these opportunities. Each of them were randomly assigned the role of a member of the entrepreneurial team – a marketing manager, a financial manager, and an operations manager – and received an information set specific to his or her role (e.g., the marketing manager received the information that for one alternative costly marketing studies need to be conducted before the realization of the business idea).

The participants had as much time as they needed to become familiar with the situation and their information sets. They were asked to carefully study their information sets in order to discuss the alternatives without needing to continuously check their sets, but they were allowed to keep their information sets during team interaction. After familiarizing themselves with the information they were asked to indicate their pre-discussion preference. Only 25 (16 %) out of our 156 participants chose the optimal alternative before the discussion. This is another indicator that we were successful in constructing a hidden profile situation where the best solution is not apparent to the team members based solely on their information set.

The teams were asked to start the discussion and to come to a decision on which of the four alternatives they wanted to exploit as an entrepreneurial team. They were told that they should take as much time as they needed, but that usually teams would finish within 30 minutes. We did not want to generate time pressure, but this time period was suggested to avoid “never-ending” discussions and to keep the teams focused on their task. When a team discussed longer than 30 minutes, the experimenter reminded them of the time frame, but no further time limits were specified (cf. Schulz-Hardt, et al., 2006 for a similar procedure). A discussion was considered to be finished when the team recorded its decision on a specific decision sheet. The average discussion time was approximately 22 minutes ( $M = 21.63$  min,  $SD = 8.14$  min). The discussions were videotaped to be coded by two independent coders. After the discussion the participants were asked to fill out a post-experiment questionnaire reporting on the manipulation check for information uncertainty and demographic variables. At the end of the study, they were debriefed, paid their reimbursement, and they left the lab.

#### 3.3.4 Variables and measures

*Dependent variable.* Our dependent variable is team decision quality. We coded the team’s answer as 1 when the team chose the best solution and as 0 for all other decisions (suboptimal solutions).

*Team metacognitive knowledge.* Metacognitive knowledge was captured in the pre-experimental questionnaire. We used an 11-item scale developed by Haynie and Shepherd (2009) which was based on Flavell (1979), Schraw and Dennison (1994), and Wright (1992). It was translated into German using a back-and-forth translation procedure recommended by Brislin (1970, 1980) to ensure maximal consistency between the translated and the original scale. A 7-point Likert scale with the anchors “I do not agree at all” and “I completely agree” was used to record the self-reported metacognitive knowledge of the participants. The Cronbach’s alpha of the scale was .77 which is considered reliable (Hair, Black, Babin, Anderson, & Tatham, 2006). From the participants’ responses we first computed an average of the 11 items of the metacognitive knowledge scale to obtain an individual score for each team member. To

construct the team level metacognitive knowledge score we then averaged the scores of the individuals who made up the teams. This operationalization by averaging the team members score is consistent with studies on team level abilities (Barrick, Stewart, Neubert, & Mount, 1998; Feyerherm & Rice, 2002), attitudes (Gibson, 2003), and personality traits (Barrick, et al., 1998). The team level metacognitive knowledge score was mean-centered before computing the interaction terms and running the analyses.

*Information uncertainty.* Information uncertainty was manipulated as a two-level between teams factor. Consistent with the literature on uncertainty, we operationalized high levels of information uncertainty as the individual's perception of a lack of sufficient information to make accurate predictions (Milliken, 1987). In uncertain situations, reliable and adequate information are unavailable so that decision makers lack a solid basis to assess probabilities of outcomes and causal effects (Duncan, 1972). When reliable and trustworthy information is available, for example from expert advisors, this will reduce a decision maker's uncertainty (Van Swol & Sniezek, 2005). Teams facing low levels of information uncertainty (26 teams) were provided with reliable and trustworthy information from an expert source. They were told that a (fictitious) renowned consulting firm had already conducted research for them such as extensive market studies, detailed proof of concepts with scientists, and in-depth interviews with experts. The information sets in this condition were presented in reputedly looking folders with the logo of this fictitious consulting firm. Further, we told the teams in this condition that for all potential venture opportunities, reliable predictions are possible and that they can trust the information gathered by the consulting firm.

Teams under high levels of information uncertainty (26 teams) were told that for all potential opportunities it is not possible to make reliable predictions. They have heard rumors about the different opportunities from their non-expert acquaintances but the trustworthiness of this information was questionable. No one had experience with this specific situation so that they cannot rely on expert opinions, the market potential is very difficult to assess, and the feasibility of the opportunities is unclear. To emphasize

the doubtfulness of this uncertain information, the information sets were presented on checkered paper and were hand written.

Thus, participants in the different conditions received the same amount and content of information, but the information was presented in a different way and with a different instruction. We only manipulated the teams' perception of the information uncertainty without varying the content of the information. Thus, we capture the effects of information uncertainty without changing the actual information presented to the participants. To check if this manipulation was successful, we asked the participants in a post-experiment questionnaire about their perception of information uncertainty. The wording of the five items was "the information that our team possessed was valuable for our decision," "the information that our team possessed was reliable," "the information that our team possessed made it possible for us to come to an optimal decision," "the information that our team possessed were trustworthy," and "our team could rely on the information that we had for our decision." The Cronbach's alpha of this five item scale was .90 which is considered reliable (Hair, et al., 2006).

*Unique information.* As in previous hidden profile studies (Dennis, 1996; Hollingshead, 1996), we counted the number of unique information items that were exchanged during discussion. Two independent coders blind to the hypotheses analyzed the videotaped discussions. The coders were intensively trained and based their coding on a manual that we had developed for this study. It contained a list of all information items and coders were to note when and which team member stated a specific item. Coders accepted slight deviations in the discussion from the original wording in the information sets, but the speaker had to link his or her information item explicitly or by context to the corresponding alternative. Both coders coded all team discussions. The correlation between the coders was  $r = .96, p < .001$ . Further, paired  $t$ -tests showed that the level of information coded did not differ significantly between the coders,  $t(51) = -1.05; p > .20$ . Because of this very high agreement between the coders we used the data of coder one for all further analyses. Before we ran our analyses this variable was mean centered.

*Control variable – common information.* The common information pooled during discussion will be used as a control variable because it has been found to be related to teams' decision outcomes (Mesmer-Magnus & DeChurch, 2009). Consistent with the operationalization of unique information stated above and other hidden profile studies (Dennis, 1996; Hollingshead, 1996), two coders counted the number of common information items that were exchanged during discussion. The correlation between the coders was  $r = .92, p < .001$ . Further, paired  $t$ -tests showed that the level of information coded did not differ significantly between the coders,  $t(51) = .38; p > .20$ . This variable was also mean centered before it was entered in the analyses.

## 3.4 Results

### 3.4.1 Manipulation of information uncertainty

First, we checked if the manipulation of information uncertainty was successful. For this we ran a  $t$ -test comparing the means on the information uncertainty scale of the participants in the high with those in the low information uncertainty condition. The test revealed a significant difference between these two conditions,  $t(154) = 11.49, p < .001$ . Thus, the participants in the information uncertainty condition perceived the information more uncertain than the participants under certainty which indicates that we successfully manipulated information uncertainty.

### 3.4.2 Descriptive statistics and correlations

We present descriptive statistics and the correlations of the research variables in Table 7. 33 % of all teams found the best solution which is consistent with other research showing that teams usually fail to solve hidden profile tasks (Hollingshead, 1996; Schulz-Hardt, et al., 2006; Stasser & Titus, 1985). Because of the rather high correlation between the amount of common and unique information exchanged during the discussion ( $r = .83, p < .01$ ), we wanted to check for potential multicollinearity problems. We followed the approach suggested by Menard (1995) and ran a linear regression to check the variance inflation factor (VIF) and tolerance. The tolerance was 0.29 (VIF = 3.45) for the amount of unique information exchanged. This is clearly

above the suggested cutoff of 0.20 (Menard, 1995) and indicates that multicollinearity is unlikely to be a concern.

**Table 7: Means, standard deviations, and correlations (before mean centering)**

		<i>M</i>	<i>SD</i>	(1)	(2)	(3)	(4)
(1)	Decision quality <sup>a</sup>	0.33	0.47				
(2)	Common information	31.60	14.34	-.09			
(3)	Information uncertainty <sup>b</sup>	.50	0.51	-.04	-.13		
(4)	Unique information	36.15	21.94	.30*	.83**	-.14	
(5)	Team metacognitive knowledge	5.37	0.35	.06	.20	-.10	.12

Notes:

*n* = 52 teams

<sup>a</sup> 0 = “team chooses suboptimal solution,” 1 = “team chooses optimal solution.”

<sup>b</sup> 0 = “information uncertainty low,” 1 = “information uncertainty high.”

\* *p* < .05; \*\* *p* < .01.

### 3.4.3 Hierarchical Logistic Regression

As the dependent variable is dichotomous, we ran a hierarchical logistic regression to test our hypotheses. Table 8 displays the results of the analysis – unstandardized coefficients, categories for *p*-values, standard errors, and corresponding odds ratios. Further, it contains information about the model fit and tests of model comparison.

First, we tested the baseline model that included only the control variable, i.e. the common information exchanged during team interaction. The baseline model is not significant,  $\chi^2(1) = .40$ , n.s., Nagelkerke Pseudo- $R^2 = .01$ . The  $-2$  log-likelihood ( $-2LL$ ) which tests the overall adequacy of the model (smaller values indicate a better model fit; Menard, 1995) is 65.33. The coefficient for common information is not significant,  $B = -0.01$ , n.s.

**Table 8: Hierarchical logistic regression analysis predicting team decision quality**

	Baseline model			Main effects model			Full model		
	<i>B</i>	<i>SE (B)</i>	Exp ( <i>B</i> )	<i>B</i>	<i>SE (B)</i>	Exp ( <i>B</i> )	<i>B</i>	<i>SE (B)</i>	Exp ( <i>B</i> )
Constant	-0.73*	0.30	0.48	-1.88*	0.85	0.15	-4.28*	1.77	0.01
Common information	-0.01	0.02	0.99	-0.33**	0.10	0.72	-0.63**	0.23	0.53
Unique information				0.23**	0.07	1.26	0.40**	0.15	1.49
Information uncertainty				0.75	0.94	2.11	2.62	1.63	13.74
Team metacognitive knowledge				0.40	1.34	1.49	3.58†	2.12	35.78
Unique information × Metacognitive knowledge							0.43*	0.18	1.54
Information uncertainty × Metacognitive knowledge							13.18*	6.18	528989.24
Model fit	-2LL = 65.33, $\chi^2$ (1) = 0.40; Nagelkerke Pseudo- $R^2$ = 0.01			-2LL = 35.12, $\chi^2$ (4) = 30.60***, Nagelkerke Pseudo- $R^2$ = 0.62			-2LL = 22.71, $\chi^2$ (6) = 43.02***; Nagelkerke Pseudo- $R^2$ = 0.78		
Incremental $\chi^2$ -Test				$\chi^2$ (3) = 30.21***			$\chi^2$ (2) = 12.41**		

Notes:

 $N = 52$ \*\*\*  $p < .001$ ; \*\*  $p < .01$ ; \*  $p < .05$ ; †  $p < .10$

In the next block we introduced the amount of unique information exchanged, information uncertainty, and metacognitive knowledge. The main effects model is significant,  $\chi^2(4) = 30.60$ ,  $p < .001$ , Nagelkerke Pseudo- $R^2 = .62$ ,  $-2LL = 35.12$ . The increase in the Nagelkerke Pseudo- $R^2$  and the decrease of the  $-2LL$  indicate a better model fit (Menard, 1995). A  $\chi^2$ -difference-test between these two models shows that the model improves significantly when including the main effects,  $\chi^2(3) = 30.21$ ,  $p < .001$ . Hypothesis 1 proposes that teams that share more unique information likely outperform teams that share less unique information. The coefficient of the amount of unique information is positive and significant,  $B = 0.23$ ,  $p < .01$ . This means that for teams that exchange one more piece of unique information the odds of finding the best solution go up by the factor 1.26. This finding provides support for hypothesis 1. In hypothesis 2 we proposed that teams that face lower information uncertainty likely outperform those that face higher information uncertainty. The coefficient for information uncertainty is not significant,  $B = 0.75$ , n.s. Therefore, hypothesis 2 is not supported.

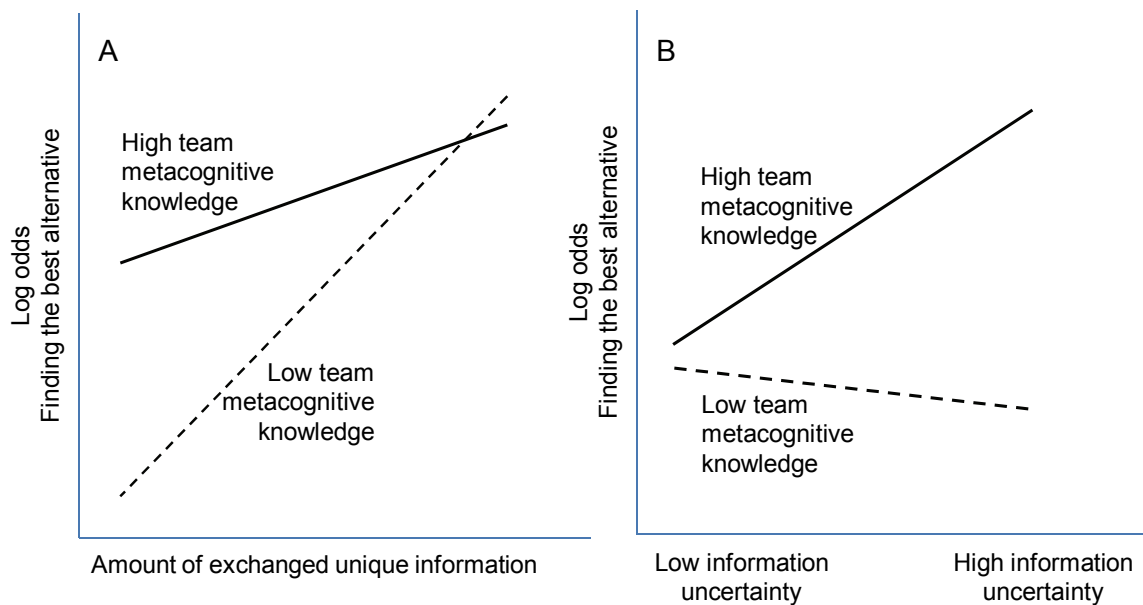
In the third step, we added the interaction terms of the unique information exchanged and information uncertainty with team metacognitive knowledge. The full model was significant,  $\chi^2(6) = 43.02$ ,  $p < .001$ , the Nagelkerke Pseudo- $R^2$  increased to .78, and the  $-2LL$  decreased to 22.71. Again, we conducted a  $\chi^2$ -difference-test between the main effects model and the full model which shows a significant improvement of the model,  $\chi^2(2) = 12.41$ ,  $p < .01$ . This indicates that the inclusion of the interaction terms enhances the predictive power of the model beyond the effect of the main effects.

Hypothesis 3 proposed that the benefit of sharing unique information is greater for teams lower in metacognitive knowledge than for those higher in metacognitive knowledge. The coefficient of the interaction term is positive and significant,  $B = 0.43$ ,  $p < .05$ . To better understand the nature of this interaction we create a graph following the recommendations by Jaccard (2001) and plot the predicted log odds on the y-axis. This has the advantage that the results are presented in linear functions even if the underlying logistic function is not linear. Figure 6A shows the graph. The x-axis represents the amount of unique information exchanged, the y-axis is the log odds for



the teams to find the best alternative. We plot lines for low team metacognitive knowledge (one standard deviation below the mean) and high team metacognitive knowledge (one standard deviation above the mean). For both lines the slope is positive, but for teams with lower metacognitive knowledge the slope is steeper. Further, the graph shows that for lower levels of unique information exchanged teams higher in metacognitive knowledge perform better than teams lower in metacognitive knowledge, whereas this difference disappears when higher levels of unique information are exchanged. This provides support for hypothesis 3.

In hypothesis 4 we postulated that the benefit of high metacognitive knowledge for team performance is greater when facing high information uncertainty than when facing low information uncertainty. The coefficient for the interaction term is significant and positive,  $B = 13.18$ ,  $p < .05$ . Again we created a graph to visualize the nature of the interaction and present it in Figure 6B. We plotted the information uncertainty on the x-axis and the log odds for the teams to find the best alternative on the y-axis. The lines represent low team-level metacognitive knowledge and high team-level metacognitive knowledge. The slope for teams with high metacognitive knowledge is more positive than the slope for teams with low metacognitive knowledge. This finding provides support for hypothesis 4.



**Figure 6: Moderating effect of team-level metacognitive knowledge (A) on the relationship of the amount of exchanged unique information and the log odds of finding the best alternative in the team decision making task and (B) on the relationship of information uncertainty and the log odds of finding the best alternative in the team decision making task.**

### 3.5 Discussion and conclusion

In the current study, we investigated an entrepreneurial decision making process at the team level. We drew on a hidden profile task and conjointly considered a team's metacognitive knowledge and information uncertainty. As in other studies (Hollingshead, 1996; Schulz-Hardt, et al., 2006; Stasser & Titus, 1985) the majority of teams were not able to solve the hidden profile and we showed that the pooling of unique information is an important factor for high quality decision (cf. Mesmer-Magnus & DeChurch, 2009). This offers an alternative explanation for the finding by Chandler and Lyon (2009) that new team members in entrepreneurial teams do not enhance the teams' knowledge acquisition and do not improve venture performance. The authors suggest that new members disrupt the social order in an entrepreneurial team. Based on our results we suggest that a team's knowledge pool will stay limited when the team does not integrate the unique information brought up by new members. Contrary to our hypothesis we did not find a significant main effect for information uncertainty even

though its experimental manipulation was successful. However, we found that the relationships between information uncertainty, team metacognitive knowledge, exchanging unique information, and decision quality were more complex than the main effects. Teams lower in metacognitive knowledge benefit more from higher amounts of unique information exchanged than teams higher in metacognitive knowledge. Further, whereas teams lower in metacognitive knowledge did not perform better under higher information uncertainty than under lower information uncertainty, teams higher in metacognitive knowledge did.

#### *3.5.1 Theoretical implications*

The current study contributes to research on entrepreneurial decision making, on team decision making, and on metacognition. First, it extends previous research on individual entrepreneurs' cognitive biases (R. A. Baron, 2004; Busenitz & Barney, 1997) by focusing on team decision making and by showing how biases in team-level entrepreneurial decision processes can arise. Previous research on entrepreneurial teams usually assumes that entrepreneurial teams are beneficial for new venture performance (Amason, et al., 2006; Brush, et al., 2001; Colombo & Grilli, 2005), in particular when the team possesses broad cognitive resources (Cantner, Goethner, & Stuetzer, 2010). Given their purpose, these studies usually focus on team composition and do not investigate actual team decision processes. We could show that entrepreneurial decision in teams are not necessarily better than individual decisions and can be effortful. Thus, investigating teams during ongoing decision making processes can complement our understanding of entrepreneurial decision making and our understanding of the functioning of entrepreneurial teams.

Second, extending research that has demonstrated the importance of pooling initially unique information (Larson, et al., 1998; Winqvist & Larson, 1998), we show that not all teams benefit equally from this information. Team metacognitive knowledge compensated shortages of pooled information. This finding is consistent with a qualitative study by Wineburg (1998) which proposed that at the individual level metacognitive knowledge can compensate for expertise. Therefore, while teams higher

in metacognitive knowledge can make the best out of the unique information that has been pooled during discussion, teams lower in metacognitive knowledge need to exchange more of this information to enhance decision quality. This gives insight into the process how teams can translate information that has been shared into a high quality decision.

Finally, our study also contributes to research on metacognition. So far, the focus has mainly been on the individual level for decision making tasks in learning (Efklides, 2009; Schmidt & Ford, 2003) and in entrepreneurial contexts (Haynie & Shepherd, 2009; Haynie, et al., 2010). As metacognition includes interpersonal aspects (Mevarech & Kramarski, 2003), it appears useful to analyze its impact on entrepreneurial team level outcomes. Indeed, the understanding of others' thought processes are more relevant in team interactions than in individual tasks. Thus, aspects of metacognitive knowledge are particularly helpful when others' cognitive processes need to be considered. We showed that metacognitive knowledge plays an important role in entrepreneurial tasks on the team level. This sheds light on a different aspect of metacognitive knowledge and helps to gain a more complete picture of it.

#### *3.5.2 Practical Implications*

This study has several practical implications for teams that want to achieve a high quality in team-level decision making tasks. First, as several authors (Hunton, 2001; Larson, Foster-Fishman, & Keys, 1994; Okhuysen & Eisenhardt, 2002) have already suggested, teams can be encouraged to share more initially unique information and pay more attention to it during the discussion. The members should explicitly address the new information that they have learned from their fellow members and integrate it into a holistic picture of the decision making situation.

Second, based on our results, we suggest that providing teams with metacognitive training can improve decision quality. Metacognition is an ability that develops over time and can be trained (Mevarech, 1999; Nietfeld & Schraw, 2002; Schmidt & Ford, 2003). Studies have shown that metacognitive training can enhance

individuals' learning and decision making outcomes (Batha & Carroll, 2007; Schmidt & Ford, 2003). Training entrepreneurial team members to better understand the cognitive processes of their fellow members, their tasks, and the strategies that they apply can also help them to improve their decision quality. Then they will be better able to benefit from information that is exchanged in their team.

Finally, teams higher in metacognitive knowledge performed better under higher information uncertainty than under lower information uncertainty, but teams lower in metacognitive knowledge did not. Teams were likely challenged by information uncertainty. Thus, it might be helpful for achieving high decision quality to challenge teams. This might stimulate teams to fully exploit their available resources and give their best. However, teams lacking the necessary resources should be trained to enable them to master the challenge.

#### *3.5.3 Limitations and Future Research*

As all empirical research, this study is also subject to limitations which offer opportunities for future research. To control for effects of previous interactions of the team and for team members' experience in specific fields, we focused on management students as novice entrepreneurs instead of experienced entrepreneurial teams. However, the use of student samples has been criticized in entrepreneurship research (P. B. Robinson, et al., 1991) because of the limited generalizability to real entrepreneurs. As the access to real entrepreneurial teams during their decision making process is extremely difficult, we followed the approach of other studies which suggest that student samples are an important first step to explore the strategic decision making of executives (Audia, Locke, & Smith, 2000). Future research could try to replicate our results based on a sample of actual entrepreneurial teams. Further, teams' decision quality could be related to new venture performance. Perhaps, entrepreneurial teams make worse decisions than individuals, but can compensate their negative consequences better than individual entrepreneurs because of their larger pool of resources (Brush, et al., 2001).

Another limitation results from the experimental design that we applied in this study. The decision making task is probably more artificial than a real world decision. The amount of information is usually much larger than in our decision making task, however, we used more pieces of information than previous experimental research on entrepreneurial decision making (cf. Burmeister & Schade, 2007; Y. R. Choi & Shepherd, 2004; Palich & Bagby, 1995).

Further, information uncertainty was only varied on two levels – high vs. low. This reduces the real world complexity to two rather extreme cases. However, this reduction enabled us to clearly distinguish between high and low levels of information uncertainty and manipulation checks indicated that the perceptions of the participants differed significantly. Thus, our design provides high levels of control, but is also connected to lower levels of generalizability. Future research could complement our work and investigate teams working on real and ongoing entrepreneurial decisions. But real world entrepreneurial decision making tasks with a clear and objective best solution are rare.

#### *3.5.4 Conclusions*

This study combines research on team-level entrepreneurial decision making, metacognition, and decision making under uncertainty. We show that – beyond a main effect for the amount of initially unique information pooled on decision quality – team metacognitive knowledge moderates the impact of the amount of initially unique information pooled on decision quality and the impact of information uncertainty on decision quality. Team metacognitive knowledge is particularly beneficial when only little information is available and when teams act under high levels of information uncertainty. Thus, this study demonstrates that metacognitive theory is not only relevant for individual entrepreneurs, but does also provide an opportunity to better understand team decision making processes. A better understanding of these phenomena can help to improve entrepreneurial team decision making and to design interventions that facilitate team-level information processing. We hope that this study makes a small but important step in this direction.

## **4 Relationship conflicts ain't all bad: A multi-level model of the accuracy of self-assessed team performance after an entrepreneurial decision making task<sup>10</sup>**

The preceding chapter has focused on the prediction of team performance in an entrepreneurial decision making task. This chapter investigates team members' and teams' assessments of this performance. An accurate self-assessment of team performance can help teams to learn from their experience for future decision making tasks. In this chapter I develop a multi-level model of the accuracy of self-assessed team performance. This model identifies the conditions when the accuracy of self-assessed performance at the individual-level and at the team-level is particularly high. Further, it compares the accuracy of the individuals' and teams' assessments across levels. The results show that perceptions of relationship conflict play a crucial role in the accuracy of self-assessed team performance at the individual-level, at the team-level and across levels which entails important implications for research on entrepreneurial learning and on team conflicts. Section 4.1 of this chapter provides an introduction to the topic. In Section 4.2 I review the literature on self-assessments of performance, self-enhancement theory, and construal level theory of psychological distance and I derive the study's hypotheses. Subsequently, in Section 4.3 the methodological approach is explained, followed by a presentation of the results in Section 4.4. In Section 4.5 the results, implications, and limitations of the study are discussed.

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<sup>10</sup> This chapter is based on Breugst, Patzelt, Shepherd, and Aguinis (2011) and is currently under revision at *Academy of Management Learning and Education*.

### 4.1 Introduction

Successful entrepreneurs need to learn. “They learn by doing. They learn from what works and, more importantly, from what doesn't work” (Smilor, 1997, p. 344). Only by learning entrepreneurs can process new information and build up a pool of expertise. For example, because serial entrepreneurs can draw on a larger amount of expertise they are usually more successful than novice entrepreneurs (Politis, 2005; Westhead, Ucbasaran, Wright, & Binks, 2005; M. Wright, Westhead, & Sohl, 1998). But people's ability to learn depends on their ability to assess their performance (Bol, et al., 2005). If people have an accurate idea whether they performed well or they did not perform well in a task, they will be better able to adjust to the requirements when they are again confronted with a similar task (Schraw, Potenza, & Nebelsick-Gullet, 1993). For example, if entrepreneurs realize that their venture failed because they made a wrong decision, they will consider different decision alternatives for the next start-up project. However, previous research has shown that it is difficult for people to accurately assess their cognitive performance (Bol & Hacker, 2001; Schraw, et al., 1993; Sitzmann, Ely, Brown, & Bauer, 2010). In particular when tasks are complex or difficult, people's ability to accurately assess their performance is limited (Hertzog, Dixon, & Hultsch, 1990; Schraw, et al., 1993; Schraw & Roedel, 1994).

Many ventures are started not started by an individual entrepreneur, but by entrepreneurial teams who make key strategic decisions (A. C. Cooper & Daily, 1997; Gruber, et al., 2008; West, 2007). Therefore, entrepreneurs do not only have to assess their own performance, but they and their co-founders have to assess their team's performance as well. Team decision making processes are connected to higher levels of complexity than processes at the individual level (Kerr & Tindale, 2004; Kozlowski & Ilgen, 2006). Thus, the question arises how well teams are able to assess their performance after an entrepreneurial decision making task. Are individuals and teams equally able to accurately assess team performance? Are there any specific characteristics of the team context that improve the accuracy of the self-assessments?



To address these questions we build on self-enhancement theory and construal level theory of psychological distance and develop a multi-level model of the accuracy of self-assessed team performance. We test this model using a sample of 156 students nested within 52 teams assembled for a typical entrepreneurial task – the decision for one out of several entrepreneurial opportunities (Y. R. Choi & Shepherd, 2004). The team task had the structure of a hidden profile task (Stasser & Titus, 1985). Thus, there was an objective best solution that the team could only discover when pooling all its information. After the task, participants were asked to assess their team's performance in the task individually and as a team (order of assessments varied). The results showed a positive relationship between a team's objective performance and self-assessment of team performance. However, there was variance in this relationship which could be explained by the team context – the perception of relationship conflict. For individual and team assessments, relationship conflict improves the accuracy of performance assessments. Further, when performance assessments are compared across levels, the individual's perception of relationship conflict and the team's collective perception of relationship conflict interact in such a way that the individual's accuracy in team performance assessment benefits from perceived relationship conflict only when the team's collective perception of relationship conflict is low.

This study makes three primary contributions. First, whereas previous research has stressed the importance of learning in the entrepreneurial context (Dimov, 2007b; Harrison & Leitch, 2005; Krauss, Frese, Friedrich, & Unger, 2005), knowledge about the entrepreneurs' self-assessments of their decision making processes is rather limited (Bryant, 2007). However, this is an important facet of entrepreneurs' learning about themselves which helps entrepreneurs to understand their strengths and weaknesses (Cope, 2005, in press). Our study focuses on the members' and the teams' abilities to self-assess team performance which is an important requisite of entrepreneurial learning.

Second, although research on self-assessment at the individual level has made an important contribution to the literature (and will likely continue to do so), given the

prevalence of teams in the field of entrepreneurship (Boni, Weingart, & Evenson, 2009; Davidsson & Wiklund, 2001; Kamm, Shuman, Seeger, & Nurick, 1990; Lechler, 2001) and in organizational life (Hollenbeck et al., 1995; Stevens & Campion, 1994; van Ginkel & van Knippenberg, 2008), there is a need to investigate self-assessments at the team level. We do this by investigating individuals' assessments of team performance and teams' assessment of team performance. Our multi-level model of the accuracy of self-assessed team performance integrates the social context of self-assessments.

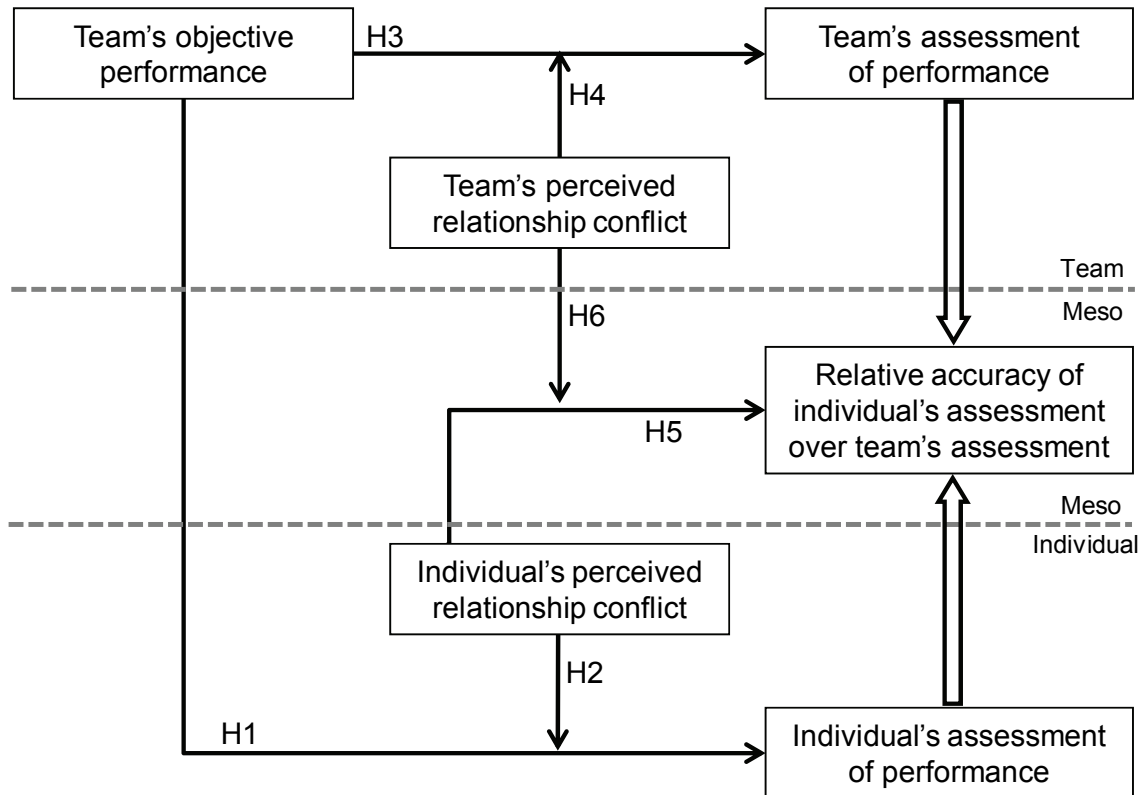
Finally, we contribute to the literature on team conflict. Most studies have found that relationship conflict diminishes task performance (Amason, 1996; Foo, 2011b; Langfred, 2007). In this study, we highlight an important exception: Relationship conflict does not diminish task performance when the task is the assessment of a team's performance on a task. Our results show that at the individual and at the team level, relationship conflict enhances the accuracy of the assessment of team performance.

This paper proceeds as follows. In the next section we will develop our theoretical model and derive the hypotheses. Then we will explain the research method, including the sample, design, variables, and the analyses. Afterwards we will present and discuss the results. Before our conclusion we point out future research opportunities.

### **4.2 Theory development**

In our multi-level model of the accuracy of self-assessed team performance we focus on the questions of how well and when members' and teams' performance assessments reflect objective team performance in an entrepreneurial decision making task. Figure 7 depicts this model. Individuals make assessments and the accuracy of those assessments is influenced by their perception of relationship conflict experienced during the task. Further, teams make assessments and the accuracy of those assessments is influenced by their collective perception of relationship conflict. Across levels, the relative accuracy of an individual's assessment over the accuracy of his or her team's assessment depends on the individual's perceived relationship conflict. The nature of

this contingent relationship depends on the team's perception of relationship conflict. Building on the literatures on team conflicts, self-enhancement, and psychological distance, we develop each of these relationships in the subsequent sections.



**Figure 7: A multi-level model of the role of relationship conflict on the accuracy of self-assessed team performance**

#### 4.2.1 Individuals' assessment of team performance

We define teams as “a distinguishable set of two or more people who interact, dynamically, interdependently, and adaptively toward a common and valued goal/objective/mission, who have each been assigned specific roles or functions to perform, and who have a limited life-span of membership” (Salas, et al., 1992, p. 4).<sup>11</sup> To achieve their collective outcome all members need to contribute to the team's task (S. G. Cohen & Bailey, 1997). When the team task is the selection of an entrepreneurial

<sup>11</sup>In this paper we will use the term team, but following previous work in the field of team and small group research (G. Chen & Kanfer, 2006; S. G. Cohen & Bailey, 1997), we do not make an explicit distinction between teams and groups.

opportunity, the common goal is to identify the most promising opportunity out of several alternatives for exploitation (Gruber, et al., 2008) and only when all members share their unique information the team can achieve a high team performance, i.e. a high decision quality (Schulz-Hardt, et al., 2006; Stasser & Titus, 1985).

For a number of tasks, there are objective criteria which indicate how well a team performed, e.g., the amount of coal mined by a team (Goodman & Leyden, 1991), the correct assembly of devices (K. Lewis, Belliveau, Herndon, & Keller, 2007), or the sales performance of teams in retail stores (George & Bettenhausen, 1990). For other tasks, the level of performance is less clear and teams depend on feedback (DeShon, Kozlowski, Schmidt, Milner, & Wiechmann, 2004). But because of the uncertainty surrounding entrepreneurial decision making tasks (McMullen & Shepherd, 2006) definitive and well-timed feedback is rarely available (Gifford, et al., 1979; P. R. Lawrence & Lorsch, 1967). Thus, for an idea how well they performed members and teams need to rely on their self-assessments of team performance in these decision making tasks. However, members may not always be fully aware of the objective performance of their team as it is often difficult for people to accurately assess their own performance. In a recent meta-analysis Sitzman et al. (2010) found that the mean corrected correlation of self-assessment of cognitive performance and actual performance was only moderate ( $\rho = .34$ ).

This divergence of perceived performance assessments from objective performance can be explained by self-enhancement theory or by the construal level theory of psychological distance. First, according to self-enhancement theory (Allport, 1937) individuals want to achieve or maintain a positive image of the self and to increase self-esteem. For example, people believe that they are responsible for success but not for failure (self-serving bias; Bradley, 1978) or they think that their current self is better than past selves (Wilson & Ross, 2001). This tendency to self-enhance also occurs in social environments – individuals rate their own group more positively than out-groups (Rabbie & Horwitz, 1969). This effect even occurs in a minimal group situation – membership is based on an irrelevant criterion, the group only exists for a

short time, and membership is anonymous (Gaertner & Insko, 2000; Oakes & Turner, 1980).

A second reason why people may have difficulties in accurately assessing their teams' performance is that they establish high levels of identification with their teams during and after a team task (Turner, Hogg, Oakes, Reicher, & Wetherell, 1987). Thus, when team members highly identify with a team, they have greater difficulty psychologically distancing themselves from that team and its tasks than do those with lower identification (Libby, Shaeffer, & Eibach, 2009; Trope & Liberman, 2010). Psychological distance enables the individual to remember and recall their team discussion from a global and third-person perspective – as a more abstract and superordinate representation with a focus on central features rather than a representation based on idiosyncratic information (Liberman & Trope, 2008; Trope & Liberman, 2010) – and encourages greater adaptive self-reflection (Ayduk & Kross, 2010). Thus, psychological distance can enhance the accuracy of assessments of team performance because members are more likely to recall central features of the team discussion which are relevant for performance such as if everyone contributed pieces of information to the team discussion. Unimportant details such as the order in which the members spoke or their initial preferences are less salient. In contrast, a reduced psychological distance due to their stronger identification with the team will constrain the members' accurate performance assessment. We offer the following hypothesis as a baseline from which other hypotheses are built:

*Hypothesis 1: Individuals' assessment of team performance is higher when the team's objective performance was a success than when it was failure.*

Although individuals' assessment of team performance in an entrepreneurial decision making task can be obstructed because of their tendency to self-enhance and/or their strong identification with the team, the extent of this obstruction likely depends on the level of perceived relationship conflict within the team. Relationship conflict is defined as “interpersonal incompatibilities among group members, which typically

includes tension, animosity, and annoyance among members within a group” (Jehn, 1995, p. 258). Thus, relationship conflict is related to interpersonal issues and is distinct from task conflict – conflict about the *content* of the team task. Perceived relationship conflict can reduce the obstructions to individuals’ accurate assessments of team performance.

Relationship conflict likely reduces members’ self-enhancement tendencies. According to the depressive realism view (Alloy & Abramson, 1979), negative affect leads to less bias and more realistic information processing. Team members who perceive higher relationship conflict are likely to experience higher levels of negative affect (Jehn, 1995; von Glinow, Shapiro, & Brett, 2004) thereby increasing the accuracy in assessing team performance. Furthermore, relationship conflict can lead members to develop a more negative view of the team (De Dreu & van Knippenberg, 2005) reducing in-group favoritism (Hogg & Terry, 2000). Because of their reduced tendency to self-enhance – based on higher levels of perceived relationship conflict – these individuals are more likely to accurately assess their team’s performance than those who perceive lower levels of relationship conflict.

Furthermore, perceptions of higher relationship conflict will likely decrease identification with the team increasing the psychological distance between the individual and his or her team (De Dreu & Beersma, 2005; De Dreu & van Vianen, 2001). Members who perceive relationship conflict to be higher will likely want to distance themselves from their team as people have a tendency to distance themselves from others with characteristics that they judge as undesirable (Schimel, Pyszczynski, Greenberg, O'Mahen, & Arndt, 2000). This psychological distance focuses the team members’ attention on central features of the task such that they will have a more global view of team performance (Lieberman & Trope, 2008; Trope & Liberman, 2010). That is, when asked to assess their team’s performance, individuals that have gained greater psychological distance as a result of perceived relationship conflict are in a more adequate “state of mind” to judge the team discussions and actions holistically and to retrospectively acknowledge what went well and what did not. In contrast, when

members perceive relationship conflict to be lower, they strongly identify with the team and have difficulties distancing themselves sufficiently to gain a global perspective about the team and its performance on the task. This will likely result in a less accurate assessment of team performance. Thus,

*Hypothesis 2: The positive relationship between objective team performance and individuals' assessment of team performance is greater for those who perceived greater relationship conflict than those who perceive lesser relationship conflict.*

### 4.2.2 Teams' assessment of team performance

The team's collective assessment of its performance will also be related to its objective performance, but will not perfectly reflect it. Teams generally want to achieve positive in-group evaluations (Brewer, 1991). Thus, the team as a whole will be inclined to increase its image by assessing its performance in a team-serving way. When members collectively discuss the assessment of team performance, they will likely place greater emphasis on those criteria in which the team excelled and less emphasis on those criteria in which it did not. Such a collective decision making process helps contribute to a positive team climate, which is a goal strived for by most people (Baumeister & Leary, 1995). Further, when the team discusses its performance assessment, members want to present themselves in a positive light in front of the other members (Isenberg, 1986; Van Swol, 2009). Mentioning positive cues about the team's performance will help them to achieve this goal. But this tendency to self-enhance and to "team-enhance" likely distorts the team's assessment of its performance.

After the team task, the common team identity will still be highly salient to the members resulting in a high identification with the team (E.-J. Lee, 2007; Mackie, 1986). This will reduce the team's psychological distance to the team's discussion and to the task (cf. Libby, et al., 2009). For example, people usually describe teams in which they are involved in a less abstract way than teams in which they are not involved (Linville, Fischer, & Yoon, 1996). This can obstruct an accurate assessment of team performance. However, despite obstructions, objective performance is likely to still

influence the assessment of team performance. Thus, we hypothesize, as a second baseline, the following:

*Hypothesis 3: Teams' assessment of team performance is higher when the team's objective performance was a success than when it was a failure.*

Teams that perceive higher relationship conflict will likely experience more hostile communications during the task (De Dreu & van Knippenberg, 2005; Pelled, 1996a). The team will be less inclined to collectively protect the team environment given that relationship conflict signals that this climate is flawed. Thus, members feel less obliged to be positive in comments about the team. Further, the members are less motivated to “build up” the team climate because their need to belong to the team is likely reduced (Baumeister & Leary, 1995). This decreases the motivation for positive evaluations (cf. Brewer, 1991). Therefore, relationship conflict will likely lead teams to less biased – more accurate – assessments of team performance.

Furthermore, in teams experiencing higher levels of relationship conflict members feel less involved with it (Hobman, Bordia, & Gallois, 2003). When the involvement with a team is lower, individuals perceive the team in a more abstract and general way (Linville, et al., 1996). Thus, relationship conflict will enhance the psychological distance of the collective from the team's discussions and actions during its task. Connected to this higher distance is the team's ability to reflect about the task from a more neutral and global position (Ayduk & Kross, 2010; Liberman & Forster, 2009). Consequently, teams having perceived higher levels of relationship conflict will discuss performance at a more abstract level and in a “cool” and calculated fashion (Kross & Ayduk, 2008). This type of discussion will help teams to derive a more accurate image of their performance. In contrast, teams with lower levels of relationship conflict will be more involved with the team and their task making it more difficult to establish psychological distance, and, as a result, will likely fail to see the “big picture” of their teams' performance (Liberman & Trope, 2008; Trope & Liberman, 2010). Thus:



*Hypothesis 4: The positive relationship between objective team performance and the team's assessment of its performance is greater for teams that perceive greater relationship conflict than those who perceive lesser relationship conflict.*

### 4.2.3 Relationship conflict and accuracy across levels

Teams usually outperform individuals in judgment tasks (Gigone & Hastie, 1997; Hill, 1982; Laughlin, Bonner, & Altermatt, 1998) because the members' errors will likely cancel each other out (Gigone & Hastie, 1997) and because members contribute important cues that help to make more accurate judgments (Van Swol, 2009). As a result of their perception of relationship conflict members will likely withdraw themselves from the team and future interactions (De Dreu & Beersma, 2005; Jehn, 1995). In smaller teams this is particularly detrimental because in smaller teams an individual is more influential on a team's decision (Mannes, 2009). Thus, teams will lose important resources if members do not contribute to the teams' assessments. The team therefore lacks the ideas and perspectives of this member, which will likely decrease the accuracy of team's assessment of team performance. However, in comparison to the team's assessment of team performance, the accuracy of an individual's assessment will not be as negatively affected by his or her withdrawal. With greater relationship conflict he or she will likely identify less with the team (De Dreu & Beersma, 2005) enabling greater psychological distance from it (Libby, et al., 2009). As we have proposed above, greater psychological distance facilitates a more global perspective that enhances assessment accuracy. Thus,

*Hypothesis 5: The greater an individual's perceived relationship conflict the more accurate is his or her assessment of team performance relative to the team's assessment of its performance.*

When an individual's perception of relationship conflict is high, but the team's perception is low, the individual's perception does not match the team's perception. As people generally feel uncomfortable to express dissent and prefer to withdraw from groups with which they disagree (Morrison & Milliken, 2000), individuals who perceive

relationship conflict to be higher will likely withdraw from teams that perceive relationship conflict to be low. These teams who perceive lower relationship conflict will likely be more involved with their team and feel more attached to it (Baumeister & Leary, 1995). This will be accompanied by a lower psychological distance (Trope & Liberman, 2010) than for the individual reducing the team's ability to assess its performance from a global perspective (Ayduk & Kross, 2010). This adversely impacts the team's accuracy of its assessment of team performance vis-à-vis the individual who perceives greater relationship conflict.

In contrast, when both the individual and the team perceive high relationship conflict all members will identify less with the team (De Dreu & Beersma, 2005) and will hence gain psychological distance from it. The whole team will thus discuss the team's performance in a distanced and objective way which will help to come to a more accurate assessment of its performance (Wyer, Perfect, & Pahl, 2010). Further, the members will feel that they can be more honest with each other because interactions laden with conflict will provoke less polite reactions (Ohbuchi, Chiba, & Fukushima, 1996). Thus, they will provide each other with comprehensive information about their team's performance. For the individuals, although the information is revealed to them and the team as a whole, they are less likely to process and register all the information revealed, preferring to place greater emphasis on their information and discount the information revealed by others. Thus, when both individuals and the team perceive high relationship conflict, teams will be more accurate than individuals.

When the individual's perception of relationship conflict is low, the team's and the individual's assessments will be similarly accurate. Because of the lower perceived relationship conflict the individual will feel committed to and involved with the team. Consequently, they will have difficulties to take an objective and distant position for the performance assessment of their team. This will not only distort their own performance assessment, but this will also distort the input from which the team assessment is made. Thus, the level of accuracy will be similar for teams' and individuals' assessments when

the individual perceives relationship conflict to be lower than does the collective of the team. Thus,

*Hypothesis 6: The positive relationship between individuals' perceived relationship conflict and the accuracy of their assessment of team performance relative to the team's assessment is more positive when the team's perception of relationship conflict is low than when it is high.*

### 4.3 Methodology

#### 4.3.1 Participants, research setting, and design

In order to control for effects of previous interactions of the team and for team members' different experience with each other and their team, we focused on business students as teams of novice entrepreneurs. Our sample consists of 156 undergraduate business students enrolled at a German university nested in 52 teams. The students were recruited in business and economics lectures to ensure that they could make an informed decision about an entrepreneurial opportunity (see description below). The students were compensated with 20 € each (~ USD 25) for participation. We grouped three students into one team and invited them to each session. On average, the participants were 24.31 years old ( $SD = 2.54$ ) and 73 (46.8 %) were male.

We used a hidden profile task (Stasser & Titus, 1985) to initiate a team interaction that could constitute the basis for our research variables. The teams were asked to choose the most attractive business opportunity from four alternatives. Before the team discussion, students received information sets about decision alternatives. Some pieces of information were given only to one member and some pieces were given to all members of a team. These pieces of information were distributed amongst members in such a way that only when all information is pooled by the members the optimal decision alternative could be identified.

Table 9 displays the distribution of the information pieces among participants. Overall, there are 32 pieces of information – eight for each decision alternative (possible business opportunity). For the optimal solution (alternative A in Table 9) there

are six positive and two negative pieces of information, whereas for the suboptimal alternatives (B-D in Table 9) there are three positive and five negative pieces of information. However, the information set for each individual contained more positive than negative pieces of information for all suboptimal alternatives, but the same number of positive and negative pieces of information for the optimal solution. Thus, the optimal solution is hidden to the participants.<sup>12</sup>

**Table 9: Distribution of information in the hidden profile experiment**

	Alternative A	Alternative B	Alternative C	Alternative D
Common information				
Positive	0	3	3	3
Negative	2	0	0	0
Unique information				
Positive	6	0	0	0
Negative	0	5	5	5
Team member 1				
Positive	2	3	3	3
Negative	2	1	2	2
Team member 2				
Positive	2	3	3	3
Negative	2	2	1	2
Team member 3				
Positive	2	3	3	3
Negative	2	2	2	1

Our study has one experimental factor with two levels (performance assessment from the individual's perspective first vs. performance assessment from the team's perspective first) which was manipulated between teams (see description below). We

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<sup>12</sup> Only 25 (16 %) out of our 156 participants chose the optimal alternative before the discussion based on their information set which indicates that the optimal alternative is indeed hidden to them. However, in a pretest when all 32 pieces of information were available for an individual participant, participants significantly preferred the optimal solution,  $\chi^2(3) = 63.05$ ,  $p < .000$ , Kendall's  $W = .43$ . This indicates that we have successfully constructed information sets for the four alternatives with one clear optimal solution and three inferior ones.

assigned the teams randomly to one of the conditions with the restriction that there are 26 teams in each condition.

### 4.3.2. Procedure

For each session we invited three students to our lab. The experimenter welcomed them and informed them about the procedure of the study. The participants were then asked to imagine being an entrepreneurial team that has just invented the three dimensional printing technology (cf. Shane, 2000). They were told that they had already identified four potential business opportunities to exploit from their technology. As a team they should now decide on one of these opportunities. Each of them should take the role of a member of the entrepreneurial team – a marketing manager, a financial manager, and an operations manager. These managerial roles were randomly assigned and each participant received an information set specific to his or her role. They were asked to study their information sets carefully to discuss the alternatives without needing to continuously check their sets, but they were allowed to keep their information sets during the subsequent team interaction. The participants had as much time as they needed to become familiar with the situation and their information sets.

After studying the materials the teams were asked to discuss and decide which of the four alternatives they wanted to exploit as an entrepreneurial team of a new venture. They were told that they should take as much time as they needed, but that usually teams would finish within 30 minutes. We did not want to generate time pressure, but this time period was suggested to avoid “never-ending” discussions and to keep the teams focused on their task. When a team discussed for more than 30 minutes, they were reminded of this time frame, but no further time limits were specified (cf. Schulz-Hardt, et al., 2006 for a similar procedure). A discussion was considered to be finished when the team recorded its decision on a provided decision sheet. The average discussion time was approximately 22 minutes ( $M = 21.63$  min,  $SD = 8.14$  min).

After the discussion, the participants were asked to fill out post-experimental questionnaires. For one half of the teams, we asked them to individually fill out a

questionnaire assessing team performance. After this individual assessment of the team's performance we asked the team as a whole to assess the team's performance. We gave the whole team a single copy of the same questionnaire and asked them to come to a consensus with respect to each item (consensus method, cf. Quigley, Tekleab, & Tesluk, 2007). They had as much time as they wanted to fill out the questionnaire. The other half of the teams was first asked to assess the team's performance from the team's perspective. Subsequently the individual members were asked to assess the team's performance independently of the team's assessment from their own perspective.

After the assessments of performance we gave another questionnaire to the participants individually. In this questionnaire, we assessed the team members' perception of task and relationship conflict. Subsequently we measured further demographic variables of the participants. Then they were debriefed and the nature of the hidden profile task was explained. Finally they were paid their reimbursement and left the lab.

#### *4.3.3 Measures and variables*

*Dependent variables.* To test our hypotheses we specify three different models – one at the individual level, one at the team level, and one across levels – with different dependent variables. First, at the individual level the dependent variable is the team members' assessment of team performance. We used a 2-item scale based on Wittenbaum and Bowman (2004). The items were “Our team performed well on the team task.” and “Our team probably performed better on the team task than the average team in this study.” The Cronbach's alpha for the scale was .83 which is considered sufficiently reliable (Hair, et al., 2006). A 7-point Likert scale with the anchors “I do not agree at all” and “I completely agree” was used to record the self-assessed performance. Second, at the team level we used the teams' assessment of team performance. It was recorded on the same scale that we used for the individuals' assessment. The Cronbach's alpha was .72 which again is considered sufficiently reliable (Hair, et al., 2006). Third, we created a cross-level variable to capture the relative accuracy of the members' assessment over the teams' assessment of team performance. We divided our

sample in teams that identified the best solution, i.e. whose objective performance was high and those that did not identify the best solution, i.e. whose objective performance was low. For the teams that performed well we subtracted the teams' assessment from the members' assessment for each team member. For the team that did not perform well we subtracted the members' assessment from the teams' assessment for each team member. Thus, higher values in this relative accuracy variable indicate that the members correctly assess high team performance more positively than the teams assess it or that the members correctly assess low team performance more negatively than the teams assess it. In contrast, lower values indicate that the teams assess high team performance more positively than the members assess it or that the teams assess low team performance more negatively than the members assess it.

*Objective team performance.* Objective team performance was directly derived from the decision sheets that teams filled out at the end of the team task. We coded a decision as 1 when the team chose the best solution. All other decisions for suboptimal solutions were coded as 0.

*Perceived relationship conflict.* We recorded the perceptions of relationship conflict during the team task with a scale developed by Jehn and coworkers (Jehn, 1995; Jehn, Chadwick, & Thatcher, 1997). The scale consists of four items, such as "How much interpersonal friction was there in your team?" and the participants' answers were recorded on 7-point Likert scales with the anchors "not at all" and "very much". Cronbach's alpha was .89 in our sample. For the individuals' perception of relationship conflict we directly used the answers of the members. For the teams' perception of relationship conflict we averaged the values of each member per team. Interrater reliability ( $ICC(1) = .40$  and  $ICC(2) = .67$ ) and interrater agreement (median  $r_{wg(j)} = .95$ ) suggest that the members' perceptions are sufficiently similar to aggregate their scores<sup>13</sup> (LeBreton & Senter, 2008).

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<sup>13</sup> Only the  $ICC(2)$  was slightly below the suggested cut-off of .7 (LeBreton & Senter, 2008).

*Control variables.*<sup>14</sup> As relationship conflict often follows or is accompanied by task conflict (T. L. Simons & Peterson, 2000), we controlled for the *perceived task conflict* during the team task. Controlling for task conflict we ensure that the personal frictions within a team help members and teams to assess their performance more accurately and that this effect will not occur for a different type of conflict related to the task. Again, we used the scale developed by Jehn and coworkers (Jehn, 1995; Jehn, et al., 1997). It consists of four items, such as “How different were your views on the content of your project?” and the participants’ answers were recorded on 7-point Likert scales with the anchors “not at all” and “very much”. Cronbach’s alpha was .85 in our sample. The individuals’ perceptions of task conflict were derived from the answers of the team members. The members’ values were then averaged for each team to obtain a team-level score of perceived task conflict. Acceptable values of interrater reliability ( $ICC(1) = .46$  and  $ICC(2) = .72$ ) and interrater agreement (median  $r_{wg(j)} = .85$ ) indicate that the aggregation is justified (LeBreton & Senter, 2008).

We manipulated the *order of the performance assessment* resulting in two different experimental conditions. We asked half of the teams to make the assessment of the team’s performance first from the individuals’ perspective and then conjointly as a team (26 teams). The other half was asked to make the assessment as a team first and then as individuals (26 teams). We controlled for the order of the performance assessment because individuals’ assessments can be influenced by preceding teams’ assessments and vice versa. This variable was dummy coded – 0 denotes individuals’ assessment first, 1 denotes teams’ assessment first.

As another control variable we included the *duration of the team task*. Teams need time to exchange and process their information (Karau & Kelly, 1992) so that a longer interaction could affect the team’s performance. Further, when team members

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<sup>14</sup> Because researchers have been cautioned about the use of control variables lately (Spector & Brannick, 2011), we only included important control variables for theory-based reasons and because they have been used as controls in related research to make our results comparable to this research (De Dreu, 2006; Jehn, 1995; Langfred, 2007). However, our results do not change (sign and significance) if all control variables are excluded or if further control variables are included in the models (in particular we reran all the analyses controlling for information uncertainty – an experimental factor that we manipulated for a different purpose than this study).



interact for a longer period, their views are more likely to assimilate (Kozlowski & Bell, 2003). This variable was derived from the videos of the team interaction and entered in seconds in the analysis. To control for potential *age* (cf. Barron & Sackett, 2008) or *gender* (cf. Soll & Klayman, 2004) effects at the individual level we asked the students to indicate their year of birth and their gender at the end of our study. From the year of birth we computed the students' age in years. Gender was entered as a dummy variable in the analysis – 0 denotes males, 1 denotes females.

*Translation procedure.* All scales were translated into German using a back-and-forth translation procedure recommended by Brislin (1970, 1980) to ensure maximal consistency between the translated and original scales. A German native speaker fluent in English translated the scales into German and a native English speaker fluent in German translated it back to English. We compared the original and the back-translated versions and found no substantial differences between them.

### 4.3.4 Data analysis

The testing of our hypotheses necessitates three different dependent variables each relating to a different level of analysis. For the relationship of objective team performance and the individuals' performance assessment we used a hierarchical linear modeling approach (HLM; Raudenbush & Bryk, 2002) to take into account the nested structure of our data (individuals are nested within teams) and to be able to focus on cross level effects (i.e. the interaction effect of objective team performance and the individuals' perceptions of relationship conflict). All variables were grand-mean centered before they were entered in the analysis. As an indicator for the explained variance in the dependent variable, we report Pseudo  $R^2$  based on the formula by Snijders and Bosker (1999). This statistic is based on the reduction of level 1 and level 2 error variances because of the inclusion of the independent variables.

For the relationship of objective team performance and the teams' performance assessment we used an ordinary least squares (OLS) regression because the dependent variable (assessment of team performance from the team's perspective) was measured at

the team level. As independent variables we included objective team performance, the team's perception of relationship conflict, and we computed and included an interaction term between these variables after centering them around their mean.

The third dependent variable is the relative accuracy of the members' assessment over the teams' assessment of team performance. As each individual has a value for this variable we use again a HLM approach. Again, all variables were grand-mean centered and we report Pseudo  $R^2$ .

### 4.4 Results

Table 10 shows the means, standard deviations, Cronbach alphas, and correlations for all variables in this study. The correlations between team's objective performance and the individuals' assessment of performance and between team's objective performance and the teams' assessment of performance are significant and positive ( $r = .17, p < .05$  and  $r = .29, p < .05$ , respectively).

**Table 10: Means, standard deviations, Cronbach's alpha, and correlations between focal variables**

		1	2	3	4	5	6	7	8	9	10	11		
1	Age	M	SD	(-)										
2	Gender <sup>a</sup>	24.31	2.54	0.11	(-)									
3	Individual's perceived task conflict	0.53	0.50	0.09	0.06	(0.85)								
4	Individual's perceived relationship conflict	3.43	1.21	-0.01	-0.03	0.54 <sup>***</sup>	(0.89)							
5	Individual performance assessment	1.66	0.97	0.02	-0.15	-0.28 <sup>***</sup>	-0.27 <sup>**</sup>	(0.83)						
6	Order of assessments <sup>b, d</sup>	5.18	0.96	0.08	0.01	-0.06	-0.05	0.11	(-)					
7	Duration of discussion [s] <sup>d</sup>	1.50	0.50	-0.02	-0.09	0.36 <sup>***</sup>	0.23 <sup>**</sup>	-0.16	-0.08	(-)				
8	Objective team performance <sup>c, d</sup>	1297.9	485.22	-0.03	-0.03	-0.16 <sup>*</sup>	-0.24 <sup>**</sup>	0.17 <sup>*</sup>	-0.29 <sup>***</sup>	0.05	(-)			
9	Team's perceived task conflict <sup>d</sup>	1.69	0.94	0.01	0.01	0.36 <sup>***</sup>	0.55 <sup>***</sup>	-0.19 <sup>*</sup>	-0.03	0.30 <sup>***</sup>	-0.23 <sup>**</sup>	(-)		
10	Team's perceived relationship conflict <sup>d</sup>	1.66	0.75	0.05	-0.01	0.49 <sup>***</sup>	0.77 <sup>***</sup>	-0.36 <sup>***</sup>	-0.06	0.29 <sup>***</sup>	-0.31 <sup>***</sup>	0.71 <sup>***</sup>	(-)	
11	Team performance assessment <sup>d</sup>	5.32	0.72	0.03	-0.20 <sup>*</sup>	-0.28 <sup>***</sup>	-0.34 <sup>***</sup>	0.65 <sup>***</sup>	0.09	-0.15	0.29 <sup>***</sup>	-0.13	-0.44 <sup>***</sup>	(0.72)

Notes:

*n* = 156 individuals, Cronbach's alpha (if applicable) is reported on the diagonal.<sup>a</sup> 0 = "male", 1 = "female."<sup>b</sup> 0 = "individuals' assessment first", 1 = "teams' assessment first."<sup>c</sup> 0 = "team chooses suboptimal solution," 1 = "team chooses optimal solution."<sup>d</sup> These variables (team level) were assigned down to individual team members.\*\*\* *p* < .001; \*\* *p* < .01; \* *p* < .05

To test our hypotheses 1 and 2 we ran a hierarchical linear model to predict the individual performance assessment of the team. Besides our control variables at the individual and team level we included the team's objective performance (level 2) and the individual's perception of relationship conflict (level 1). The results are displayed in Table 11.

**Table 11: Hierarchical linear model of individual performance assessment**

Variables	Model 1		Model 2		Model 3	
<i>Level 1 main effects</i>						
Age	-0.00	(0.03)	-0.02	(0.02)	-0.01	(0.02)
Gender <sup>a</sup>	-0.11	(0.13)	-0.15	(0.13)	-0.21	(0.13)
Individual's perceived task conflict	-0.12	(0.07)	-0.09	(0.07)	-0.11	(0.07)
Individual's perceived relationship conflict					0.31**	(0.11)
<i>Level 2 main effects</i>						
Duration of discussion	-0.00	(0.00)	-0.00	(0.00)	-0.00*	(0.00)
Order of performance assessments <sup>b</sup>	0.15	(0.21)	0.31	(0.19)	0.23	(0.16)
Objective team performance			0.48*	(0.19)	0.59**	(0.16)
<i>Cross-level interactions for objective team performance</i>						
Individual's perceived relationship conflict × objective team performance					0.91**	(0.34)
Pseudo $R^2$	0.04		0.10		0.25	

Notes:

$n = 156$  individuals (level 1) in 52 teams (level 2).

Unstandardized estimates (based on grand-mean centering) are reported, robust standard errors are in parentheses.

Pseudo  $R^2$  indicates the amount of total variance in the dependent variable explained by the predictors.

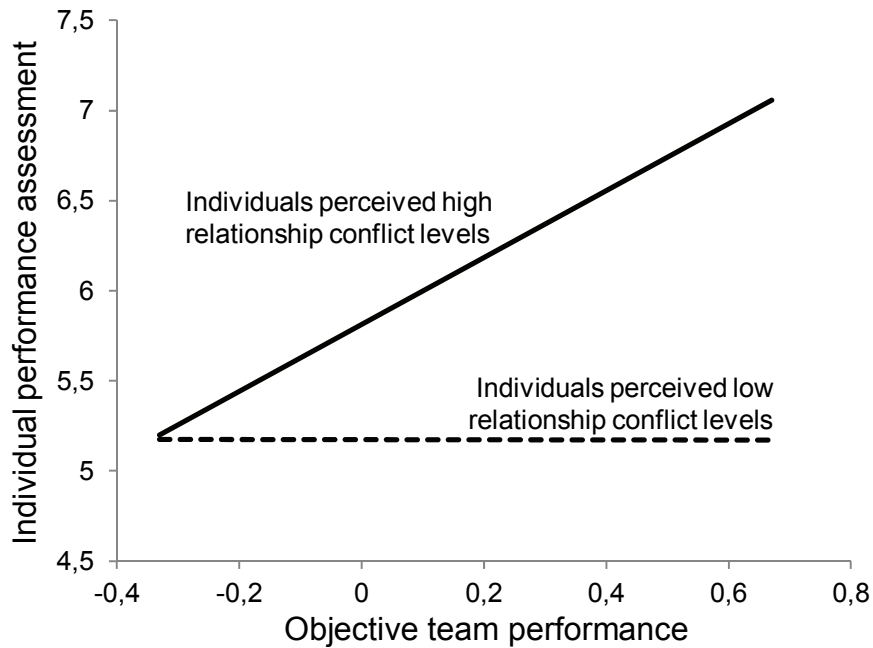
Interactions between all level 2 with all level 1 variables were also included in the model but are not displayed in the table to keep it at a manageable size.

<sup>a</sup> 0 = "male," 1 = "female."

<sup>b</sup> 0 = "individuals' assessment first," 1 = "teams' assessment first."

\*\*  $p < .01$ ; \*  $p < .05$

In a first step we included the control variables (model 1) which explained 4 percent of the variance of the individual students' performance assessment. As shown in model 2 we found that objective team performance had a positive and significant coefficient ( $\gamma = 0.48, p < .05$ ) which is consistent with hypothesis 1. Objective team performance accounted for 6 percent additional variance in individual performance assessment beyond that accounted for by controls (total  $R^2 = .10$ ). Further, in model 3 the cross-level effect between objective team performance and individuals' perceived relationship conflict (Hypothesis 2) was positive and significant ( $\gamma = 0.91, p < .01$ ). The interaction term accounted for 15 percent additional variance of individual performance assessment (total  $R^2 = .25$ ). To better understand the nature of this interaction effect, we plotted this relationship in Figure 8. The y-axis represents the members' performance assessment and the x-axis is the objective performance of the team. We plotted separate lines for higher (solid line, one standard deviation above the mean) and lower (dashed line, one standard deviation below the mean) levels of individuals' perception of relationship conflict. Figure 8 shows that the line for higher levels of relationship conflict – in contrast to the line for lower levels of relationship conflict – is steeper. This indicates that higher levels of relationship conflict are connected to a more accurate assessment of team performance from the members' perspective which is consistent with hypothesis 2.



**Figure 8: Interaction effect of objective team performance by individual's perceived relationship conflict on individual performance assessment**

Hypotheses 3 and 4 relate to the assessment of team performance from the team's perspective as the dependent variable. We applied an OLS regression and stepwise included the control variables (model 1), objective team performance and team's perceived relationship conflict (model 2), and the product between objective performance and relationship conflict (model 3). Table 12 displays the results. The control variables do not have a significant influence on the team's performance assessment and the overall model is not significant ( $R^2_{adj} = .05$ ;  $F(4, 47) = 1.62$ , n.s.). When objective team performance and the team's perceived relationship conflict are included, the explained variance rises to 24 % ( $F(6, 45) = 3.64$ ;  $p < .01$ ). The coefficient of objective team performance is positive, but it is not significant on a conventional level ( $b = 0.36$ ;  $p < .10$ ). Thus, the support for hypothesis 3 is limited.

In a next step, we included the interaction between objective team performance and the team's perceived relationship conflict. The increase in explained variance was significant ( $\Delta R^2 = .06$ ;  $p < .05$ ;  $R^2_{adj} = .29$ ;  $F(7, 44) = 3.95$ ;  $p < .01$ ). Further, the

coefficient of this interaction was positive and significant ( $b = 1.06$ ;  $p < .05$ ). To further probe this interaction, we plotted it in Figure 9. The y-axis represents the teams' performance assessment and the x-axis is the objective performance of the team. We plotted separate lines for higher (solid line, one standard deviation above the mean) and lower (dashed line, one standard deviation below the mean) levels of teams' perception of relationship conflict. Figure 9 shows that the line for higher levels of relationship conflict – in comparison to the line for lower levels of relationship conflict – is steeper. This indicates that higher levels of relationship conflict are connected to a more accurate assessment of team performance from the teams' perspective which is consistent with hypothesis 4.

**Table 12: Ordinary least square regression of team performance assessment**

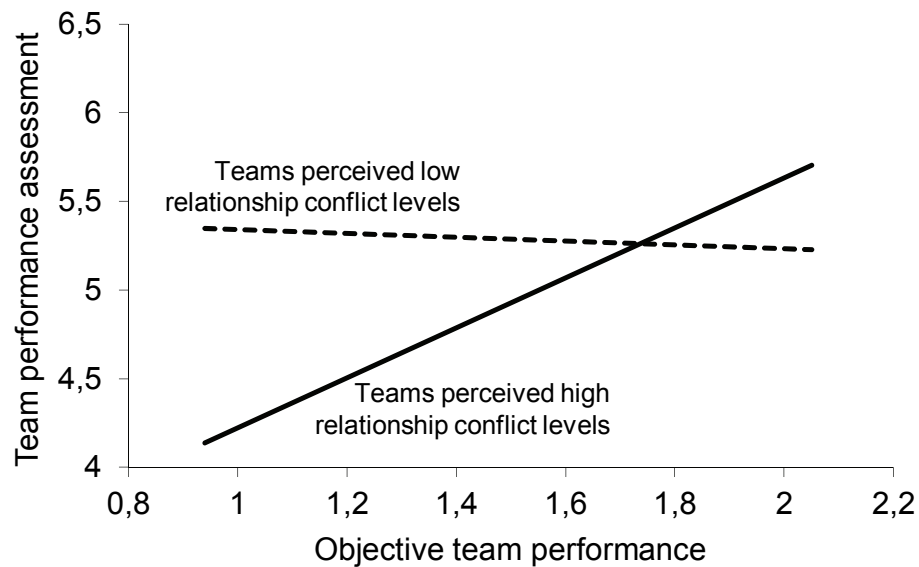
	Model 1			Model 2			Model 3		
	b	SE	$\beta$	b	SE	$\beta$	b	SE	$\beta$
Intercept	5.59***	0.33		4.91***	0.34		5.11***	0.34	
Order of performance assessments <sup>a</sup>	0.12	0.20	0.08	0.19	0.19	0.13	0.21	0.18	0.15
Duration of discussion	0.00	0.00	-0.11	0.00	0.00	-0.08	0.00	0.00	-0.10
Team's perceived task conflict	-0.07	0.11	-0.10	0.28*	0.13	0.37	0.24	0.13	0.31
Objective team Performance				0.36†	0.21	0.24	0.69*	0.26	0.45
Team's perceived relationship conflict				-0.56**	0.17	-0.59	-0.24	0.23	-0.25
Objective team performance × team's perceived relationship conflict							1.06*	0.51	0.40
Model fit	R <sup>2</sup> <sub>adj</sub> = .05; F(4, 47) = 1.62, ns			R <sup>2</sup> <sub>adj</sub> = .24; F(6, 45) = 3.64**; $\Delta R^2 = .21^{**}$			R <sup>2</sup> <sub>adj</sub> = .29; F(7, 44) = 3.95**; $\Delta R^2 = .06^*$		

Notes:

$n = 52$

<sup>a</sup> 0 = "individuals' assessment first," 1 = "teams' assessment first."

\*\*\*  $p < .001$ ; \*\*  $p < .01$ ; \*  $p < .05$ ; †  $p < .10$



**Figure 9: Interaction effect of objective team performance by team's perceived relationship conflict on team performance assessment**

Finally, we ran a third model to test hypotheses 5 and 6 related to the relative accuracy of the members' assessment over the teams' assessment of team. Table 13 displays the results of the hierarchical linear model. Again we first included the control variables at level one and level two (model 1). The explained variance of this model was close to 0. Then, we included the perceptions of relationship conflict from the individuals' and the team's perspective (model 2). We focused on the effect of the individuals' perceived relationship conflict on the relative accuracy of the members' assessment (hypothesis 5). However, model 2 in Table 13 shows that the coefficient of the individuals' perceived relationship conflict is not significant ( $b = 0.11$ ; n.s.) and did not explain any additional variance. Thus, hypothesis 5 is not supported. Hypothesis 6 relates to the effect of the interaction of individuals' perceived relationship conflict and teams' perceived relationship conflict on the relative accuracy of the members' assessment. Model 3 shows that the cross-level effect between team's and individual's perceived relationship conflict is significant ( $\gamma = -0.36$ ;  $p < .001$ ). This cross-level interaction accounted for 3 % of the variance in the relative accuracy of the members' assessment over the teams' assessment. It is depicted in Figure 10.



**Table 13: Hierarchical linear model of relative accuracy of individuals' assessment over the team's assessment**

Variables	Model 1		Model 2		Model 3	
<i>Level 1 main effects</i>						
Age	0.01	(0.02)	0.02	(0.02)	0.02	(0.03)
Gender <sup>a</sup>	0.07	(0.11)	0.05	(0.11)	0.02	(0.11)
Individual's perceived task conflict	0.08	(0.06)	0.08	(0.07)	0.07	(0.06)
Individual's perceived relationship conflict			-0.02	(0.09)	0.11	(0.11)
<i>Level 2 main effects</i>						
Duration of discussion	0.00	(0.00)	0.00	(0.00)	0.00	(0.00)
Order of performance assessments <sup>b</sup>	0.23	(0.12)	0.22	(0.12)	0.19	(0.12)
Team's perceived task conflict	-0.01	(0.11)	-0.02	(0.11)	-0.06	(0.13)
Team's perceived relationship conflict					0.05	(0.19)
<i>Cross-level interactions</i>						
Individual's perceived relationship conflict × team's perceived relationship conflict					-0.36 <sup>***</sup>	(0.07)
Pseudo $R^2$	0.00		0.00		0.03	

Notes:

$n = 156$  individuals (level 1) in 52 teams (level 2).

Unstandardized estimates (based on grand-mean centering) are reported, robust standard errors are in parentheses.

Pseudo  $R^2$  indicates the amount of total variance in the dependent variable explained by the predictors. Interactions between all level 2 with all level 1 variables were also included in the model but are not displayed in the table to keep it at a manageable size.

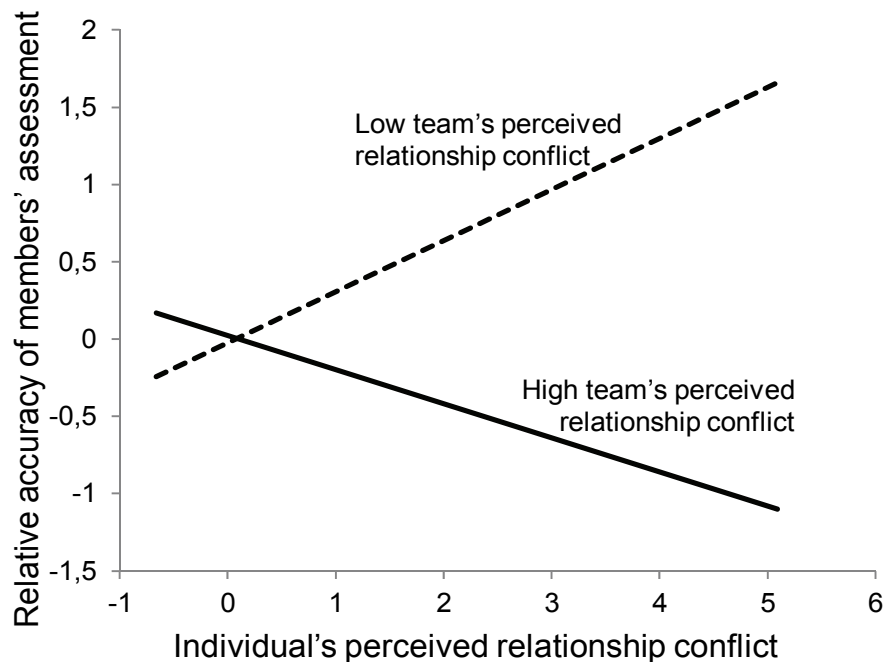
<sup>a</sup> 0 = "male," 1 = "female."

<sup>b</sup> 0 = "individuals' assessment first," 1 = "teams' assessment first."

<sup>\*\*\*</sup>  $p < .001$

On the y-axis of Figure 10 we have plotted the relative accuracy of the members' assessment – higher values indicate that the individual is more accurate in its performance assessment than its team. The x-axis represents the individuals' perceptions of relationship conflict and the separate lines represent the level of teams' perceptions of relationship conflict. Figure 10 shows that there is no difference in accuracy when the individual members perceive relationship conflict to be lower. When the individual perceives relationship conflict to be higher and the team perceives

relationship conflict to be lower (dashed line), the accuracy of the single member increases relative to the team. When the individual and the team perceive relationship conflict to be higher, the accuracy of the single member decreases relative to the team. This is consistent with hypothesis 6.



**Figure 10: Interaction effect of individual's perceived relationship conflict by team's perceived relationship conflict on the relative accuracy of individual's performance assessment over team's performance assessment**

#### 4.5 Discussion and conclusion

Entrepreneurial activity often takes place in teams (Boni, et al., 2009; Davidsson & Wiklund, 2001; Kamm, et al., 1990; Lechler, 2001). To learn from their decision making processes and to improve these processes over the time, members and teams need to be able to assess their team's performance in entrepreneurial decision making tasks. From research at the individual level, it is well-known that individuals have difficulties to accurately assess their cognitive performance (Bol & Hacker, 2001; Schraw, et al., 1993; Sitzmann, et al., 2010). But it is unclear how accurately members and teams assess team performance and if accuracy is higher under some conditions than others.

To address these questions this study proposed a theory-based multi-level model of the accuracy of self-assessed team performance which predicts when self-assessments of team performance will be more or less accurate. We conducted an experiment based on a team decision making task and largely found support for the proposed model. The results showed a positive relationship between a team's objective performance and self-assessment of team performance at the individual and at the team level. Heterogeneity in these relationships can be explained by perceived relationship conflict – higher levels improve the accuracy of performance assessments. When the accuracy of performance assessment is compared across levels, our results show that the individual's accuracy in team performance assessment benefits from higher levels of perceived relationship conflict only when the team's collective perception of relationship conflict is low.

### *4.5.1 Theoretical implications*

This study contributes to research on entrepreneurial learning, on self-assessment of performance, and on conflict in teams. First, while it has been repeatedly acknowledge that learning is an important challenge for entrepreneurs (Holcomb, Ireland, Holmes, & Hitt, 2009; Politis, 2005; Smilor, 1997), the processes how entrepreneurs build on their experience for learning are still unclear (Sardana & Scott-Kemmis, 2010). An essential prerequisite for learning from one's experience is an accurate idea what went well and what did not (Bol, et al., 2005). However, the uncertainty that frequently surrounds entrepreneurial decision making tasks (McMullen & Shepherd, 2006) makes it difficult for entrepreneurs to get definitive and well-timed feedback (Gifford, et al., 1979; P. R. Lawrence & Lorsch, 1967). Thus, entrepreneurs need to rely on their self-assessed performance for learning. As entrepreneurial activity often takes place in teams (Amason, et al., 2006; Gartner, 1985; Harper, 2008), the performance of the team as a whole needs to be assessed. Taking into account the social context in which self-assessments are made improves the accuracy of the members' and the teams' idea how their team performed. This is a first step – learning about oneself (Cope, 2005, in press) – on the way to entrepreneurial learning from experience. Future

studies on entrepreneurial learning should also consider the social context and search for factors that help members and teams to translate their experiences into learning processes. Identifying these factors will improve our understanding of entrepreneurial learning. Further, these factors will likely shed light on the relationship between previous entrepreneurial experience and venture performance (see the contrary findings by Westhead, et al., 2005; Westhead & Wright, 1998).

Second, previous research has emphasized the role of self-enhancement theory (Barron & Sackett, 2008; Heidemeier & Moser, 2009; Klein, 2001) in explaining the process how self-assessments develop. Complementing this literature, we draw on the construal level theory of psychological distance to suggest a process of how self-assessments form. Whereas self-enhancement theory emphasizes the fact that students will assess their performance higher than it actually was, construal level theory builds on the notion that a greater distance between assessor and task is helpful for more accurate performance assessments. For the purpose of our study, construal level theory was particularly useful because it explains variance in the accuracy of performance assessments beyond self-enhancement tendencies. This helps to understand the heterogeneity in the relationship between self-assessed and objective performance which can be attributed to the students' perspective on the team task – more or less distanced. These findings emphasize that scholars trying to understand the accuracy of self-assessments can profit from taking different theoretical perspectives when studying their phenomenon of interest.

Finally, while much research on relationship conflict suggests that it has a negative impact on team performance (Jehn, 1995; Langfred, 2007; Mohammed & Angell, 2004) and on new venture performance (Amason & Schweiger, 1994; Ensley & Hmieleski, 2005; Ensley, Pearson, & Amason, 2002), our study challenges this finding by presenting a specific task for which this statement does not apply. Specifically, we could show that in fact relationship conflict improves the members' and the teams' ability to accurately assess the team's performance. The correlates and consequences of relationship conflict that usually impair team performance – such as a negative view of

the team (De Dreu & van Knippenberg, 2005), a hostile communication (De Dreu & van Knippenberg, 2005; Pelled, 1996a), and lower levels of commitment to and identification with the team (De Dreu & Beersma, 2005; Hobman, et al., 2003) – improved the accuracy of self-assessed team performance. This interesting new facet of relationship conflict could be further tested in different assessment tasks. For example, perhaps relationship conflict will more generally enhance members' and teams' assessment accuracy – not only of the team's performance, but also of team processes and other, non-performance related outcomes of these processes. However, even if relationship conflict can help members of entrepreneurial teams to learn, it can be detrimental for the entrepreneurial venture. Relationship conflicts in an entrepreneurial team can trigger members' exit from the team (Ucbasaran, Lockett, Wright, & Westhead, 2003; Vanaelst et al., 2006) and hence negatively affect new venture performance (Beckman, 2006). Future research on conflicts in entrepreneurial teams is needed to shed light on these relationships. It seems to be particularly interesting to distinguish teams that are able to transform relationship conflict in something positive, i.e. accurate assessments of their performance and entrepreneurial learning, from teams that suffer from the negative consequences of relationship conflict.

##### *4.5.2 Limitations and future research*

Like other research our study is subject to limitations, but these limitations provide opportunities for future research. As participants we relied on teams of management students as novice entrepreneurs instead of experienced entrepreneurial teams. This has the benefit that we can control for effects of previous interactions and feedback, but this has also been subject to criticism in entrepreneurship research (P. B. Robinson, et al., 1991) because of the limited generalizability to real entrepreneurs. However, the access to entrepreneurial teams making decisions related to their own venture is problematic. Further, the objective performance in real tasks is difficult to assess. Thus, we followed the approach of other studies which suggest that student samples are an important first step to explore the strategic decision making of executives (Audia, et al., 2000). Future research trying to replicate our results based on

a sample of actual entrepreneurial teams could focus on the relationship between self-assessed performance and venture performance as an objective indicator of performance in decision making task. Further, a longitudinal design would be necessary to disentangle the effects of conflicts on venture performance (Amason & Schweiger, 1994; Ensley, et al., 2002) and of venture performance on conflicts (Forbes, Korsgaard, & Sapienza, 2010).

Second, objective team performance in our team task was dichotomous. On the one hand this is advantageous because there is a clear difference between high and low objective performance. On the other hand, our variable does not take into account that some teams which did not identify the best solution performed better than others. Thus, future research could rely on team tasks where there is more variance in teams' objective performance. Perhaps it is more difficult – or even easier – for members and teams to assess team performance in tasks without a clear “right or wrong”.

Finally, while we recorded self-assessed performance at the individual and at the team level, we did not measure relationship conflict at both levels. Relationship conflict was measured at the individual level only and then aggregated to a team-level construct. Interrater reliability and agreement provide support for aggregating the individual conflict scores to the team level and this procedure is consistent with previous research on team conflicts (De Dreu, 2006; Jehn, 1995; Mohammed & Angell, 2004). However, future research could additionally measure relationship conflict at the team level to differentiate between the individuals' and the teams' perceptions.

### *4.5.3 Practical implications*

This study shows that both, the members' and the teams' assessments of team performance in an entrepreneurial decision making task can be quite accurate under specific conditions. Thus, teams that are unable to receive feedback from outside the team can rely on both types of assessments for subjective assessments of team performance. Sometimes it might be beneficial if the team as a whole discusses about its performance. Then the information and opinion of each member on team performance is

accessible to the whole team and members can learn from each other. Thus, the ideas of the single members represent mutual feedback. On other occasions it might be beneficial if the individuals reflect for themselves what went well and what did not. These reflections will not be distorted by the need to present oneself in a positive light in front of the other members (Isenberg, 1986; Van Swol, 2009). However, our results indicate that teams are more accurate than individuals when teams perceive relationship conflict to be high.

Further, entrepreneurial teams should be aware that the context of a task and their state of mind affects the accuracy of their performance assessment. When teams and members subjectively assess their team performance, their distance from the team and the team task is important. Members and teams could consider reflecting about the team task from a third-person perspective, focusing on global elements of the team task, and coming to an abstract view of it. This distance will enable them to more objectively and globally perceive their team's performance and to come to more accurate performance assessments. Thus, members and teams should try to make use of the state of mind connected to relationship conflict, at best without experiencing relationship conflict in their team.

#### *4.5.4 Conclusions*

This study focuses on team members' and teams' assessments of team performance in an entrepreneurial decision making task. To learn for future decision making tasks an accurate self-provided feedback can be helpful for teams. Our results showed a positive relationship between a team's objective performance and self-assessment of team performance at the individual and at the team level. In particular when perceptions of relationship conflict are high, members' and teams' assessment of team performance gain in accuracy. Teams can take advantage of these positive effects of relationship conflict in this context and create a larger psychological distance between the team, its members, and the team task. Thus, our study helps to understand how self-assessments of team performance in an entrepreneurial decision making task are formed and how their accuracy can be improved.





## **5 Negative affective reactions to team conflict after an entrepreneurial decision making task: The moderating role of uncertainty and team efficacy<sup>15</sup>**

Whereas the previous chapters explored cognitive processes in the field of entrepreneurial decision making, this chapter addresses the concomitant affective processes. I analyze team members' negative affect that arise from conflicts that the members experience during the entrepreneurial decision making task. Based on Jehn's (1995) model of intragroup conflict I theorize and find that conflicts about personal issues, i.e. relationship conflicts, increase the members' negative affect, whereas conflicts about the team's task reduce it. Importantly, I identify two moderators, one relating to the decision context (information uncertainty) and one to the characteristics of the team (team efficacy), that play a crucial role in these relationships. In Section 5.1 I introduce the topic. Section 5.2 provides a review of the literature on team conflicts, team decisions under uncertainty, and team efficacy. I also derive the hypotheses in this section. In Section 5.3 I explain the study's method and in Section 5.4 I present my results. In Section 5.5 I discuss the results, their implications, and the limitations of this study.

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<sup>15</sup> This chapter is based on Breugst (2011). An earlier version of this paper has been accepted for presentation in a refereed paper session at the Babson College Entrepreneurship Research Conference (BCERC), June 8-11, 2011 in Syracuse, NY, USA.

### 5.1 Introduction

Research on entrepreneurial teams suggests that team diversity is beneficial for team effectiveness (Chowdhury, 2005; Foo, Wong, & Ong, 2005) because diversity will enhance the team's pool of skills and knowledge and its cognitive resources (De Dreu & West, 2001; Milliken & Martins, 1996; Rink & Ellemers, 2010). But higher levels of diversity can also cause conflict among team members (Garcia-Prieto, Bellard, & Schneider, 2003; Mohammed & Angell, 2004; Pelled, Eisenhardt, & Xin, 1999). Usually, conflict is seen as harmful for teams because it negatively impacts team related attitudes of team members and team performance (Ayoko, Callan, & Hartel, 2003; De Dreu, 2008; Frone, 2000). However, not all conflicts are detrimental for a team – sometimes conflicts can help a team progress on a task, stimulate different perspectives, and resolve disagreement (Eisenhardt, Kahwajy, & Bourgeois, 1997).

Many studies implicitly assume that conflict leads to negative affective reactions of team members (Jones & Bodtker, 2001; Nair, 2008; von Glinow, et al., 2004). However, research has not yet investigated the members' direct affective reaction to conflict and has not yet explored under what circumstances conflicts cause more or less negative affect during team interactions. The development of negative affect is an important topic because negative affect limits creativity (Gasper, 2003; Hirt, et al., 1997), cooperative behavior (George, 1990), and performance in decision making tasks (Staw & Barsade, 1993) – aspects that are crucial for teams in entrepreneurial decision making tasks.

To better understand team members' negative affective reactions to conflict I build on Jehn's (1995) model of intragroup conflict and attributional theory of emotion (Weiner, 1985) to develop a model of negative affective reaction to conflict in a team-level entrepreneurial decision making task contingent on characteristics of the decision context and the team. Specifically, I focus on moderating effects of information uncertainty, a condition which is frequently connected to entrepreneurial decision making tasks (Knight, 1946; McMullen & Shepherd, 2006), and I explore the impact of team efficacy – a team's belief in its ability to perform effectively (Gibson, 1999) –

which is an important trigger of team motivation (Gibson & Earley, 2007) and members' positive view and expectations of the team (Gibson & Earley, 2007; Jex & Bliese, 1999; Mulvey & Klein, 1998; Tasa & Whyte, 2005). I test this model on a sample of 156 participants grouped in teams of three using an entrepreneurial decision making task based on a hidden profile experiment (Stasser & Titus, 1985) combined with an experimental manipulation of the level of information uncertainty. The study's results extend the existing literature in three important ways.

First, I contribute to the literature on relationship and task conflict by showing that both trigger opposite affective reactions in team members. Whereas relationship conflict has been consistently judged as detrimental to team processes and performance (De Dreu & Weingart, 2003) and, in a next step, to venture performance (Ensley & Hmieleski, 2005; Li & Hambrick, 2005), the impact of task conflict is not yet sufficiently understood. I find that relationship conflict increases whereas task conflict decreases negative affect. Higher levels of uncertainty buffer the negative impact of relationship conflict and decrease the positive impact of task conflict. Further, team efficacy increases the negative affective reaction to relationship conflict. These results help to better understand the differences between these two types of conflict. They indicate that when a proximal outcome like the team members' affective reaction is considered, task conflict can be beneficial for team members.

Second, this study takes into account a typical context of entrepreneurial decision making tasks – information uncertainty (Knight, 1946; McMullen & Shepherd, 2006) – which turned out to impact the team members' affective reaction to conflict. It appears that when team members feel less accountable for the outcome of their task (higher levels of uncertainty), the effect of the conflict on negative affective experience is weakened. When team members feel more accountable for the outcome of their task (lower levels of uncertainty), these effects are amplified. Interestingly, while uncertainty is usually seen as a negative factor because it decreases the willingness for entrepreneurial actions (McKelvie, et al., 2011) and venture performance (e.g., Chandler, et al., 2009; McMullen & Shepherd, 2006), my results show potentially

positive affective consequences in team interactions. This finding extends research on the role of uncertainty in entrepreneurial decision making of individuals (Fraser & Greene, 2006; McKelvie, et al., 2011; McMullen & Shepherd, 2006).

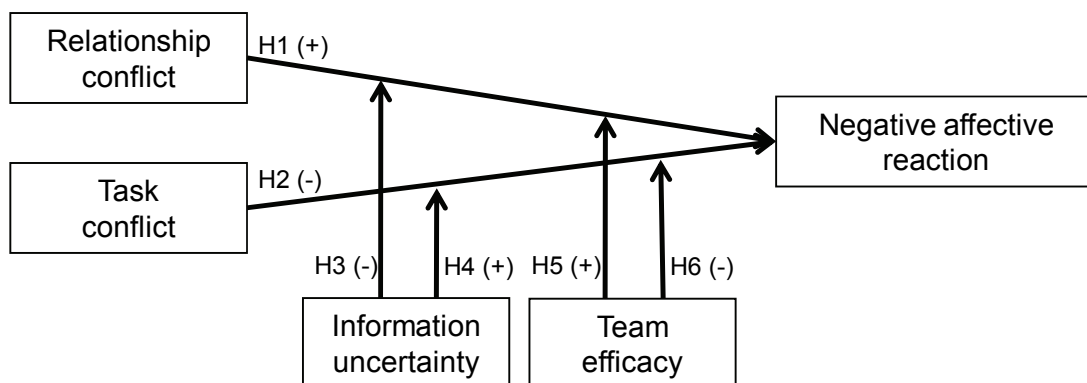
Finally, this study provides new insights into the role of team efficacy in team decision tasks. Whereas previous research has highlighted the overall positive effects of team efficacy on team performance (Gibson & Earley, 2007; Gully, Joshi, Incalcaterra, & Beaubien, 2002) and also on venture performance (Ensley, et al., 2004), I show that there can also be a downside. Specifically, when team efficacy is high, team members facing relationship conflict will experience more negative affect from that conflict than members of teams with low levels of team efficacy. This finding challenges the assumption that team efficacy is generally beneficial for team processes and team performance because it suggests that team efficacy can make team members more vulnerable to negative outcomes of team conflict.

This paper proceeds as follows. In the next section I formulate the theory and derive my hypotheses. Then I explain the research method of this study, and the sample, design, variables, and the analyses I used. Afterwards I present and discuss the results. Before the conclusion I elaborate on limitations of this study and point out future research opportunities.

### **5.2 Affective reactions to conflict after an entrepreneurial decision making task**

To explain outcomes of team conflict, Jehn (1995) developed a model that distinguishes between two types of conflict. Relationship conflict refers to “interpersonal incompatibilities among group members, which typically includes tension, animosity, and annoyance among members within a group” (Jehn, 1995, p. 258). Task conflict denotes “disagreements among group members about the content of the tasks being performed, including differences in viewpoints, ideas, and opinions” (Jehn, 1995, p. 258). While relationship conflict has been shown to decrease team performance and team member satisfaction (Amason, 1996; Jehn, 1995), and, in a next step, to decrease venture performance (Ensley & Hmieleski, 2005; Li & Hambrick,

2005), only a small number of studies find negative outcomes arising from task conflict (Lovelace, Shapiro, & Weingart, 2001; Ng & Van Dyne, 2005). Indeed, a considerable number of studies show that task conflict increases team performance and team member satisfaction (Amason, 1996; Kurtzberg & Mueller, 2005; Pelled, et al., 1999). In this study I build on Jehn's (1995) model of intragroup conflict and attributional theory of emotion (Weiner, 1985) to explain team members' negative affective reaction to a team-level entrepreneurial decision making task contingent on information uncertainty and team efficacy. Figure 11 depicts my model. I propose that team members' perceived level of relationship conflict leads to more intense negative affective reactions from team interaction. In contrast, perceived task conflict counteracts team members' negative affective reaction to conflict. Information uncertainty and team efficacy moderate the influence of task and relationship conflict on the negative affective reaction, albeit in a different manner.



**Figure 11: Model of negative affective reaction to team conflict after an entrepreneurial decision making task contingent on information uncertainty and team efficacy**

### 5.2.1 Relationship conflict, task conflict, and affective reaction

Relationship conflict often arises when there are personality differences between the team members or differences with respect to non-task-related opinions or world views (Jehn & Bendersky, 2003). Because of these differences team members find it difficult to develop a positive team climate and might come to develop a dislike for each

other (De Dreu & van Vianen, 2001). Experiencing relationship conflict during a team task has several negative consequences for the team members, which, in the end, can result in negative affective experiences.

First, in relationship conflict communication patterns are often abrasive, negative, and hostile (De Dreu & van Knippenberg, 2005; Pelled, 1996a), which might cause negative affective reactions (Yoshimura, 2004). For example, when team members feel attacked by others in the team, they might fear that others want to harm them during or after the discussion, or they might experience disappointment and anger that those others are not able to express themselves in a socially acceptable way. Further, since arguing in a hostile climate with a conflicting party is both cognitively and emotionally challenging, relationship conflict depletes team members' coping resources. To the extent these coping resources become exhausted, team members will experience mental strain from the interaction (Walton & Dutton, 1969).

Second, relationship conflict can make members feel less accepted by others in the team (Jehn, 1997a) which counteracts the development of a positive social identity from being a team member (Pelled, 1996b). In general, individuals want to be accepted by their coworkers and identify with them, but conflict impedes a feeling of having a common identity (Frone, 2000). This lack of common identity can diminish team members' self-esteem and lead to unfavorable affective outcomes. For example, the failure to identify with the team can lead individuals to experience loneliness and social isolation. These team members might also fear that their situation will last in the future because they do not see a way to connect to other team members again. Since the need for belonging is a fundamental psychological need (Ryan and Deci, 2000), a lacking social team identity and its accompanying negative affective experiences can even result in clinical depression and somatic symptoms (Frone, 2000).

Finally, relationship conflict reduces team members' perceptions of their own and the team's performance (Mohammed & Angell, 2004; Vodosek, 2007). Team members that experience higher levels of relationship conflict might perceive that this conflict consumes time and energy, and that team interaction and processes do not

proceed well (De Dreu & Beersma, 2005; Pelled, 1996b). These perceptions of poor team performance are likely to cause dissatisfaction with the team and perhaps anger and frustration about their own and the others' inability to perform well. Further, these team members might blame themselves for the little progress in completing the task and feel, perhaps, shame and guilt that they are not able to perform well. Therefore, I offer the following baseline hypothesis:

*Hypothesis 1: The greater the perceived relationship conflict, the greater the negative affective reaction to the team decision process.*

Whereas relationship conflict emerges from interpersonal issues, task conflict emerges from team members' different opinions about the content of the task being performed (Jehn, 1995, p. 258). For example, when team members have different functional backgrounds reflective of a different belief structure, they are likely to have diverging opinions about the definition of the team's tasks, goals, and the appropriate procedures (Pelled, et al., 1999). Task conflict is less likely experienced as disturbing by team members than relationship conflict; some studies even find that task conflict can be beneficial for team performance (Amason, 1996; DeChurch & Marks, 2001; Jehn, 1994; Kurtzberg & Mueller, 2005; Pelled, et al., 1999). It appears that task conflict can also prevent negative affective reactions in team decision tasks.

First, even though task conflict and relationship conflict are often related because one can trigger the other (T. L. Simons & Peterson, 2000), task conflict does not extend to interpersonal problems and cause personal attacks between the team members (Yang & Mossholder, 2004). Instead, in task conflict team members discuss in a constructive way the task and compare and analyze their different views (Amason & Schweiger, 1994). When team members disagree, they are likely to address their different viewpoints and ideas about the task (Kurtzberg & Mueller, 2005) and are better able to understand the perspective of their fellow members (T. L. Simons & Peterson, 2000). When the members' mutual understanding is higher, dissatisfaction, frustration, and anger about others' behavior is reduced because team members know the assumptions and mental models underlying that behavior and may thus, to some

extent, anticipate it. Deeper understanding of others and anticipation of their behavior can also reduce fear about potentially harming action of other team members in the future.

Second, task conflict provides the team with the opportunity to discuss the members' different views of the task. If the members are stimulated to express their opinions, they will be better able to see their influence on the team's decision (Amason & Schweiger, 1994). Thus, they feel better integrated in team decision making processes (Amason, 1996). They will be more satisfied with the decision of their team and feel more committed to the decision outcome (Amason & Schweiger, 1994; T. L. Simons & Peterson, 2000). When task conflict leads team members to perceive that their view points are adequately considered during team discussion and that their opinion has not been ignored, they are likely less dissatisfied with the team decision process and less frustrated even if the team decision outcome does not match their original preference (Folger, Rosenfield, Grove, & Corkran, 1979).

Third, since during task conflict team members discuss and share their different opinions, they develop a deeper understanding of the task and possible solutions (Kurtzberg & Mueller, 2005; Pelled, 1996a). Clarifying different viewpoints helps to integrate different perspectives (Janssen, Vliert, & Veenstra, 1999) and thus leads to a better understanding of the decision-making process and its relatedness to the task. Enhanced understanding of team processes can help team members realize their progress with the current task, which reduces, for example, fear or worry, that the task will not be completed successfully, and might diminish dissatisfaction with the team decision process as a whole. Thus, as a second baseline hypothesis:

*Hypothesis 2: The greater the perceived task conflict, the lesser the negative affective reaction to the team decision process.*

### 5.2.2 *Conflicts, information uncertainty, and affective reaction*

Entrepreneurial decision makers are often confronted with uncertain contexts (Knight, 1946; McKelvie, et al., 2011; McMullen & Shepherd, 2006). Uncertainty



refers to “an individual’s perceived inability to predict something accurately. An individual experiences uncertainty because he/she perceives himself/herself to be lacking sufficient information to predict accurately or because he/she feels unable to discriminate between relevant data and irrelevant data” (Milliken 1987 p. 136). In particular, decision makers’ perception of uncertainty entails that reliable and adequate information is not available for making predictions and decisions (cf. Duncan, 1972).

Research suggests that when decision makers are provided with uncertain information about a task they do not feel the same responsibility for their decision outcomes as when they are provided with certain information. For example, in a hypothetical managerial situation, participants accepted lesser responsibility when their company was described as facing an uncertain future than when it was described as having a certain future (Dermer, 1974). Further, in a common resource dilemma participants were more angry with their competitors after overuse when they were certain about the size of the common resource than when the resource’s size was uncertain (de Kwaadsteniet, van Dijk, Wit, & De Cremer, 2010). It appears that in team decision tasks under conditions of high information uncertainty members will not feel as responsible (and not hold their fellow members as responsible) for the progress and success of the decision process than under conditions of low information uncertainty. These differences in responsibility perceptions are likely to explain, partly, to what extent relationship conflict and task conflict influence negative affective experiences of team members.

First, information uncertainty likely buffers the effect of relationship conflict on team members’ negative affective reaction. When team members are provided with uncertain information, they are likely to attribute aspects of others’ and their own behavior to external and uncontrollable causes. That is, even though relationship conflict signals that the team does not progress and perform as expected (see above), team members might to some extent attribute the reasons for this underperformance to the external situation characterized by information uncertainty. For example, these team members might think that decision making in the given situation is difficult for

everybody involved and “apologize” when others communicate in a hostile, abrasive, and negative way. This view of the situation diminishes team members’ anger at, and frustration and disappointment about, the others’ behavior in relationship conflicts. In contrast, in a certain situation team members will perceive that others should be better able to control their behavior and communication style, and avoid personal attacks toward others. Thus, they perceive the attacks of their fellow team members during relationship conflict as under the others’ control which will result in higher levels of anger, frustration, and disappointment about those others’ behaviors (Weiner, 1985). This argument is consistent with research showing that the experience of anger at a target person is elicited when the behavior of that target person is interpreted to be hostile and when that person can be blamed (Averill, 1983; Wilkowski & Robinson, 2010).

Further, the experience of negative affect directed to oneself can be diminished by information uncertainty. For example, when people feel responsible for negative outcomes (low information uncertainty), they tend to feel guilty for these outcomes (Berndsen & Manstead, 2007; C. A. Smith & Ellsworth, 1985). Further, when relationship conflict indicates that the team does not progress well, those feeling responsible for the decision process might experience anger and disappointment about their own inability to deliver as they wanted. Since certain information is available, these team members will have difficulties finding an obvious external cause for a suboptimal progress and are likely to attribute it to internal and controllable reasons leading to the experience of negative affect (Siemer & Reizenzein, 2007; Weiner, 1985). In contrast, under high information uncertainty, team members will feel less responsible and, partly, attribute unsatisfactory outcomes to the external situation which reduces their feelings of guilt, anger, and disappointment about themselves and their performance. Thus:

*Hypothesis 3: The positive relationship between relationship conflict and negative affective reaction is more positive when the team decision process involves lower levels of information uncertainty than higher levels of information uncertainty.*

The strength of the relationship between task conflict and affective reaction likely also varies contingent on the nature of the team task characteristics. Information uncertainty can help to explain this variance as it is likely to diminish the negative relationship between task conflict and team members' negative affective experiences.

Since task conflict improves the mutual understanding of team members, teams who rarely experience task conflict are likely to understand each other less well than those who face task conflict more often (T. L. Simons & Peterson, 2000). Under higher levels of information uncertainty members of low task conflict teams can attribute a lack of understanding of other team members to external causes because people generally have problems understanding verbally presented information under uncertainty (Grether, 1978). In contrast, when information uncertainty is low team members likely have to admit that poor mutual understanding within the team is their own (and their fellows') fault because communication is insufficient. Attributing a lack of understanding of the other members to external causes likely reduces team members' potential disappointment and frustration with the team process, and their anger at the others in the team, because they do not perceive themselves and the others (fully) accountable for insufficient mutual understanding.

Further, as task conflict helps team members to integrate their different views (Janssen, et al., 1999; Kurtzberg & Mueller, 2005) on the task and its progress, in teams with lower levels of task conflict members are more likely to have problems seeing this progress which might lead to dissatisfaction with team outcomes and stress because members perceive that the successful completion of the task is at risk. This experience of stress can cause anger and frustration (Thoresen, Kaplan, Barsky, Warren, & de Chermont, 2003). Members of low task conflict teams with uncertain information available are likely to attribute the reasons for suboptimal outcomes to the nature of the task, thus experiencing lower levels of dissatisfaction, stress, anger, frustration, and fear of failure. These team members might even think that they themselves and their team members have performed satisfactorily given the difficulties represented by the uncertainty of the information at hand even if the task fails in the end. Thus:

*Hypothesis 4: The negative relationship between task conflict and negative affective reaction is more negative when the team decision process involves lower information uncertainty than higher information uncertainty.*

### 5.2.3 Conflicts, team efficacy, and affective reaction

Team efficacy is an important characteristic of teams and refers to “a group’s belief in its ability to perform effectively” (Gibson, 1999, p. 138). Team efficacy is closely connected to collective efficacy since both relate to a team’s confidence that they can achieve collective accomplishments (Gibson, 1999; Shamir, 1990). But whereas collective efficacy is based on the aggregated perceptions of the team members, team efficacy is a team-level perception (Gibson, Randel, & Earley, 2000; Mulvey & Klein, 1998). Thus, in contrast to collective efficacy, team efficacy is an actual team-level construct which reflects the interaction process within a team (Gibson, et al., 2000; Lindsley, Brass, & Thomas, 1995). Team efficacy provides teams with motivation and facilitates team effectiveness (Gibson & Earley, 2007). It is connected to a positive view of the team, positive expectation about future team interactions, and higher attached importance to the team (Gibson & Earley, 2007; Jex & Bliese, 1999; Mulvey & Klein, 1998; Tasa & Whyte, 2005). In the following I illustrate why, consequently, team efficacy will intensify the negative effect of relationship conflict and diminish the effect of task conflict on team members’ experiences of negative affect.

First, negative affect triggered by relationship conflict (Jehn & Bendersky, 2003; Pelled, et al., 1999) will intensify when team efficacy is high. Since team efficacy increases team members’ perceptions that they can perform well in their task (Gibson, 1999), they are likely to expect a positive and constructive team interaction (Lindsley, et al., 1995; Tasa & Whyte, 2005). In case this expectation does not fulfill and relationship conflict develops, they will likely be disappointed about the abrasive, negative, and hostile communication within the team (De Dreu & van Knippenberg, 2005; Pelled, 1996a). For example, these team members will experience increased anger towards the other team members and are likely to blame them for the negative and non-productive

interaction patterns within the team (Averill, 1983; Wilkowski & Robinson, 2010). In teams lower in team efficacy members will have lower expectations regarding team performance and the quality of the decision process. These team members might even expect the development of relationship conflicts and thus tolerate it without substantial negative affective reactions.

Second, higher team efficacy is connected to greater identification with and commitment to the team (Mulvey & Klein, 1998; van Zomeren, Leach, & Spears, 2010) leading team members to attach more importance to their team and its tasks (Jex & Bliese, 1999). The more important the team and the task is perceived, the more will team members be affected by the development of relationship conflict (Jehn, 1997b). For example, research has shown that relationship conflict is particularly harmful for the development of trust and respect between the team members when the team is perceived to be an important group in the members' social environment (Jehn, 1997b; Jehn, Greer, Levine, & Szulanski, 2008). This diminished perception of trust and respect within the team can trigger team members' experiences of disappointment, frustration, or anger about the other team members and their behavior.

Further, high team efficacy indicates to team members that the team will be able to achieve its goals and that future interaction will be positive even when the team members have opposed opinions and perceptions of their team (Gibson & Earley, 2007; Tasa & Whyte, 2005). On the one hand, these perceptions trigger team members' tendency to stay with the team in the face of difficulties such as relationship conflict. On the other hand, however, individuals do not want to work in teams where communication is hostile and negative (De Dreu & van Knippenberg, 2005; Pelled, 1996a) leading to a tendency to withdraw from the team (De Dreu & Beersma, 2005; Jehn, 1995). These opposed tendencies to act will likely lead to cognitive dissonance (Festinger, 1957) of team members, which can trigger negative affect (Harmon-Jones, 2000). Thus, in teams with high levels of team efficacy relationship conflict does not only yield negative affect because of the hostile, abrasive, and negative communication

style, but in addition because of the potential cognitive dissonance arising from team members' desire to both stay with and leave the team. Thus:

*Hypothesis 5: The positive relationship between relationship conflict and negative affective reaction to the team decision process is more positive when team efficacy is higher than when it is lower.*

Further, team efficacy might partly explain heterogeneity in the relationship between task conflict and negative affect. First, task conflict is related to a greater exchange of ideas and triggers the perception of being more integrated in the team (Amason & Schweiger, 1994; Kurtzberg & Mueller, 2005), which can diminish negative affective reactions to team processes (see above). These benefits of being integrated are likely the larger, the more positive the member's image of the team. For example, when task conflict contributes to buffering feelings of loneliness and fear of social isolation because individuals believe that they are an important part of the team, this effect is likely even larger when that team is perceived to have an overall positive image (e.g., to be able to perform well). As team efficacy is associated with a more positive view of the team (Jex & Bliese, 1999; Prussia & Kinicki, 1996), it will likely enhance the benefits of task conflict for diminishing team members' negative affective experiences.

Moreover, the higher team efficacy, the more important its members perceive the team and its tasks to be. When the team is perceived important for the members, they highly appreciate an atmosphere where the arguments of each member are heard (as reflected in task conflicts; Amason & Schweiger, 1994; Kurtzberg & Mueller, 2005). They are likely to appreciate the exchange of ideas and arguments about the task because they perceive this atmosphere to be helpful in dealing with the task. Thus, they will connect task conflict with the team's ability to perform effectively (Gibson & Earley, 2007). Thus, perceived team and task importance resulting from higher levels of team efficacy are likely to multiply the positive effects of task conflict and counteract the development of negative affect related to team members themselves and towards other team members (see earlier). Thus:

*Hypothesis 6: The negative relationship between task conflict and negative affective reaction to the team decision process is more negative when team efficacy is higher than when it is lower.*

### 5.3 Research methods

#### 5.3.1 Sample, design, and research setting

To be able to control for effects of previous interactions of the team, I focused on business students as novice entrepreneurs instead of experienced entrepreneurial teams. The sample consists of 156 undergraduate business students enrolled at a German university. The students were recruited in business and economics lectures to ensure that they could make sense of the hypothetical venture situation that was the basis of their team decision task (see description below). The students were compensated with 20 € (~USD 25) for participation. I made appointments with volunteers and invited three students to each session. On average, the participants are 24.31 years old ( $SD = 2.54$ ). Seventy-three (46.8 %) participants were male, 83 (53.2 %) were female.

I experimentally manipulated one independent variable with two levels (high vs. low information uncertainty) between teams in the study. Teams were randomly assigned to the two experimental conditions with the restriction that I wanted to achieve equal sample sizes in each condition. Thus, I ended with 26 teams per condition.

To provoke a discussion between the team members, I used a hidden profile experiment. In hidden profile situations teams are asked to decide on one out of several alternatives, but the best solution to that decision task is not initially evident to the team members from their personal information set (Stasser & Titus, 1985). This experiment has been applied to study team decision making in social psychology (Schulz-Hardt, et al., 2006; Stasser & Titus, 1985), organizational behavior (Alge, et al., 2003; Okhuysen & Eisenhardt, 2002), and communication research (Cruz, et al., 1997; Savadori, van Swol, & Sniezek, 2001). In this study's hidden profile approach, the teams put themselves in the role of entrepreneurial teams and were confronted with the decision:

which out of four alternative business opportunities would they exploit when starting a venture based on a specific technology, a typical entrepreneurial decision making task (Y. R. Choi & Shepherd, 2004). Before the team discussion, team members received information sets about decision alternatives. Some pieces of information were given only to one team member and some pieces were given to all team members. These pieces of information were distributed in such a way that only when all information is pooled by the team members the optimal decision alternative could be identified.

Table 14 displays the distribution of the information pieces among participants. Overall, there are 32 pieces of information – eight for each decision alternative (possible business opportunity). For the optimal solution (alternative A in Table 14) there are six positive and two negative pieces of information, whereas for the suboptimal alternatives (B-D in Table 14) there are three positive and five negative pieces of information. However, the information set for each individual contained more positive than negative pieces of information for all suboptimal alternatives, but the same number of positive and negative pieces of information for the optimal solution. Thus, the optimal solution is hidden to the participants.<sup>16</sup>

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<sup>16</sup> Only 25 (16 %) out of 156 participants chose the optimal alternative before the discussion based on their information set which indicates that the optimal alternative is indeed hidden to them. However, in a pretest when all 32 pieces of information were available for an individual participant, participants significantly preferred the optimal solution,  $\chi^2(3) = 63.05, p < .000$ , Kendall's  $W = .43$ . This indicates that I have successfully constructed information sets for the four alternatives with one clear optimal solution and three inferior ones.



**Table 14: Distribution of information in the hidden profile experiment**

	Alternative A	Alternative B	Alternative C	Alternative D
Common information				
Positive	0	3	3	3
Negative	2	0	0	0
Unique information				
Positive	6	0	0	0
Negative	0	5	5	5
Team member 1				
Positive	2	3	3	3
Negative	2	1	2	2
Team member 2				
Positive	2	3	3	3
Negative	2	2	1	2
Team member 3				
Positive	2	3	3	3
Negative	2	2	2	1

### 5.3.2 Procedure

I grouped three students into one team and invited them together to the lab. The experimenter welcomed the participants and informed them about the procedure of the study. First, the participants filled out pre-experimental questionnaires where I assessed their tendency to monitor their thoughts and actions and their currently experienced affect (see descriptions below). Second, the experimenter introduced the participants to the hypothetical team decision making task. Students were asked to imagine being an entrepreneurial team that had just invented the three dimensional printing technology (cf. Shane, 2000). They were told that they had already identified four potential business opportunities to exploit from their technology. As a team they should now decide on one of these opportunities. Each of them should take the role as a member of the entrepreneurial team consisting of a marketing manager, a financial manager, and an operations manager. These managerial roles were randomly assigned and each participant received an information set specific to his or her role. They were asked to study their information sets carefully in order to discuss the alternatives without needing to continuously check their sets, but they were allowed to keep their information sets

during subsequent team interaction. The participants had as much time as they needed to become familiar with the situation and their information sets.

After studying the materials, the teams were asked to start the discussion and to come to a decision on which of the four alternatives they wanted to exploit as an entrepreneurial team of a new venture. They were told that they should take as much time as they needed, but that usually teams would finish within 30 minutes. I did not want to generate time pressure, but this time period was suggested to avoid “never-ending” discussions and to keep the teams focused on their task. When a team discussed for more than 30 minutes, the experimenter reminded them that the discussion had gone for half an hour. The teams then focused on finishing their discussion and no further time limits were specified (cf. Schulz-Hardt, Brodbeck, Mojzisch, Kerschreiter, & Frey, 2006 for a similar procedure). A discussion was considered to be finished when the team recorded its decision on a provided decision sheet. The average discussion time was approximately 22 minutes ( $M = 21.63$  min,  $SD = 8.14$  min).

After the team discussion, the experimenter distributed post-experimental questionnaires to the participants. In team questionnaires I assessed team efficacy as a consensus measure. The whole team was given a single copy of the same questionnaire and asked to come to a consensus with respect to each item (Gibson, 1999, 2003; Quigley, et al., 2007). In individual questionnaires the participants' perceptions of task and relationship conflict, team performance, information uncertainty, and their negative affect were assessed. Finally, demographic details were recorded, such as participants' age and gender. At the end of the study, the participants were debriefed and the nature of the hidden profile task was explained. They were paid their reimbursement and left the lab.

### 5.3.3 *Measures and variables*

*Dependent variable.* The dependent variable of this study is the team members' negative affective reaction to the team interaction. The participants' negative affect was measured before and after the team interaction with the negative items of the Positive and Negative Affect Schedule (PANAS, Watson, et al., 1988). The participants were

asked to indicate to what extent they felt “distressed”, “upset”, “guilty”, “scared”, “hostile”, “irritable”, “ashamed”, “nervous”, “jittery”, and “afraid” on 5 point Likert-type scales with the anchors “very slightly or not at all” to “extremely”. The Cronbach’s alpha for the negative affect scale was .73 before the team interaction and .72 after the team interaction which is considered sufficiently reliable (Hair, et al., 2006). The members’ negative affective reaction was operationalized via a difference score (cf. Cho & Hambrick, 2006; Major, Kozlowski, Chao, & Gardner, 1995). Difference scores have been criticized for being unreliable and for their negative correlation with the baseline values (Cronbach & Furby, 1970). However, many researchers have shown that this criticism is unjustified (Rogosa & Willett, 1983; R. H. Williams & Zimmerman, 1996). Rogosa, Brandt, and Zimowski (1982) demonstrated that difference scores can be an unbiased measure of change, in particular when there is individual variance in the amount of change and when hence the stability of the focus variable is low. I subtracted the members’ negative affect score *before* the interaction from the negative affect score *after* the interaction. Thus, positive values in this variable indicate that the members reacted with increased negative affect to the team interaction whereas negative values indicate that the negative affect of the members was reduced after the interaction. As each team member has his or her own value – the dependent variable is measured on the individual level (level one, see below).

*Perceived relationship conflict.* The perceptions of relationship conflict during the team task was recorded with a scale developed by Jehn and coworkers (Jehn, 1995; Jehn, et al., 1997). The scale consists of four items, such as “How much interpersonal friction was there in your team?”, and the participants’ answers were recorded on 7-point Likert-type scales with the anchors “not at all” and “very much”. Cronbach’s alpha was .89 in this sample. This variable is measured on level one.

*Perceived task conflict.* Task conflict was also recorded with the scale developed by Jehn and coworkers (Jehn, 1995; Jehn, et al., 1997). It consists of four items, such as “How different were your views on the content of your project?”, and the participants’ answers were recorded on 7-point Likert-type scales with the anchors “not at all” and

“very much”. Cronbach’s alpha was .85 in this sample. This variable is also measured on level one.

*Information uncertainty.* Information uncertainty was manipulated as a two-level between teams factor. Consistent with the literature on uncertainty, I operationalized high levels of information uncertainty as the individual’s perception of a lack of sufficient information to make accurate predictions (Milliken, 1987). In uncertain situations, reliable and adequate information are unavailable so that there is no solid basis to assess probabilities of outcomes and causal effects (Carpenter & Fredrickson, 2001; Duncan, 1972). When reliable and trustworthy information is available, for example from expert advisors, this will reduce a decision maker’s uncertainty (Van Swol & Sniezek, 2005). To improve the quality of their decision, decision makers are likely to rely on advice provided by expert and valued sources (Harvey & Fischer, 1997; Sniezek, Schrah, & Dalal, 2004).

Teams facing *low levels of information uncertainty* (26 teams) were provided with such reliable and trustworthy information from an expert source. They were told that a (fictitious) renowned consulting firm had already completed research for them such as extensive market studies, detailed proofs of concepts with scientists, and in-depth interviews with experts. The information sets were presented in reputedly looking folders with the logo of the fictitious consulting firm. Further, the teams were told in this condition that for all potential venture opportunities reliable predictions are possible and that they can trust the information gathered by the consulting firm. Teams under *high levels of information uncertainty* (26 teams) were told that for all potential venture opportunities no reliable predictions are possible. They have heard some rumors about the different opportunities from their non-expert acquaintances but the trustworthiness of this information was questionable. No one has experience with this specific situation so that they cannot rely on expert opinions, the market potential is very difficult to assess, and the feasibility of the opportunities is unclear. To emphasize the doubtfulness of this uncertain information, the information sets were presented on checkered paper and were hand written.

Thus, participants in the different conditions received the same amount and content of information, but the information was presented in a different way and with a different instruction. Therefore, I only manipulated the teams' perception of the information uncertainty without varying the information. This allows me to capture the effects of information uncertainty holding constant the content of the information. As information uncertainty varied between teams, it represents a team-level variable on level two. It was entered as a dummy variable in the analysis – 0 means that information uncertainty is low, 1 means that information uncertainty is high. To check if the manipulation of information uncertainty was successful, the participants were asked in a post-experiment questionnaire about their perception of uncertainty of the information. The wording of the five items was “the information that our team possessed was valuable for our decision,” “the information that our team possessed was reliable,” “the information that our team possessed made it possible for us to come to an optimal decision,” “the information that our team possessed were trustworthy,” and “our team could rely on the information that we had for our decision.” The Cronbach's alpha of this five item scale was .90 which is considered reliable (Hair, et al., 2006).

*Team efficacy.* Consistent with previous research, I operationalize team efficacy as a team's collective confidence to accomplish a task (i.e. group efficacy in Gibson, 1999; Gibson & Earley, 2007). Following the recommendations by Little and Madigan (1997) who argue that efficacy is always related to specific tasks and “should be tailored to the setting in which it will be administered” (p. 524), I adapted my measure of team efficacy to the team task. In the context of a hidden profile situation, Kelly and Loving (2004, p. 192) identified six potentially important goals for a team: “making a high quality decision, completing the task quickly, coming to consensus, discussing all relevant information, getting along with other team members, and encouraging everyone to contribute information”. Therefore, I asked each team to rate their confidence to achieve each of these six goals on 7-point Likert-type scales with the anchors “Not at all confident” and “Very confident”. Cronbach's alpha of the team efficacy measure was .79 which is considered reliable (Hair, et al., 2006). As the team

efficacy measure captures the shared belief of the team as a whole and was assessed as a consensus measure (cf. Gibson, 1999, 2003; Quigley, et al., 2007), it was entered as a team-level variable in the analysis.

*Control variables.* To take into account the “baseline” affect of the participants, I control for their *negative affect before the team interaction* (cf. Cho & Hambrick, 2006). Further, because positive affect can buffer the generation of negative affect and can lead to a higher resilience (Fredrickson, 2001), I also control for the members’ *positive affect before the team interaction*. To measure positive affect, I draw on the positive items of the PANAS (Watson, et al., 1988). The participants were asked to indicate to what extent they felt “interested”, “excited”, “strong”, “enthusiastic”, “proud”, “alert”, “inspired”, “determined”, “attentive”, and “active” on 5 point Likert-type scales with the anchors “very slightly or not at all” to “extremely”. The Cronbach’s alpha for the positive affect scale was .78 which is considered sufficiently reliable (Hair, et al., 2006). The participants’ affects were captured at the individual level of analysis.

Monitoring, which is a process of “self-observation and self-control guided by situational cues” (Snyder, 1974, p. 526), was postulated and found to influence perceptions of, and reactions to, conflict (R. A. Baron, 1998; Jones & Bodtker, 2001; Neuman & Baron, 1998). Further, monitoring has an impact on the negative affective reactions to events such as stress (Spada, Nikcevic, Moneta, & Wells, 2008). Therefore, I controlled for the participants’ tendency to *monitor* their thoughts and actions. I recorded monitoring with a 7-item scale developed by Haynie and Shepherd (2009) which is based on Flavell (1979), Schraw and Dennison (1994), and Wright (1992). A 7-point Likert-type scale with the anchors “I do not agree at all” and “I completely agree” was used to record the participants’ monitoring. The Cronbach’s alpha of the scale was .73 which is considered reliable (Hair, et al., 2006). This variable is measured at the individual level.

As task and relationship conflict are both related to team members’ perceptions of performance (Jehn, et al., 1997; Mohammed & Angell, 2004; Vodosek, 2007) and as perceived performance is also related to affect (Fisher & Noble, 2004), I controlled for

the members' *perceptions of team performance*. To assess perceived team performance I used a two-item scale based on Wittenbaum and Bowman (2004). The items were "Our team performed well on the team task." and "Our team probably performed better on the team task than the average team in this experiment." The Cronbach's alpha for the scale was .83 which is considered sufficiently reliable (Hair, et al., 2006). A 7-point Likert-type scale with the anchors "I do not agree at all" and "I completely agree" was used to record the perceived team performance.

As another control variable I include the *duration of the team task*. Teams need time to exchange and process their information (Karau & Kelly, 1992) so that a longer interaction could affect the team members' perception of their team. Further, the development of affect can require different amounts of time (Frijda, Mesquita, Sonnemans, & Goozen, 1991). This variable was derived from the videos of the team interaction and it was entered in seconds in the analysis. To control for potential impact of *age* or *gender* on the individual level effects the students were asked to indicate their year of birth and their gender at the end of the study. From the year of birth I computed the students' age in years. Gender was entered as a dummy variable in the analysis – 0 denotes males, 1 denotes females.

*Translation procedure.* All scales were translated into German using a back-and-forth translation procedure recommended by Brislin (1970, 1980) to ensure maximal consistency between the translated and original scales. A German native speaker fluent in English translated the scales into German and a native English speaker fluent in German translated it back to English. I compared the original and the back-translated versions and found no substantial differences between them.

## 5.4 Results

### 5.4.1 Manipulation of information uncertainty

First, I checked if the manipulation of information uncertainty was successful. For this I ran a *t*-test comparing the means on the information uncertainty scale of the participants in the high information uncertainty conditions with those in the low

uncertainty conditions. The test revealed a significant difference between these two conditions,  $t(154) = 11.49$ ,  $p < .001$ . Thus, the participants in the information uncertainty condition perceived the information more uncertain than the participants under certainty which indicates that I have successfully manipulated information uncertainty.

### 5.4.2 Data analysis

To test the study's hypotheses I use a hierarchical linear modeling approach (HLM; Raudenbush & Bryk, 2002). This procedure takes into account the nested structure of the data (individuals are nested within teams) and enables researchers to focus on cross level effects (i.e. the interaction of conflict with both information uncertainty and team efficacy). All variables were grand-mean centered before they were entered in the analysis. I present descriptive statistics and the correlations of the research variables in Table 15. To test my hypotheses I run a hierarchical linear model with the participants' negative affective reaction as the dependent variable<sup>17</sup>. As an indicator for the explained variance in the dependent variable, I report Pseudo  $R^2$  based on the formula by Snijders and Bosker (1999). This statistic is based on the reduction of level 1 and level 2 error variances because of the inclusion of the independent variables.

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<sup>17</sup> Because of the criticism on difference scores (cf. Cronbach & Furby, 1970), I ran the analyses with a different dependent variable – the members' negative affect after the team interaction. The results (signs and significances) did not change.



Table 15: Means, standard deviations, Cronbach's alpha, and correlations between focal variables

	M	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) Negative affective reaction	-0.16	0.28	(-)											
(2) Relationship conflict	1.66	0.97	0.07	(0.89)										
(3) Task conflict	3.43	1.21	0.02	0.54***	(0.85)									
(4) Information uncertainty <sup>a,c</sup>	0.05	0.50	-0.08	0.06	-0.05	(-)								
(5) Team efficacy <sup>c</sup>	6.13	0.64	-0.22**	-0.56***	-0.32***	-0.04	(0.79)							
(6) Monitoring	5.16	0.75	-0.16*	0.00	0.02	0.00	0.11	(0.73)						
(7) Perceived performance	5.18	0.96	-0.09	-0.27**	-0.28***	0.07	0.46***	0.26**	(0.83)					
(8) Positive affect T1	3.02	0.54	-0.02	-0.13	-0.11	-0.05	0.19*	0.28***	0.30***	(0.78)				
(9) Negative affect T1	1.30	0.36	-0.74***	0.14	-0.01	-0.01	0.06	0.10	-0.01	0.10	(0.73)			
(10) Negative affect T2	1.14	0.25	0.06	0.28***	0.02	-0.09	-0.16*	-0.05	-0.11	0.13	0.63***	(0.72)		
(11) Age	24.31	2.54	0.03	-0.01	0.09	-0.06	0.03	0.13	0.02	-0.02	-0.04	-0.02	(-)	
(12) Gender <sup>b</sup>	1.53	0.50	-0.09	-0.03	0.06	0.01	-0.08	-0.12	-0.15	-0.22**	-0.03	-0.14	0.11	(-)
(13) Duration <sup>c</sup>	1297.90	485.22	-0.04	0.23**	0.36***	-0.06	-0.24***	0.11	-0.16	0.07	0.09	0.10	-0.02	-0.09

Notes:

<sup>n</sup> = 156 individuals, Cronbach's alpha (if applicable) is reported on the diagonal.<sup>a</sup> 0 = "information uncertainty low," 1 = "information uncertainty high."<sup>b</sup> 0 = "male," 1 = "female."<sup>c</sup> These variables (team level) were assigned down to individual team members.\*\*\* $p < .001$ ; \*\* $p < .01$ ; \* $p < .05$

Table 16 displays the results of the HLM. In a first step, I only included the control variables in the analysis (model 1) which explained 56 % of the variance in the members' negative affective reaction. In model 2, perceived relationship and task conflict were entered. This model accounted for 59 % of the variance in the members' negative affective reaction. Consistent with Hypothesis 1, I find that relationship conflict increases the team members' negative affective reaction ( $b = 0.06, p < .01$ ), whereas task conflict reduces it ( $b = -0.03, p < .05$ ) which is consistent with Hypothesis 2. Finally, I introduced information uncertainty and team efficacy on level two in the analysis (model 3). This model accounts for 62 % of the variance of the dependent variable. Hypotheses 3 and 4 relate to cross-level effects of information uncertainty and relationship and task conflict. Both interaction terms are significant ( $\gamma$  for relationship conflict =  $-0.10, p < .01$  and  $\gamma$  for task conflict =  $0.05, p < .05$ ). To better understand the nature of these interactions I plot them in Figure 12. The y-axis represents the participants' negative affective reaction, the x-axis in Figure 12A represents relationship conflict and in Figure 12B task conflict. For information uncertainty I draw two separate lines, the dashed one for low information uncertainty and the continuous line for high information uncertainty. In Figure 12A, the negative affective reaction to relationship conflict is more pronounced for low information uncertainty than for high information uncertainty which provides support for Hypothesis 3. Figure 12B shows that the reduction of negative affective reaction due to task conflict is more pronounced when information uncertainty is low than when it is high. This finding provides support for Hypothesis 4.

**Table 16: Hierarchical linear model of the prediction of negative affective reaction**

Variables	Model 1		Model 2		Model 3	
<i>Level 1 main effects</i>						
Age	0.00	(0.00)	0.00	(0.00)	0.01	(0.00)
Gender <sup>a</sup>	-0.06*	(0.03)	-0.06	(0.03)	-0.06*	(0.03)
Positive affect T1	0.04	(0.02)	0.05	(0.03)	0.08**	(0.03)
Negative affect T1	-0.58***	(0.09)	-0.60***	(0.09)	-0.60***	(0.06)
Monitoring	-0.04	(0.03)	-0.05	(0.03)	-0.06**	(0.02)
Perceived performance	-0.03	(0.02)	-0.02	(0.02)	0.01	(0.01)
Relationship conflict			0.06**	(0.02)	0.06**	(0.02)
Task conflict			-0.03*	(0.01)	-0.03*	(0.01)
<i>Level 2 main effects</i>						
Duration of discussion	0.00	(0.00)	0.00	0.00	-0.00	(0.00)
Information uncertainty <sup>b</sup>					-0.05*	(0.02)
Team efficacy					-0.05	(0.03)
<i>Cross-level interactions for information uncertainty</i>						
Relationship conflict					-0.10**	(0.03)
Task conflict					0.05*	(0.02)
<i>Cross-level interactions for team efficacy</i>						
Relationship conflict					0.04*	(0.02)
Task conflict					-0.03	(0.03)
Pseudo $R^2$	0.56		0.59		0.62	

Notes:

$n = 156$  individuals (level 1) in 52 teams (level 2).

Unstandardized estimates (based on grand-mean centering) are reported, robust standard errors are in parentheses.

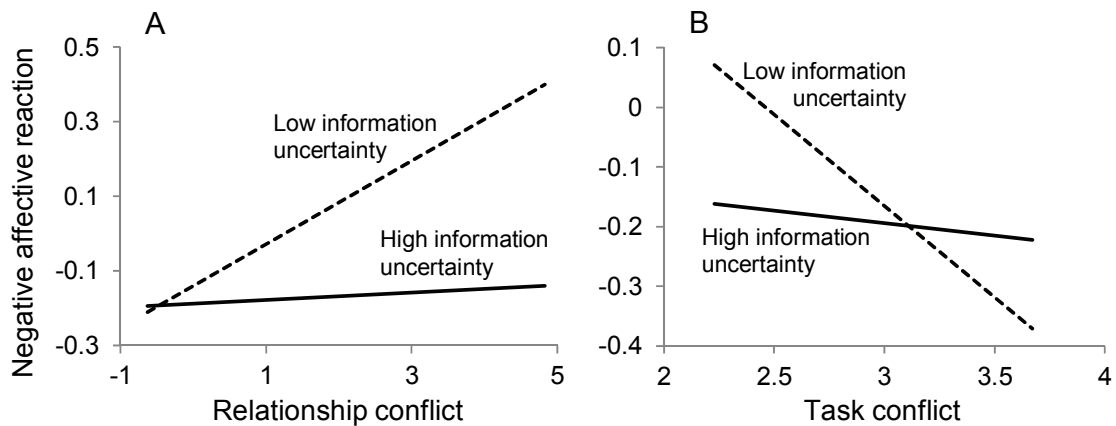
Pseudo  $R^2$  indicates the amount of total variance in the dependent variable explained by the predictors.

Interactions between all level 2 with all level 1 variables were also included in the model but are not displayed in the table to keep it at a manageable size.

<sup>a</sup> 0 = "male," 1 = "female."

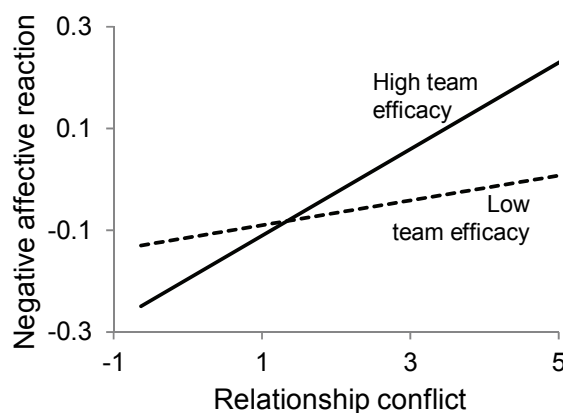
<sup>b</sup> 0 = "information uncertainty low," 1 = "information uncertainty high."

\*\*\*  $p < .001$ ; \*\*  $p < .01$ ; \*  $p < .05$



**Figure 12: Cross-level effects of information uncertainty on the relationship between (A) relationship conflict and (B) task conflict and negative affective reaction**

Hypotheses 5 and 6 focus on the cross-level interaction of team efficacy and relationship and task conflict. The interaction of relationship conflict and team efficacy is significant ( $\gamma = 0.04$ ,  $p < .05$ ). Figure 13 shows a plot of this interaction. Again the y-axis is the participants' negative affective reaction and the x-axis represents the level of perceived relationship conflict. I draw two separate lines for high (one standard deviation above the mean) and low (one standard deviation below the mean) levels of team efficacy. The negative affective reaction to relationship conflict increases more when team efficacy is high than when it is low. This finding provides support for Hypothesis 5. The interaction of task conflict and team efficacy is not significant ( $\gamma = -0.03$ , ns). Therefore, Hypothesis 6 is not supported.



**Figure 13: Cross-level effect of team efficacy on the relationship between relationship conflict and negative affective reaction**

### 5.5 Discussion and conclusion

In this paper I proposed a model of team members' negative affective reactions to conflict in an entrepreneurial decision tasks. Drawing on Jehn's (1995) model of intragroup conflict, attributional theory (Weiner, 1985), and a hidden profile decision making task (Stasser & Titus, 1985) with 156 participants nested within 52 teams, I found that relationship conflict triggers, and task conflict diminishes, negative affect from team discussions. More importantly, I identified uncertainty of information used in the entrepreneurial decision task and team efficacy as moderators of these effects. These results inform the literature on team conflict, entrepreneurial team decision making under uncertainty, and team efficacy.

Drawing on Jehn (1995) and others (Amason, 1996; J. N. Choi & Sy, 2010; De Dreu & Weingart, 2003), a considerable literature has emerged that acknowledges that the nature of conflict differs, and that relationship conflict and task conflict are different from each other with respect to their causes and consequences for decision processes. For example, Amason (1996) investigated both types of conflict in top management teams and found that relationship conflict diminished team decision quality and members' satisfaction whereas task conflict enhanced team decision quality and satisfaction. Further, Kurtzberg and Mueller (2005) found that relationship conflict reduced team members' creativity, whereas task conflict increased their creativity the following day. In the entrepreneurial context, a study by Ensley and Hmieleski (2005) showed that relationship conflict was negative and task conflict was positively related to new venture performance. However, although some studies implicitly assume that conflict leads to team members' negative affect (Jones & Bodtger, 2001; Nair, 2008; von Glinow, et al., 2004), so far research has not explicitly investigated the affective consequences of task and relationship conflict. I complement the literature on team conflict by analyzing how relationship and task conflict impact the negative affective reactions of team members in an entrepreneurial decision task. The finding that both types of conflict impact affective reactions in an opposite manner further substantiates

the different nature of these conflicts and their different implications for outcomes of team processes.

### *5.5.1 Theoretical implications*

This study contributes to research on team conflict, on team decision making in an entrepreneurial context, and on team efficacy. First, my findings extend the range of harm that relationship conflict, and of benefits that task conflict, can yield for team members. For example, research has identified reduced decision quality (Amason, 1996), reduced team innovativeness (De Clercq, Thongpapanl, & Dimov, 2009), and members' dissatisfaction with their team (Duffy, Shaw, & Stark, 2000) as potentially detrimental outcomes of relationship conflict. These studies assume that relationship conflict distracts the members from the team task and creates a negative and aggressive atmosphere in teams. Similarly, studies have shown that teams can benefit from task conflict in terms of improved creativity (Kurtzberg & Mueller, 2005) and higher decision quality (Amason, 1996) – outcomes that benefit from the team's focus on its task and from an open atmosphere. This study focuses on the members' negative affect as a proximal outcome of team conflict following implicit assumptions that conflict are connected to negative affect (Jones & Bodtker, 2001; Nair, 2008; von Glinow, et al., 2004). It appears that for this affective outcome measure the general assumption that relationship conflict is “something bad” and task conflict is “something good” also holds.

An important contribution of this study is that it identifies moderator variables for the relationship between conflict types and outcomes of the decision process. Whereas previous research has already identified moderators of the conflict-performance relationship such as task type (De Dreu & Weingart, 2003) and a team's openness (Jehn, 1995), this study focuses on the uncertainty of the information available for the team and team efficacy. Specifically, my results suggest that information uncertainty diminishes both the negative effect of relationship conflict, and the positive effect of task conflict, on team members' negative affective reactions. Team efficacy increases the negative affective reaction to relationship conflict, but it does not

moderate the impact of task conflict. These results help better understand some conflicting outcomes of previous studies. While – consistent with this study – relationship conflict has been consistently judged as detrimental to team processes and performance (De Dreu & Weingart, 2003; Foo, 2011b; Mohammed & Angell, 2004), for task conflict some studies find positive (Amason, 1996; Kurtzberg & Mueller, 2005; Pelled, et al., 1999), others negative (Foo, 2011b; Lovelace, et al., 2001; Ng & Van Dyne, 2005), and again others no effects (Devine, 1999; Passos & Caetano, 2005). The results indicate that a positive outcome of task conflict – in terms of team members' reduced negative affective reactions – is particularly likely under contextual conditions of low information uncertainty. This finding highlights the importance of considering the specifics of the research setting when studies on conflict are compared, and it suggests a considerable potential for future studies to make important contributions by investigating moderating effects in the conflict-outcome relationship.

Further, this study contributes to the literature on team decision making under uncertainty. Thus, I focused on a context that is frequently experienced by entrepreneurial teams (Amason, et al., 2006; Chowdhury, 2005). Usually, uncertainty is assumed to impede the willingness for entrepreneurial actions (McKelvie, et al., 2011) and to have negative consequences for venture performance (e.g., Chandler, et al., 2009; McMullen & Shepherd, 2006). However, this study showed that uncertainty can also have positive consequences for team members in an entrepreneurial decision making task. Uncertainty reduces the team members' feelings of responsibility and, thus, can reduce the negative consequences of higher levels of relationship conflict and the negative consequences of lower levels of task conflict. Future research could investigate the effects of entrepreneurs' perceptions of uncertainty on the profound consequences of venture failure (Shepherd, 2003). Perhaps entrepreneurs can use higher levels of uncertainty as an excuse for their venture's underperformance. Though this will not help the entrepreneurs to deal with the financial costs of venture failure, it could help them to handle the emotional costs of venture failure (Shepherd, Wiklund, & Haynie, 2009). If these perceptions are conveyed to the entrepreneur's environment, venture failure could

be communicated as misfortune, but not as the entrepreneur's mistake (see Cardon, Stevens, & Potter, 2011 for the different consequences of these two perceptions in communities).

Finally, this study provides new insights into the role of team efficacy in team decision making. Previous research has found that team efficacy is conducive to team performance (Gibson & Earley, 2007; Gully, et al., 2002) and has indicated that it has positive effects on venture performance (Ensley, et al., 2004). This lead to the prevailing view that team efficacy is something that should be developed and stimulated in teams (Gibson, 2003; Silver & Bufanio, 1996). To some extent, my results challenge this view because they suggest that there is a downside when team efficacy is considered as a moderator of the conflict-outcome relationship. Specifically, when team efficacy is high, team members facing relationship conflict will experience more negative affect from that conflict than members of teams with lower team efficacy. That is, team efficacy can make team members more vulnerable to negative outcomes of team conflict. This complements research emphasizing the dangers of highly efficacious teams such as overconfidence (Lindsley, et al., 1995), reduced critical thinking (Goncalo, Polman, & Maslach, 2010), and, thus, lower decision quality (Whyte, 1998).

### *5.5.2 Limitations*

I would also like to point out some limitations of this work that future studies should address. First, even if the teams worked on an entrepreneurial decision making task, they are no actual entrepreneurial teams that are jointly responsible for their venture (Kamm, et al., 1990). On the one hand, this allows me to control for effects of previous interactions and ensures that the members' negative affective reaction can be ascribed to their experiences in the recent team interaction. On the other hand, the use of student samples has been criticized in entrepreneurship research (P. B. Robinson, et al., 1991) because of the limited generalizability to real entrepreneurs. I acknowledge that the research setting in this study is rather artificial and the participants were only required to interact in the laboratory for a limited amount of time. Actual entrepreneurial teams interact for longer time spans and know each other for quite some



time, which might impact the way they cope with relationship and task conflict. Therefore, I encourage future research to further explore the role of relationship conflict and task conflict in the generation of negative affect in discussions of actual entrepreneurial teams. However, student sample represent an important first step to explore psychological processes of executives (Audia, et al., 2000). Further, this study entails high levels of experimental control and allows reducing the influence of potential confounding effects of other contextual factors.

Second, I relied on self-reports of the participants' affects. Affects are complex phenomena that involve physiological activation, behavioral changes, and a characteristic experience (Frijda, 1986; Gross & John, 1997; Izard, 2009). Thus, affects are difficult to measure (Barrett, Mesquita, Ochsner, & Gross, 2007; Parrott & Hertel, 1999) and self-reports have been criticized for being limited to the experience component of affect and for relying on verbal representations of affect (Barrett, 2004; K. R. Scherer, 2005). Future research could combine several measures of affect and complement self-reports with physiological measures and observer ratings to capture different facets of affect (Gross & John, 1997). However, self-reports have also been considered as the best way to measure the subjective experience of affects because this experience is only fully accessible via introspection (Barrett, et al., 2007; M. D. Robinson & Clore, 2002).

Finally, I focused on information uncertainty and team efficacy as two moderators of the conflict-negative affective reaction relationship. These moderators reflect both the decision context and the characteristics of the groups. However, there is ample room for research of other potential moderators. For example, regarding the entrepreneurial decision context, perhaps the dynamism of a decision making task (R. A. Baron & Tang, 2011; Jurkovich, 1974) could be included. If the information is very unstable and highly dynamic, this could, on the one hand, reduce the members' feeling of responsibility to the same extent as information uncertainty. On the other hand, higher levels of dynamism could also make the members more impatient and, thus, more vulnerable to the negative effects of conflict. With respect to team properties,

future studies might investigate variables such as team size because larger teams possess more cognitive resources and hence experience higher levels of cognitive conflict (Amason & Sapienza, 1997). Another interesting variable could be intra-team trust (Langfred, 2007) because trust could cause the members to attribute positive outcomes to the team and its members and negative outcomes to external factors (Rempel, Ross, & Holmes, 2001). Finally, a future research avenue is to complement this study by focusing on positive affect instead of negative affect as the dependent variable.

### *5.5.3 Practical implications*

This study also has some practical implications for team processes in entrepreneurial and organizational contexts. Managing conflict is a major task of team members and, if existent, team leaders (Eisenhardt, et al., 1997; Joni & Beyer, 2009). To create and maintain a team atmosphere where negative affect of team members are low and where detrimental influences of these emotions on team processes (cf. George, 1990; Staw & Barsade, 1993) are minimized, members should try to counteract relationship and stimulate (at least to some extent) task conflict during the team decision making task. Importantly, in team tasks where information uncertainty is low, managing these conflicts in the appropriate way seems particularly crucial. Further, when counteracting relationship conflicts team members and leaders might consider the team's efficacy. If team efficacy is high, it appears particularly important to counteract relationship conflicts in order to minimize team members' negative affective reactions. These suggestions highlight team members' and leaders' need to consider the nature of team conflict, the decision context, and the characteristics of the team conjointly when managing and interfering with decision processes.

Alternatively, teams should consider alternative perceptions of the task and the team, in particular when they realize that their team interaction is dissatisfying and frustrating. For example, team leaders could communicate to the other members that the task is particularly challenging for the team when they perceive relationship conflict to be high or task-related exchange to be low. These alternative perceptions should enable

the members to attribute outcomes of their team task to factors which are (for task conflict) or are not (for relationship conflict) under the control of the other members. This misattribution might reduce the team members' affective reactions to team interactions and thus could reduce negative consequences of conflict.

### *5.5.4 Conclusions*

Firms are often found and run by teams and teams are entrusted with important decisions in these contexts (Amason, et al., 2006; Barrick, Bradley, Kristof-Brown, & Colbert, 2007; Cantner & Stuetzer, 2010; Harper, 2008). Team decision making bears the danger of emerging conflict, however, there are different types of conflict which have a differential impact on the team members. This study contributes toward understanding this impact in more detail by showing that relationship conflict triggers, and task conflict diminishes, negative affect team members experience from an entrepreneurial decision making task. Importantly, this study also finds that this impact is contingent on the decision context (information uncertainty) and the characteristics of the team (team efficacy). I hope that these results stimulate future research on the impact of conflict on team members' affective experiences and the interplay between conflict, context, and team composition in explaining these reactions.



## **6 Perceptions of entrepreneurial passion and employees' commitment to entrepreneurial ventures<sup>18</sup>**

This chapter focuses on the perspective of the employees in entrepreneurial ventures and suggests that they can be influenced by the entrepreneur's affects. Drawing on the social identity model of leadership (SIMOL) I propose two mechanisms how perceptions of entrepreneurial passion influence employees' commitment to entrepreneurial ventures. Testing these mechanisms with data from a survey with 124 employees, I find that employees' perceptions of passion for inventing, founding, and developing impact commitment differentially. While perceptions of entrepreneurs' passion for inventing and developing enhance commitment, perceived passion for founding has the opposite effect. Employees' experiences of positive affect at work and their goal clarity mediate these effects. Section 6.1 provides an introduction to the topic. In Section 6.2 I review the literature on entrepreneurial passion, leadership, goal setting, and emotional transfer and derive the study's hypotheses. In Section 6.3 the methods used are explained and in Section 6.4 the results are presented. I discuss the results and highlight their implications for the literature on entrepreneurial passion and leadership in entrepreneurial firms in Section 6.5.

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<sup>18</sup> This section is based on Breugst, Klaukien, Domurath, and Patzelt (2011) and is under revision (3<sup>rd</sup> round) for a special issue on "Affect in Entrepreneurship" of *Entrepreneurship Theory and Practice*. An earlier version of the paper based on a different data set was presented in refereed paper sessions at the 2009 Babson College Entrepreneurship Research Conference, June 4-6, 2009 in Babson Park, MA, USA and at the 2010 Academy of Management Meetings, August 6-10, 2010 in Montréal, Canada. This earlier version is also published in the 2010 Academy of Management Best Paper Proceedings.

### 6.1 Introduction

Entrepreneurial passion refers to “consciously accessible intense positive feelings experienced by engagement in entrepreneurial activities associated with roles that are meaningful and salient to the self-identity of the entrepreneur” (Cardon, et al., 2009b, p. 517). Experiencing passion is typical of many successful entrepreneurs; it is the “fire of desire” that drives their daily efforts (Cardon, et al., 2009b, p. 515) and motivates them to persist in the face of obstacles (X.-P. Chen, et al., 2009). We still know little, however, about how employees' perceptions of entrepreneurial passion influence their commitment to new ventures. This is an important research topic because employee commitment is crucial for the success of new firms (J. N. Baron & Hannan, 2002). Moreover, in most small ventures entrepreneurs and employees are in frequent and direct contact with each other suggesting that entrepreneurs can substantially impact employee motivation and behavior (Ensley, Hmieleski, & Pearce, 2006). Nevertheless, securing the employees' commitment in new ventures is challenging since missing organizational legitimacy, the lack of financial resources for paying high salaries, and the uncertainty about the venture's future development path often motivate employees to look for career options outside the venture (Cardon, 2003; Cardon & Stevens, 2004).

Therefore, in this study we investigate how entrepreneurial passion influences the commitment of employees to new ventures. Consistent with previous research (e.g., Brundin, et al., 2008; Newcombe & Ashkanasy, 2002; Wu, McMullen, Neubert, & Yi, 2008), and because perceptions of the environment rather than objective characteristics influence the behavior of individuals (Das & Teng, 2001), we view entrepreneurs' displays of passion from an employee perspective and focus on perceptions of entrepreneurial passion. We draw on the social identity model of leadership (SIMOL, van Knippenberg & Hogg, 2003) and on a model of entrepreneurial passion (Cardon, et al., 2009b) to propose two possible mechanisms (mediating relationship) how perceived entrepreneurial passion impacts employee commitment. Using survey data on 124 venture employees closely working with entrepreneurs we find that employees' positive

affect at work and the clarity of their work goals mediate the relationship between perceived entrepreneurial passion and commitment, but in a different manner for different types of entrepreneurial passion. These findings inform existing literature in three important ways.

First, our study addresses Cardon's (2008) call for research on the impact of entrepreneurial passion on new venture employees. Existing literature on entrepreneurial passion has mostly focused on the entrepreneur (Cardon, et al., 2009b) and how his or her passion influences venture success (Baum & Locke, 2004), or investor commitment (X.-P. Chen, et al., 2009), but only few have proposed that entrepreneurial passion can also impact new venture employees (Cardon, 2008). Our study is unique in that it explores this relationship empirically and acknowledges that different types of entrepreneurial passion exist (Cardon, et al., 2009b).

Second, our study is unique in proposing and empirically testing two possible, non-exclusive mechanisms (mediating relationships) by which the three types of entrepreneurial passion impact the commitment of employees, an issue that has not been investigated so far. We find that perceived passion either influences employees' positive affect at work, their goal clarity, or both, which in turn triggers commitment. Importantly, these mechanisms explain why perceived passion for inventing and developing impact the employees' commitment positively, whereas passion for founding has a negative effect. Our data also suggest that the affective path is more dominant than the cognitive path (goal clarity). This supports Cardon's (2008) claim that entrepreneurial passion (and employees' perception of passion) is mainly affective in nature.

Finally, our results inform the leadership literature by emphasizing that similar affective displays of leaders in different contexts can influence followers differently. Existing studies (either implicitly or explicitly) suggest that leaders' displays of positive affect generally enhance, for example, followers' organizational citizenship behavior (Johnson, 2008) or performance (George, 1995), arguing that leaders' positive affect is contagious and evokes positive affective experiences in employees at work, which in

turn results in positive outcomes. For entrepreneurial passion, however, it appears that this argument does not apply uniformly. Specifically, our data suggest that employees' perceptions of entrepreneurs' passion for founding new ventures – the “heart” of entrepreneurial activity – can signal that the entrepreneur might leave the current venture once it is established and found the next one, thus also diminishing employee commitment to that venture. Focusing on how entrepreneurial passion influences employees also extends the literature on entrepreneurial leadership which has focused on entrepreneurs' leadership styles (Ensley, et al., 2006; Hmieleski & Ensley, 2007) but rarely on their affective displays (Brundin, et al., 2008).

### 6.2 Theory development

Cardon et al. (2009b) distinguish three different types of entrepreneurial passion. Passion for *inventing* reflects entrepreneurs' passion for activities related to identifying, inventing, and exploring new opportunities, passion for *founding* reflects entrepreneurs' passion for activities involved in establishing a venture for commercializing and exploiting opportunities, and passion for *developing* reflects entrepreneurs' passion for activities related to nurturing, growing, and expanding the venture after it has been founded. When engaging in activities they are passionate for, entrepreneurs “show strong and positive emotions toward their projects” (X.-P. Chen, et al., 2009, p. 203). These strong affects can be perceived by employees through the passionate entrepreneur's animated facial expression, energetic body movements, and rich body language (X.-P. Chen, et al., 2009).<sup>19</sup>

The Social Identity Model of Leadership (SIMOL; van Knippenberg & Hogg, 2003) provides a theoretical framework for understanding how perceived entrepreneurial passion influences the motivation and behavior of new venture employees. The SIMOL proposes that group leadership becomes more effective when

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<sup>19</sup> Employees may also work and interact with more than one entrepreneur when the venture is run by an entrepreneurial team. In our theory and empirical design we refer to the entrepreneur who the focal employee interacts with most and works with closest together. We expect this entrepreneur to have more impact on the employee and explain a larger part of variance of their behavior than other entrepreneurs who are in less frequent and close contact to the employee (Vecchio, 2003).



leaders are more prototypical members of the groups they are supposed to lead, i.e. when they serve as an ideal representative of employees' attitudes and values (Ellemers, de Gilder, & Haslam, 2004). Leaders who share more perceptions, attitudes, or values with their employees will be better able to influence them than less prototypical leaders (van Knippenberg & Hogg, 2003). Since the different types of entrepreneurial passion represent manifestations of distinct perceptions, attitudes, and values (Cardon, et al., 2009b), the extent to which employees share these perceptions, attitudes, and values might explain variance in their behavior. Further, most newly founded ventures employ only a small number of people, which facilitates their direct contact with entrepreneurs and enhances the salience of entrepreneurs' perceptions, attitudes, and values in a social setting (Ellemers, et al., 2004) as compared to larger work groups. Finally, a more prototypical leader is particularly effective in helping team members to cope with uncertain environments (van Knippenberg & Hogg, 2003) as they are typical of the entrepreneurial context (McKelvie, et al., 2011; McMullen & Shepherd, 2006). Consistent with the SIMOL, we acknowledge that there is variance in the perceptions, attitudes, and values among employees for example, based on their social and educational background. However, it is not our purpose to explore this variance. Instead, we focus on perceptions and attitudes that are, at least to some extent, important to all employees – namely perceptions and attitudes related to the venture's successful future development (see below).

The SIMOL suggests two ways how perceptions of entrepreneurial passion can influence the employees' commitment. First, perceptions of positive affect displayed by passionate entrepreneurs can be transferred and can trigger the experience of positive affect in employees themselves. Second, perceived passion can influence employees' goal clarity. Both, positive affect and goal clarity are known to influence organizational commitment (Jackson & Schuler, 1985; Thoresen, et al., 2003) and thus represent possible mechanisms (mediators) how perceived entrepreneurial passion impacts the employees' commitment to entrepreneurial ventures. Our research model, which we will now detail, is depicted in Figure 14.

### 6.2.1 Perceived entrepreneurial passion and employees' positive affect at work

Affects can be transferred in social interactions between people because individuals have the innate tendency to mimic another person's facial expression. As a response to physiological feedback from muscles involved in this mimicking, people tend to experience the exposed emotion themselves (see Hatfield, Cacioppo, & Rapson, 1994 for an overview). For example, when we observe others in our environment cheering and laughing, we are likely to experience positive affect as well. Importantly, however, these 'concordant' processes of affective transfer (transfer of the same or a similar affective experience) do not occur to the same extent under all circumstances; sometimes there are even 'discordant' reactions where displays of affect induce a different affective experience in others (Heider, 1958). For example, when we experience *schadenfreude* we feel happy when we perceive others to suffer.

The SIMOL suggests that how perceptions of entrepreneurial passion influence employees depends on sharing relevant perceptions, attitudes, and values because "for a leader's emotions to translate into follower emotions it is important that leader and followers share a group membership with which followers identify" (van Knippenberg & Hogg, 2003, p. 282). That is, the more employees perceive to share entrepreneurs' perception, attitudes, and values, the more likely they will experience concordant affective reactions in social interactions (Heider, 1958). It appears that the extent to which perceptions of entrepreneurial passion can trigger concordant reactions in employees depends on the type of passion displayed.

First, entrepreneurs passionate about *inventing* show positive affect while identifying and exploring new opportunities and developing new products and services. Since developing new products and services is essential for the venture's future performance, employees working with these passionate entrepreneurs will perceive that it is highly important for them to make the venture successful in the long run – an attitude that employees are likely to share given their interest in job and income security (Monsen, Patzelt, & Saxton, 2010). Moreover, in young and innovative ventures employees often indirectly or directly participate in the success of innovation efforts

(e.g., through stock options, profit sharing, and other performance-based incentives, Cardon & Stevens, 2004), which aligns their perceptions and attitudes with the entrepreneur's passionate inventing activities. Based on this sharing of perceptions, attitudes, and values related to the venture's future, employees are likely to experience a concordant affective reaction – that is, positive affect – when they perceive higher levels of entrepreneurial passion for inventing (Epstude & Mussweiler, 2009; Platow et al., 2005).

Second, entrepreneurs passionate for *founding* display positive affect during activities related to the creation of a new firm such as raising capital from investors, finding the right location, and attracting the first employees. These activities are distinct from those pursued by salaried employees and usually do not involve them, making it unlikely that entrepreneur and employees share common perceptions and attitudes related to these activities. Further, employees' perceptions of entrepreneurs' passion for such activities might indicate to them that once the current venture is sufficiently established (seed capital is raised, the right location is found, the first employees are hired), the entrepreneur is motivated to engage in these activities again and will move on to create the next firm instead of making the current venture successful in the long run. Therefore, there appears to be a conflict between entrepreneurs' and employees' perceptions and attitudes regarding the current venture's future development. This is likely to reduce concordant affective transfer (Platow, et al., 2005) or even lead to a discordant affective reaction (e.g., employees worry about their future when they believe that the entrepreneur will leave the firm after the start-up phase) resulting in less positive affect that employees experience at work.

Third, entrepreneurs experiencing passion for *developing* their current venture display positive affect when engaging in activities such as finding new customers, developing new markets, and optimizing organizational processes. Employees' perception of the entrepreneur's passion for these activities will indicate to them that they are 'in the same boat' with the entrepreneur because both have a vital interest in making the company successful in the long run. This sharing of perceptions, attitudes,

and values can be further enhanced when incentive systems allow employees to participate in the venture's future success (see above), thus intensifying concordant transfer of positive affect (Platow, et al., 2005). Therefore, we postulate:

*Hypothesis 1a: Perceived entrepreneurial passion for inventing will be positively related to employees' positive affect at work.*

*Hypothesis 1b: Perceived entrepreneurial passion for founding will be negatively related to employees' positive affect at work.*

*Hypothesis 1c: Perceived entrepreneurial passion for developing will be positively related to employees' positive affect at work.*

### 6.2.2 Perceived entrepreneurial passion and employees' goal clarity

Perceptions of entrepreneurial passion demonstrate to employees that entrepreneurs pursue their goals in a coherent and coordinated way (Cardon, et al., 2009b). Moreover, passion can facilitate the communication of entrepreneurs' visions for their venture (Baum & Locke, 2004). The SIMOL suggests that shared perceptions, attitudes, and values between entrepreneurs and employees facilitate entrepreneurs' communication of visions that help employees to clarify what is expected of them and to define their own goals (House, 1977). Therefore, perceptions of entrepreneurial passion can influence employees' goal clarity at work – “the extent to which the outcome goals and objectives of the job are clearly stated and well defined” (Sawyer, 1992, p. 134). It appears that perceptions of different types of entrepreneurial passion (reflecting different entrepreneurial goals and visions) impact employees' goal clarity differently.

First, entrepreneurs who are passionate for *inventing* focus their activities, for example, on the development of a high quality product and will be little distracted by other activities such as launching the product too early or producing higher quantities instead of high quality. These entrepreneurs either directly or indirectly through their actions communicate to employees that inventing a high quality product is the highest priority for the venture, which helps employees define their own goals at work. Since employees and entrepreneurs are likely to share, at least to some extent, perceptions and

attitudes related to inventing new products due to its importance for long-term venture success (see above), perceptions of entrepreneurial passion for inventing can contribute to enhance employees' goal clarity.

In contrast, perceived passion for *founding* new ventures likely decreases employees' goal clarity. As detailed earlier, the nature of the tasks associated with founding a new venture is relatively unrelated to the tasks and interests of employees, and it is unlikely that employees share related perceptions and attitudes with the entrepreneur. Therefore, perceived passion for founding is unlikely to comply with the interests and goals of employees. Further, employees' perceptions of passion for founding may be an indicator for entrepreneurs' motivation to leave the venture. This could mean that entrepreneurs invest less time, money, and effort into the current venture or could even exit, making it unclear for employees how much effort they should invest in the venture themselves. Employees may perceive that there are multiple and incompatible goals (i.e., supporting the current firm vs. supporting a potential new venture) leading to experiences of goal conflict (Locke, Smith, Erez, Chah, & Schaffer, 1994) and diminished goal clarity.

Finally, when entrepreneurs are passionate for *developing*, they demonstrate a strong interest in their current venture and that developing this venture is a priority goal of their work engagement. For example, they might communicate a vision of a strongly growing and dynamic firm which will soon be the biggest supplier worldwide of the product offered. Development-related activities are likely to involve employees closely and, in addition, are consistent with their perceptions and attitudes as they relate to developing a successful career in the growing venture (see above). Thus, employees are likely to adopt the goals and visions communicated (Haslam & Platow, 2001) helping them clarify expectation and goals at work. Therefore, we postulate:

*Hypothesis 2a: Perceived entrepreneurial passion for inventing will be positively related to employees' goal clarity.*

*Hypothesis 2b: Perceived entrepreneurial passion for founding will be negatively related to employees' goal clarity.*

*Hypothesis 2c: Perceived entrepreneurial passion for developing will be positively related to employees' goal clarity.*

### *6.2.3 Indirect effects of entrepreneurial passion on employees' organizational commitment*

The effects of perceived entrepreneurial passion on employees' positive affect at work and clarity of work goals can impact the employees' commitment to the venture. That is, positive affect and goal clarity are likely to mediate the effect of perceived entrepreneurial passion on employee organizational commitment. Organizational commitment is a work-related attitude and denotes "the strength of an individual's identification with and involvement in a particular organization" (Porter, Steers, Mowday, & Boulian, 1974, p. 604). Studies on individual-level antecedents of organizational commitment found that, for example, an internal locus of control, high self-efficacy, and organizational tenure trigger commitment. Organizational-level factors influencing commitment include organizational support, organizational justice, and transformational leadership (findings are taken from the meta-analysis by Meyer, Stanley, Herscovitch, & Topolnytsky, 2002 who provide a comprehensive review on the topic).

The affect infusion model (AIM, Forgas & George, 2001) suggests that positive affect has a direct impact on employees' work-related attitudes because it infuses their cognitive processes (Thoresen et al., 2003). Positive affect at work signals to employees that everything is going well, that the current situation is not threatening, and that their environment is safe. Thus, employees experiencing positive affect can fully focus on the demands of the current work task and build up resources for current or upcoming challenges (Fredrickson, 2001) which they can proactively approach and in which they can invest extra effort (Foo, et al., 2009). A meta-analysis of studies on affects and work

attitudes (Thoresen, et al., 2003) supports the positive relationship between employees' experiences of positive affect at work and organizational commitment.

Second, while clear and unambiguous goals trigger employees' satisfaction (Sawyer, 1992) and performance (Tubre & Collins, 2000) at work, conflicting goals and unclear priorities reduce their motivation to pursue these goals (Locke, et al., 1994). Work goals that are unclear lose their importance for employees and diminish their willingness to get involved with these goals, decreasing organizational commitment subsequently (Meyer & Allen, 1997). Unclear goals can also reduce employees' commitment to their venture because they cannot link their effort to rewards (Jackson & Schuler, 1985; Tubre & Collins, 2000). In particular in new ventures where established routines are missing clear goals and reward contingencies are crucial for attracting employees (Ensley, et al., 2006). To the extent that employees' goal clarity at work is enhanced – for example, through their perceptions of passion for inventing and developing – they become more committed to these goals and, subsequently, the venture (Maier & Brunstein, 2001). Therefore, we postulate:

*Hypothesis 3a: Perceived entrepreneurial passion for inventing will have a positive indirect effect on employees' organizational commitment via positive affect at work.*

*Hypothesis 3b: Perceived entrepreneurial passion for founding will have a negative indirect effect on employees' organizational commitment via positive affect at work.*

*Hypothesis 3c: Perceived entrepreneurial passion for developing will have a positive indirect effect on employees' organizational commitment via positive affect at work.*

*Hypothesis 4a: Perceived entrepreneurial passion for inventing will have a positive indirect effect on employees' organizational commitment via goal clarity.*

*Hypothesis 4b: Perceived entrepreneurial passion for founding will have a negative indirect effect on employees' organizational commitment via goal clarity.*

*Hypothesis 4c: Perceived entrepreneurial passion for developing will have a positive indirect effect on employees' organizational commitment via goal clarity.*

### 6.3 Methodology

#### 6.3.1 Data collection and sample

Our sample frame is employees in German ventures who report to work closely together with the founder of their firm. In order to find these employees, first we identified 47 business incubators from the German Federal Association of Innovation, Technology, and Start-up Centers (ADT, 2010) and Regional Associations. Focusing on incubator ventures is advantageous because they are usually in an early development phase (Phan, Siegel, & Wright, 2005; Rice, 2002) and thus likely to be small and heavily influenced by the initial founder(s). From the incubators' websites we compiled a list of ventures located in the incubators. We excluded subsidiaries of large firms because these are most likely to be led by a salaried manager. All together our list contained 664 ventures.

In a second step, we trained two research assistants, who contacted all firms by telephone, explained the purpose of our study, and asked for at least one employee who works closely together with the venture's founder to participate in the study. Of the 664 firms, we were able to contact 516 firms; the others either did not exist anymore (15) or were unavailable by telephone (133). Further investigation revealed that most of the unavailable firms had also ceased to exist. Some (89) firms did not have any employees and had to be excluded. Additional 34 firms had to be excluded because employees were unable to complete the questionnaire (e.g., because of insufficient knowledge of the German language). Employees from 241 firms out of the remaining 393 agreed to participate (61.3 %). We sent e-mail invitations to these employees, which summarized the study purpose and provided them with a link to our online survey (see below). If employees did not participate within ten days, we sent another e-mail which reminded them of the importance of their participation and again provided them with a link to the survey.



We received responses from 124 employees from 102 ventures<sup>20</sup>, representing a 19.8 % response rate in terms of firms contacted. When we compared the assessments of early (first 31 of the 124) and late respondents (last 31) there were no significant differences in all study variables ( $p > .10$ ), indicating that non-response bias is unlikely to be a problem in our data set.

On average, employees are 37.13 years old (standard deviation 10.42 years), and 50.8 % of them are female. Fifty six % have a university degree, 16 % have a high school degree, and 25 % have finished vocational education. They have 11.44 years of average working experience (std. dev. 9.92 years) and have worked 5.18 years (std. dev. 5.14) for their current employer. Eighty-nine % are in daily contact with the entrepreneur, 8 % have weekly contact with him/ her, and only 3 % have less frequent contact with him/ her. The employees' ventures are on average 9.51 years old (std. dev. 5.97) and have 11.93 employees (std. dev. 16.78).

### 6.3.2 Measures

*Organizational commitment.* The dependent variable of our study is employees' organizational commitment and was measured with a nine item scale (Mowday, Porter, & Steers, 1982) which captures affective attitudes towards the venture as a whole. An exemplary item is "I really care about the fate of this organization". A 7-point Likert scale with the anchors "I do not agree at all" and "I completely agree" was used to record employees' commitment. Cronbach's alpha of the scale was .92 indicating high reliability (Hair, et al., 2006).

*Perceptions of entrepreneurial passion.* To assess employees' perception of the entrepreneurs' passion we adapted a scale on entrepreneurs' self-reported passion (Cardon, Stevens, & Gregoire, 2009a) to reflect the employees' perspective. Exemplary items are "The entrepreneur appears to feel energized when s/he is developing product prototypes" (passion for inventing), "The entrepreneur appears to be excited by

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<sup>20</sup> As some participants worked for the same venture, we partly have a nested data structure. However, since the pattern of results did not change when we used only one employee per firm, below we report the findings for the whole sample.

establishing a new company” (passion for founding), and “The entrepreneur appears to be excited by assembling the right people to work for the business” (passion for developing)<sup>21</sup>. Perceptions of entrepreneurial passion were measured on 7-point Likert scales with the anchors “I do not agree at all” and “I completely agree”. Each scale consists of five items and Cronbach’s alpha was .82, .83, and .83 for passion for inventing, founding, and developing, respectively. This indicates high reliability (Hair, et al., 2006).

Since our scale is an adaptation of the scale published by Cardon, et al. (2009a), we used confirmatory factor analysis (CFA) to confirm the distinctiveness of the three types of perceived entrepreneurial passion. We compared a three-factor model where the three latent variables for the passion types were allowed to correlate with a one-factor model where all 15 items loaded on one latent variable. Results indicated that the three-factor model ( $\chi^2(84) = 173.52, p < .001$ ; CFI = .91; RMSEA = .09, SRMR = .07; PCFI = .73) fits the data better than the one-factor model ( $\chi^2(87) = 315.81, p < .001$ ; CFI = .77; RMSEA = .15, SRMR = .10; PCFI = .64). This indicates that the three types of entrepreneurial passion can be discriminated by employees.

*Positive affect at work.* We measured employees’ positive affect at work with a short version of the positive affect scale from the Positive and Negative Affect Schedule (PANAS; Watson, et al., 1988). The short scale consists of five items (“enthusiastic,” “inspired”, “attentive,” “proud,” and “interested”) and has recently been used in entrepreneurship research (Foo, et al., 2009). The PANAS can be applied for different settings (Watson, et al., 1988). We framed it as “the mood generally experienced at work”, consistent with others (K. Lee & Allen, 2002). Positive affect was assessed on a 5-point Likert scale with the anchors “not at all” and “always”. Cronbach’s alpha of the scale was .84.

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<sup>21</sup> The corresponding original items are “I feel energized when I am developing product prototypes,” “Establishing a new company excites me,” and “Assembling the right people to work for my business is exciting.”

*Goal clarity.* To assess the extent to which employees are clear about their goals and responsibilities at work we used a 5-item scale by Sawyer (1992). Employees had to rate items, like their “duties and responsibilities” or “the expected results of [their] work” on 7-point Likert scales ranging from “very unclear” to “very clear”. Cronbach’s alpha of goal clarity was .94.

*Control variables.* To control for age or gender effects we recorded the study participants’ age (in years) and gender (coded as 0 for males and 1 for females). Both *age* and *gender* correlate with individuals’ organizational commitment (Meyer, et al., 2002). Furthermore, we control for the time that the participant has worked together with the entrepreneur because over time the influence of the entrepreneur on the focal employee may change. This variable is labeled *time with entrepreneur* and is dummy coded; 0 denotes that they have worked together for up to 3 years and 1 denotes that they have worked together for more than 3 years. Finally, we control for the participants’ educational background as a proxy for their job content. This variable is labeled *educational background* and is dummy coded; 0 denotes that their vocational training/studies were in the field of business, social sciences, or humanities and 1 denotes that their vocational training/studies were in the field of engineering or natural sciences.

### 6.4 Results

Table 17 shows means, standard deviations, and the correlations of all variables. The perceived entrepreneurial passion variables are significantly correlated with organizational commitment. The mediating variables, positive affect and goal clarity, are also significantly and positively correlated with organizational commitment.<sup>22</sup>

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<sup>22</sup> As correlations among the passion variables are relatively high, we checked for potential multicollinearity problems by calculating variance inflation factors (VIF) for all models. The highest VIF is 2.41 (for perceived passion for developing), which is clearly below the critical value of 10 (Hair, et al., 2006) and indicates that multicollinearity is unlikely to be a concern in our study.

**Table 17: Means, standard deviations, Cronbach's alpha, and correlations between focal variables**

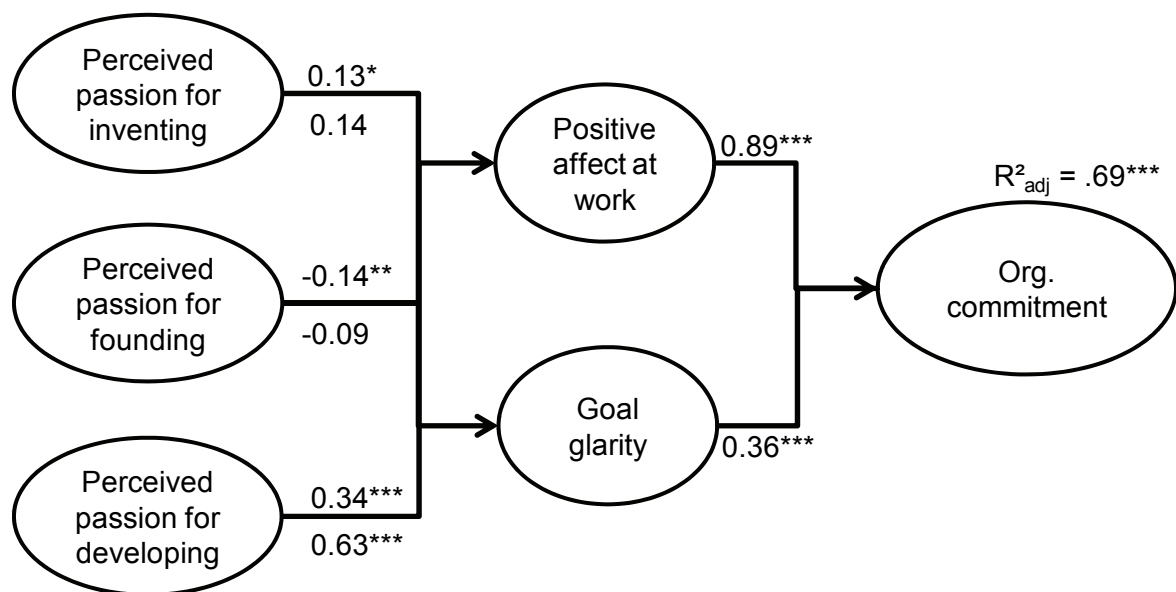
	M	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) Organizational commitment	4.84	1.35	(0.92)									
(2) Perceived passion for inventing	4.97	1.28	0.39***	(0.82)								
(3) Perceived passion for founding	4.58	1.30	0.28**	0.48***	(0.83)							
(4) Perceived passion for developing	4.94	1.25	0.58***	0.46***	0.59***	(0.83)						
(5) Positive affect at work	3.78	0.68	0.75***	0.37***	0.22*	0.52***	(0.84)					
(6) Goal clarity	5.56	1.41	0.74***	0.35***	0.31***	0.60***	0.63***	(0.94)				
(7) Age	37.13	10.41	0.17	0.02	0.04	0.17	0.12	0.18*	(-)			
(8) Gender <sup>a</sup>	0.51	0.50	0.15	0.05	0.12	0.26**	0.15	0.20*	0.24**	(-)		
(9) Time with entrepreneur <sup>b</sup>	0.48	0.50	0.06	-0.08	-0.04	-0.01	0.02	0.01	0.35**	-0.02	(-)	
(10) Educational background <sup>c</sup>	0.51	0.50	0.04	0.03	-0.07	-0.05	-0.01	0.03	0.02	-0.52***	0.05	(-)

Notes:

<sup>n</sup> = 124, Cronbach's alpha (if applicable) is reported on the diagonal.<sup>a</sup> 0 = "male," 1 = "female."<sup>b</sup> 0 = "worked together for up to 3 years," 1 = "worked together for more than 3 years."<sup>c</sup> 0 = "training in field of business, social sciences, or humanities," 1 = "training in field of engineering or natural sciences."\*\*\*  $p < .001$ ; \*\*  $p < .01$ ; \*  $p < .05$

To test our hypotheses we used a macro developed by Preacher and Hayes (2008) that allows us to test our whole model including the multiple mediators at once and relies on bootstrapping to test the indirect effects of perceived entrepreneurial passion on commitment. This procedure can be used for rather small sample sizes and does not rely on the assumption of normality for the indirect effects (Preacher & Hayes, 2008). We ran three analyses for each type of perceived entrepreneurial passion with the other types as covariates. Further, we entered our control variables – age, gender, time with entrepreneur, and educational background – as covariates but did not find any significant effects ( $p > .20$ ).

Figure 14 displays the results for the direct effects of perceived entrepreneurial passion on employees' positive affect and goal clarity. Consistent with Hypotheses 1a, 1b, and 1c all types of perceived entrepreneurial passion show a significant positive (passion for inventing,  $\beta = 0.13$ ,  $p < .05$ , and developing,  $\beta = 0.34$ ,  $p < .001$ ) or negative (passion for founding,  $\beta = -0.14$ ,  $p < .01$ ) relationship with employees' positive affect at work. Contrary to Hypotheses 2a and 2b, perceived passion for inventing ( $\beta = 0.13$ ,  $ns$ ) and perceived passion for founding ( $\beta = -0.09$ ,  $ns$ ) did not have a significant influence on goal clarity. However, we found support for Hypothesis 2c suggesting a positive relationship between perceived passion for developing and goal clarity ( $\beta = 0.63$ ,  $p < .001$ ).



Notes:

$n = 124$

Results are based on the Preacher and Hayes macro (2008)

Control variables: age, gender, time with entrepreneur, educational background

\*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$

**Figure 14: Research model and results**

We tested the significance of indirect effects with a bias-corrected bootstrapping procedure with 10,000 bootstrap samples (Preacher & Hayes, 2008). Table 18 displays the indirect effects, their standard errors, and the 95 % bias-corrected confidence intervals. First, the indirect effect of perceived passion for inventing on commitment via positive affect is positive and significant (indirect effect = 0.12, 95% CI = .00<sup>23</sup> - .24), whereas the indirect effect via goal clarity is not significant (indirect effect = 0.05, 95% CI = -.03 - .17). These findings support Hypothesis 3a, but not Hypothesis 4a. Second, for perceived passion for founding the indirect effect on commitment via positive affect is negative and significant (indirect effect = -0.13, 95% CI = -.26 - -.03), but the indirect effect via goal clarity is also not significant (indirect effect = -0.03, 95% CI = -.14 - .05). This supports Hypothesis 3b, but not 4b. Third, the indirect effects of perceived passion for developing on commitment via positive affect and goal clarity are

<sup>23</sup> The lower limit of the confidence interval was 0.0002. Thus, 0 is not included in the confidence interval.

both positive and significant (indirect effect = 0.29, 95% CI = .16 - .46 and indirect effect = 0.23, 95% CI = .10 - .40, respectively). This provides support for Hypotheses 3c and 4c. Finally, both positive affect and goal clarity show a positive and significant relationship with participants' organizational commitment ( $\beta = 0.89$ ,  $p < .001$  and  $\beta = 0.36$ ,  $p < .001$ , respectively). The model is significant,  $R^2_{adj} = .69$ ,  $F(9,114) = 32.11$ ,  $p < .001$ .<sup>24</sup>

**Table 18: Indirect effects of perceived entrepreneurial passion (via positive affect at work and goal clarity) on organizational commitment**

	Bootstrap – Indirect Effect	SE	Lower Limit 95% CI	Upper Limit 95% CI
Inventor passion → PA → OC	.12*	.06	.00	.24
Inventor passion → Goal CI → OC	.05	.05	-.03	.17
Founder passion → PA → OC	-.13*	.06	-.26	-.03
Founder passion → Goal CI → OC	-.03	.04	-.13	.05
Developer passion → PA → OC	.29**	.07	.16	.46
Developer passion → Goal CI → OC	.23**	.08	.10	.40

Notes:

$n = 124$ , CI = Confidence Interval; PA = Positive Affect at Work; Goal CI = Goal Clarity; OC = Organizational Commitment.

Control variables: age, gender, time with entrepreneur, educational background.

Confidence intervals are bias-corrected, based on 10,000 bootstrap samples.

$R^2_{adj} = .69$ ,  $F(9,114) = 32.11$ ,  $p < .001$

\*\*  $p < .01$ ; \*  $p < .05$

## 6.5 Discussion and conclusion

Building on the SIMOL (van Knippenberg & Hogg, 2003) we proposed that perceptions of the entrepreneurs' passion for inventing, founding, and developing a venture can have differential impacts on employees' positive affect at work and goal

<sup>24</sup> To test the robustness of our results, we also ran a Structural Equation Model (SEM). Although our sample size is below the typical recommendations for SEM studies, we found similar patterns. The model fit was within accepted thresholds ( $\chi^2(574) = 889.84$ ;  $p < .001$ ; CFI = .90; RMSEA = .07, 90% CI = .058 - .075; SRMR = .08). But because of the small sample size these results have to be taken with care. Thus, we decided to report in detail only results from the Preacher and Hayes (2008) procedure which is more accurate for small sample sizes.

clarity, thereby affecting their commitment to new ventures. Our data show that, first, perceived passion for *inventing* has a positive influence on the employees' positive affect at work and thereby their organizational commitment. Second, perceived passion for *founding* has a negative influence on employees' positive affect and, indirectly, on their organizational commitment. Third, perceived passion for *developing* has a positive effect on the employees' positive affect and goal clarity and, thus, indirectly a positive effect on their organizational commitment. Interestingly, the analysis of indirect effects suggests that employees' positive affect at work is a more important mediator for the perceived passion – commitment relationship than goal clarity (which mediates only the effect of passion for developing). One reason for this finding might be that passion is mainly affective in nature (Cardon, et al., 2009b), which likely also accounts for its displays and employees' perceptions of these displays. Hence, perceptions of entrepreneurial passion will be more closely connected to the employees' affect (via affective transfer) than to a more rational and cognitive interpretation of passionate displays, which influence goal clarity. However, perceived passion for developing has a consistent positive relationship with goal clarity which emphasizes that the communication of goals and visions by passionate entrepreneurs can also influence employee motivation and commitment.

### 6.5.1 *Theoretical contributions*

Existing research highlights that passion results in high levels of energy and effort entrepreneurs invest in new ventures, and that entrepreneurial passion hence contributes to new venture success (Baum & Locke, 2004). However, this literature has neglected the importance of employees for new venture performance and the potential impact of (perceptions of) entrepreneurial passion on employee motivation and behavior. Following Cardon's (2008) call for research on the impact of entrepreneurial passion on ventures' employees we explore this issue by focusing on how employees' perceptions of entrepreneurial passion influence their affect at work, goal clarity, and organizational commitment. Supported by the SIMOL we identified differential effects for the three types of entrepreneurial passion. For passion for developing (and to a lesser



extent for passion for inventing) we found that there might be a rather “indirect” path how entrepreneurial passion contributes to new venture success – specifically via triggering the employees’ commitment – since employee commitment is crucial for organizational success (Steyrer, Schiffinger, & Lang, 2008). Importantly, for passion for founding this indirect effect might be negative. Thus, we would like to encourage future research on this issue. For example, in a mediation model researchers could simultaneously investigate the “direct” impact of entrepreneurial passion on new ventures success and the “indirect” path of perceived entrepreneurial passion via the employees’ commitment and compare how much variance of new venture performance each path explains.

While research has shown that expressed affect can lead to affective reactions in the target person’s surrounding (Epstude & Mussweiler, 2009), this issue has rarely been discussed in the entrepreneurship literature. This is surprising given that entrepreneurship is a highly emotional process (R. A. Baron, 2008) suggesting that entrepreneurs display a variety of different affects to employees. Importantly, our results indicate that it is not simply the positive affect accompanying entrepreneurial passion that spills over from entrepreneur to employee, but that this process is contingent on perceptions, attitudes, and values linked to the type of passion employees perceive. Only when the entrepreneur’s passion relates to perceptions, attitudes, and values that align with those of employees (in terms of making the current venture successful in the long run), perceptions of passion likely trigger concordant affective reactions and induce positive affect in employees. This is consistent with the SIMOL proposing that leaders perceived as being prototypical for the group are more effective than non-prototypical leaders in influencing employees (van Knippenberg & Hogg, 2003).

Although leadership is a major task of entrepreneurs (Hmieleski & Ensley, 2007; Vecchio, 2003), this aspect has rarely been investigated in the entrepreneurship literature so far. Leadership has a crucial influence on employees’ behavior, and employees are permanently influenced by their leaders’ behavior (e.g., House, 1971;

Wu, et al., 2008) and their affective displays (e.g., K. M. Lewis, 2000; Sy, Côté, & Saavedra, 2005). The few studies on entrepreneurial leadership have typically focused on the relationship between leadership styles and organizational performance (Ensley, et al., 2006; Hmieleski & Ensley, 2007), but they have typically not investigated how leading entrepreneurs' affective displays impact employee motivation and behavior. As an exception, Brundin et al. (2008) used an experimental design to explore the relationship between entrepreneurs' affective displays and employees' motivation to engage in entrepreneurial action. Extending this work, we show that the different types of entrepreneurial passion differentially explain employees' positive affect at work, their goal clarity, and, thus, their organizational commitment. This important role of entrepreneurs' passionate displays is consistent with the literature on emotional leadership which suggests that leaders' affective displays can significantly impact the behavior of employees (K. M. Lewis, 2000; Sy, et al., 2005). Future models of entrepreneurial leadership should acknowledge the role of affective displays as a way to influence employee behavior beyond power, the structuring of work tasks, and supporting employees (House, 1971).

### *6.5.2 Limitations and future research*

Our study is subject to limitations which offer opportunities for future research. First, we relied on employees' subjective perceptions of entrepreneurs' passion and did not assess entrepreneurial passion and its display relying on more objective criteria (e.g. analyses of video recordings). Although employees' perceptions of the environment rather than objective characteristics influence their behavior (Das & Teng, 2001), future research could assess entrepreneurial passion in several ways to see how self-reported passion from the entrepreneur's perspective translates into perceived passion from the employees' perspective. Third person ratings of the entrepreneur's passionate displays could be used to rule out biases in the perceptions of the employees. Second, based on the literature on leadership (van Knippenberg & Hogg, 2003), affective transfer (Epstude & Mussweiler, 2009), and the communication of visions (Haslam & Platow, 2001) we postulate that perceived passion will influence employees' affect at work and

goal clarity which will in turn influence their organizational commitment. However, it is also possible that employees who are highly committed to their organization will perceive their supervisor as passionate for developing the venture, and that employees who are not committed to their organization will perceive their supervisor as passionate for founding a new firm. Thus, we cannot be sure of the causality implied by our model, even if our theory supports it. Future research could longitudinally investigate these relationships and follow employees from their start in the new venture over a longer period of time.

### 6.5.3 *Conclusion*

In conclusion, our study finds that employees' perceptions of entrepreneurial passion impact their commitment to ventures via influencing their affective experiences at work and their goal clarity, but differently for different types of passion. While passion for inventing and developing are conducive to employee commitment, passion for founding is detrimental. It appears that perceptions of entrepreneurial passion mainly impact employees via the affective path, and less via the cognitive path (goal clarity). We hope that these findings inspire further research on entrepreneurs' affective displays and leadership and how they impact new venture employees.



## **7 Conclusions and avenues for new research**

In this thesis I present five empirical studies which focus on important and innovative issues in the field of entrepreneurial behavior in social contexts. The chapters of this thesis investigate different phenomena, i.e. cognitive and affective factors, in three different social contexts of entrepreneurial individuals: their family, their fellow team members, and their employees. To address my research questions I use secondary and original data, and I employ cross-sectional analyses as well as an experimental design. In the following Section 7.1, I conclude this thesis by briefly summarizing the main results of the studies. I highlight their contributions to previous research in the field of entrepreneurship as well as to social, affective, and organizational psychology. In Section 7.2, I will – based on this thesis' findings – discuss new avenues for research in the field of entrepreneurship and organizational behavior.

### **7.1 Summary of results and contributions**

The goal of this thesis is to investigate the social context for entrepreneurial individuals and, in particular, how this context influences and is influenced by their thoughts, feelings, and actions. The individual chapters focus on different contexts which represent important surroundings for entrepreneurial individuals at different steps of the entrepreneurial process.

Chapter 2 represents the first step in the entrepreneurial process, the formation of entrepreneurial intentions. I develop a model of the transmission of entrepreneurial intentions within families across multiple generations, and I investigate variance of this transmission across different cultures. The model is tested with a large and international data set covering more than 50,000 individuals. Whereas previous research has already highlighted the role of parents for the formation of offspring's entrepreneurial intentions (Matthews & Moser, 1996; Wang & Wong, 2004), this study shows that there is an additional intra-familial effect arising from grandparents' entrepreneurial status.

Grandparents contribute to the formation of offspring's intentions beyond the parents' effect. Further, this chapter highlights the complexity of intra-familial transmissions of entrepreneurial intentions by showing that the parents' and grandparents' influences partly substitute for each other. Finally, this chapter is – to the best of my knowledge – one of the first studies examining cross-cultural variance in the transmission of entrepreneurial intentions within families. Adding to the literature on cultural influences on entrepreneurship (Hayton, et al., 2002; Steensma, et al., 2000; Taylor & Wilson, in press), the results show that differences in social structures surrounding individuals can explain heterogeneity in the transmission of entrepreneurial intentions from parents and/or grandparents to children. Thus, this chapter helps understand the mechanisms how entrepreneurial intentions are transmitted between generations. In a next step, these results can hopefully contribute to creating environments which promote entrepreneurial intentions among young people.

Chapter 3 focuses on a further step in the entrepreneurial process. Before the creation of a venture, entrepreneurial individuals need to evaluate potential business opportunities and decide to exploit (one of) them (Y. R. Choi & Shepherd, 2004; Shane & Venkataraman, 2000). I accentuate in this chapter that these decisions are often made in a team context (cf. A. C. Cooper & Daily, 1997; Gruber, et al., 2008). Borrowing from social psychology this decision situation is exemplified by a hidden profile experiment (Stasser & Titus, 1985) and by experimentally manipulating the information uncertainty surrounding the decision task – a context which is frequently connected to entrepreneurial decision making (Knight, 1946; McKelvie, et al., 2011; McMullen & Shepherd, 2006). In contrast to research emphasizing that teams achieve a higher quality in entrepreneurial decisions than individuals (Chowdhury, 2005; Forbes, et al., 2006; T. Simons, Pelled, & Smith, 1999) but consistent with research in social psychology showing that team decisions can be substantially biased (Mesmer-Magnus & DeChurch, 2009; Schulz-Hardt, et al., 2006; Stasser & Titus, 1985), I find that teams have difficulties to achieve high levels of decision quality. Those teams that achieve high decision quality significantly exchange more initially unique information.

However, there is heterogeneity in this relationship which can be explained by team metacognitive knowledge – a team’s ability to understand the cognitive processes, its tasks, and the strategies necessary for addressing these tasks (cf. Flavell, 1979). Team metacognitive knowledge is also helpful for teams that encountered high levels of information uncertainty. This study speaks to research on entrepreneurial teams and on team decision making. It demonstrates that team-level entrepreneurial decision processes can be biased and can hence lead to a suboptimal decision quality which is detrimental for new ventures. Further, it shows why some teams are better able to deal with information uncertainty than others – an environmental condition that is particularly relevant in entrepreneurial contexts (McKelvie, et al., 2011; McMullen & Shepherd, 2006). Finally, research on team decision making has emphasized the importance of sharing initially unique information for decision quality (Mesmer-Magnus & DeChurch, 2009). However, to the best of my knowledge, no research so far has addressed why some teams are better able to use information when it has been exchanged than other teams. This study shows that those teams higher in metacognitive knowledge are better able to translate unique information that has been shared into superior team performance. Based on these findings, important implications for the decision making of entrepreneurial teams can be derived. Specifically, (i) teams should be encouraged to focus on information that is new to them, (ii) they should be challenged in their decision making task, and, most importantly, (iii) team metacognitive knowledge should be trained.

The focus of Chapter 4 is on members’ and the teams’ assessments of team performance *after* a team-level entrepreneurial decision task. Understanding the conditions under which self-assessments are accurate is important because self-assessments represent crucial feedback to entrepreneurial decision makers when there is only limited feedback available due to high environmental uncertainty (Gifford, et al., 1979; P. R. Lawrence & Lorsch, 1967). Thus, an accurate self-assessment of team performance can help teams to learn from their experience for future decision making tasks. In this study, I develop a multi-level model of the accuracy of self-assessed team

performance. The results show that heterogeneity in the relationship between a team's objective performance and self-assessment of team performance can be explained by the perception of relationship conflict – intra-team conflict relating to interpersonal tensions, animosities, and frictions between members (Jehn, 1995) – at the individual and at the team level. Further, when performance assessments are compared across levels, the individual's perception of relationship conflict and the team's collective perception of relationship conflict interact in such a way that the individual's accuracy in team performance assessment benefits from perceived relationship conflict only when the team's collective perception of relationship conflict is low. This study contributes to research on entrepreneurial learning as it helps understand an important aspect of learning – learning about oneself (Cope, 2005, in press). Further, it provides insight into the formation of self-assessments in a social context which is particularly relevant for the entrepreneurial and the organizational context where many tasks are executed by teams (Amason, et al., 2006; Harper, 2008; Stevens & Campion, 1994; van Ginkel & van Knippenberg, 2008). Intriguingly, I also identify a remarkable role of relationship conflict in the accuracy of self-assessed performance. Whereas relationship conflict was repeatedly shown to decrease team performance in a variety of tasks (Amason, 1996; Foo, 2011b; Langfred, 2007), this study shows that it does not diminish performance when the task is the assessment of a team's performance. Thus, this study helps understand how self-assessments of team performance in an entrepreneurial decision making task are formed, and how their accuracy can be improved by establishing a specific state of mind of the assessors.

Whereas the first three chapters of this thesis investigate cognitive aspects of entrepreneurial individuals, Chapter 5 and Chapter 6 explore affective processes in entrepreneurial contexts. In Chapter 5, I analyze team members' negative affect arising from the entrepreneurial decision making task. The development of negative affect is an important topic because negative affect limits creativity (Gaspar, 2003; Hirt, et al., 1997), cooperative behavior (George, 1990), and performance in decision making tasks (Staw & Barsade, 1993) – aspects that are crucial for the functioning of entrepreneurial



teams. I build on the literature of team conflict and distinguish relationship conflict – which relates to interpersonal tensions, animosities, and frictions between team members – from task conflict – which relates to disagreements about the task and different task-related opinions between team members (Jehn, 1995). Based on this distinction I propose a model of negative affective reaction to conflict contingent on characteristics of the decision context and the team. Both types of conflicts are postulated and found to trigger opposite affective reactions in members. Drawing on the literature on team interactions (De Dreu & Weingart, 2003; Gibson, 1999) and attributional theory of emotion (Siemer & Reisenzein, 2007; Weiner, 1985) I theorize that the reduced feelings of responsibility connected to higher levels of uncertainty and lower levels of team efficacy will reduce the impact of both types of conflict on the members' negative affect. The empirical data show that uncertainty buffers the negative impact of relationship conflict and decreases the positive impact of task conflict. Team efficacy increases the negative effects of high relationship conflict, but does not moderate the impact of task conflict on members' negative affective reaction. Interestingly, while uncertainty is usually seen as negative because it decreases the willingness for entrepreneurial actions (McKelvie, et al., 2011) and venture performance (e.g., Chandler, et al., 2009; McMullen & Shepherd, 2006), my results show potentially positive affective consequences in team interactions. Further, team efficacy, which has previously been related positively to team performance (Gibson & Earley, 2007; Gully, et al., 2002) and new venture success (Ensley, et al., 2004) intensifies negative affective reactions to conflict in my study. These findings suggest interesting future research avenues regarding the interplay of uncertainty, team efficacy, conflict, entrepreneurial team members' affective experiences, and new venture performance.

In Chapter 6, I integrate an additional perspective, i.e. the perspective of the entrepreneur's employees. I analyze how employees' perceptions of three different types of entrepreneurial passion (cf. Cardon, et al., 2009b) impact their commitment to entrepreneurial ventures. Because employees are an important factor for venture success

(J. N. Baron & Hannan, 2002; Deshpande & Golhar, 1994), it is relevant for entrepreneurship research and practice to understand what causes employees to stay in an entrepreneurial venture. Drawing on the social identity model of leadership (SIMOL; van Knippenberg & Hogg, 2003) I propose two mechanisms how perceptions of entrepreneurial passion influence employees' commitment to entrepreneurial ventures. This study demonstrates differential effects of passion for inventing, founding, and developing on employee commitment. While perceptions of entrepreneurs' passion for inventing and developing enhance commitment, perceived passion for founding – a core activity for entrepreneurs – has the opposite effect. Further, I identify two mediators in this relationship: employees' experiences of positive affect at work and their goal clarity. This study adds to the literature on entrepreneurial passion by showing that entrepreneurial passion does not only impact the entrepreneur, but that it can also have an impact on employees of entrepreneurial ventures. Moreover, this study extends the literature on entrepreneurial leadership which has focused on entrepreneurs' leadership styles (Ensley, et al., 2006), but rarely on their affective displays (Brundin, et al., 2008). Thus, I show that entrepreneurial passion has a far-reaching impact beyond its impact on the entrepreneur.

### 7.2 Avenues for new research

In the introduction of this thesis I emphasize the importance of entrepreneurship for economic growth and innovation. Therefore, researchers have been fascinated by the individuals performing entrepreneurial actions. This research focusing on the people side of entrepreneurship has tried to answer – among others – the following questions:

*“(1) Why do some persons but not others choose to become entrepreneurs? (2) Why do some persons but not others recognize opportunities for new products or services that can be profitably exploited? And (3) Why are some entrepreneurs so much more successful than others?” (R. A. Baron, 2004, p. 221f)*

Over the last years, research on entrepreneurial behavior has helped us develop provide some answers to these questions. For example, cognitive mechanisms have been identified which motivate individuals to become entrepreneurs (Krueger, et al., 2000). In the context of opportunity recognition, the use of mental connections has been analyzed (Gregoire, Barr, & Shepherd, 2010). Further, researchers have examined the relationship between entrepreneurs' state affect and their effort put into venture tasks as a prerequisite of venture success (Foo, et al., 2009). However, probably because of their wide range and their complexity, final answers to these questions could not be derived (Mitchell, et al., 2007). This thesis provides a further contribution to answering – at least some aspects of – these questions. However, my focus was not on entrepreneurial individuals in isolation, but connected to relevant others in their surroundings. Thus, this thesis highlighted the importance of the social context in understanding entrepreneurial behavior.

Each of the empirical studies presented in this thesis entails its own suggestions for further research which are described in the respective chapters. Nevertheless, there are further avenues for future research that can be derived from the thesis which might help to find more answers to the questions raised above. I will conclude this thesis by suggesting new research opportunities for scholars in the fields of entrepreneurial and organizational behavior.

First, this thesis explores the role of different social contexts of entrepreneurial individuals. Given this scope, I concentrated on three relevant social contexts which play important roles in different stages of the entrepreneurial process. However, as already shown in Figure 1, entrepreneurial individuals exert influence on other actors and are influenced by other actors. Future research could investigate the impact of other actors of an entrepreneur's social context. So far, the role of investors has been in the focus of research. For example, research has investigated the impact of entrepreneurial passion on these investors (X.-P. Chen, et al., 2009), and conflicts between investors and entrepreneurs (Higashide & Birley, 2002). However, the role of other actors, such as external advisors, business partners, or friends, has not been studied. For example, it

is unclear to what extent external advisors shape the decision processes of entrepreneurs or entrepreneurial teams. The influence of friends on the decision to become (or stay) self-employed has also hardly been considered. Further, there is only anecdotal evidence that the entrepreneur's customers can be influenced by the entrepreneur's passion (Chang, 2001). Particularly promising for future research appears an investigation of the interplay between different contextual factors. For example, what are the dynamics of decision making processes or conflicts in an entrepreneurial team and how do these processes develop when the team members are also family members? Research has already shown that family firms differ from other firms (Block, in press; Miller, et al., 2011). However, these studies have not taken into account that discussions in a team might also differ if the team is the family circle because of greater levels of closeness and greater difficulties to dissolve these relationships (cf. Zolin, Kuckertz, & Kautonen, in press).

Second, all studies presented in this thesis are cross-sectional and do not follow the participants over an extended time. Although, given the purpose of the studies, this appears adequate, future research could extend the knowledge gained here by using a longitudinal design. For example, students could be followed over an extended time period and their actual decision to become entrepreneurs could be recorded. Further, entrepreneurial teams could be accompanied for several team decisions. Then, changes in their information exchange, in their ability to assess team performance, and in their reaction to team conflict could be investigated over the course of time. A particularly promising subject of study in a longitudinal design could be learning in entrepreneurial teams. Previous research on entrepreneurial learning has distinguished experiential learning from vicarious learning (Holcomb, et al., 2009; Lévesque, Minniti, & Shepherd, 2009), i.e. learning by transforming one's own experience and learning by observing others. To the best of my knowledge, so far research has not investigated entrepreneurial learning in a team context in a longitudinal design. Such a study would provide important insights how experiences made by individual team members can be transformed and integrated into team knowledge, and how entrepreneurial teams as a

whole can adapt to feedback from their environment (see Haynie, et al., in press for an individual-level study on adaption to feedback in an entrepreneurial task). Another opportunity for research is a longitudinal investigation of the interplay between entrepreneurs and their employees over a longer time frame. This would enable researchers to make causal statements such as that perceived passion triggers the employees' commitment and that it is not the employees' commitment which influences their perceptions of entrepreneurial passion.

Third, although this thesis investigates variables which can be related to venture performance, e.g. team decision quality (West, 2007), negative affect (Foo, et al., 2009), and employee commitment (J. N. Baron & Hannan, 2002), actual venture performance is not part of the scope of this thesis. But as venture performance represents an ultimate outcome for entrepreneurship (Dimov, 2007a), future research could relate the topics of this thesis to venture performance. For example, researchers could compare entrepreneurs with entrepreneurial and non-entrepreneurial parents with respect to the success of their ventures. Team decision quality, team metacognitive knowledge, and the accuracy of performance assessments could also be related to venture success. Moreover, the impact of team members' negative affect and of employees' venture commitment for venture performance could be explored. This would take the results of this thesis one step further and would provide additional practical implications. For instance, if children of entrepreneurs are found to be more successful than children of non-entrepreneurs, the resulting implication is not only to create an atmosphere which encourages entrepreneurial activities, but to design specific interventions which help children of non-entrepreneurs to learn the skills and to gain knowledge that children of entrepreneurs can learn from their parents. Further, if an accurate assessment of one's team performance helps the team's venture to perform well, an important implication could be to provide more corrective feedback to entrepreneurial teams, e.g. from early investors, advisors, or business partners.

Finally, as this thesis is located at the intersection of entrepreneurship research and research in organizational behavior, it also offers future research opportunities for

the field of organizational behavior. Entrepreneurship provides a highly interesting context for researchers in organizational behavior. First, entrepreneurial individuals are often confronted with high levels of uncertainty (Knight, 1946; McKelvie, et al., 2011; McMullen & Shepherd, 2006) which represents a promising field to investigate decision making and, in particular, the use of heuristics and biases (Armor & Sackett, 2006; Busenitz & Barney, 1997; Tversky & Kahneman, 1974). Second, whereas teams often are embedded in an organizational context and have to report to their supervisors (S. G. Cohen & Bailey, 1997), entrepreneurial teams do not have these limits and requirements. On the one hand, this gives them freedom and independence; on the other hand this aggravates the level of uncertainty and intensifies their stress because of higher levels of responsibility (Boyd & Gumpert, 1983). Thus, entrepreneurial teams represent a special case of work teams in general and might be different in their decision making processes or in their affective reaction as compared to teams in an organizational setting. Third, a key construct in organizational behavior is organizational commitment (N. J. Allen & Meyer, 1990; Herrbach, 2006; Meyer, et al., 2002). In contrast to many ‘regular’ employees or managers, entrepreneurs are emotionally tightly linked to their venture and often perceive them as their “babies” (Cardon, et al., 2005). Thus, the entrepreneurial context would be well-suited to disentangle the commitment to one’s organization and other facets of commitment, such as the commitment to the members of one’s team (Ricketta & Van Dick, 2005). In a next step, this could help understand what makes people stay in a firm and design appropriate work environments. Thus, researchers in organizational behavior could use the entrepreneurial context as a boundary condition when testing their theories. This would help better understand and develop theories in their field and, at the same time, shed light on individuals’ entrepreneurial behavior.

In conclusion, despite the contributions of this thesis and many other studies, the discussion above suggests that a lot of work still has to be done to understand entrepreneurial behavior. It seems to be particularly promising to take into account different perspectives on entrepreneurial behavior, as demonstrated in this thesis by

integrating different social contexts. Entrepreneurship research has always had a strong focus on the person of the entrepreneur (Baum, et al., 2007), and this fascination does not appear to diminish given that research is continuously growing in this field. To date the “entrepreneurial myth” (Nicholson & Anderson, 2005, p. 152) is not yet illuminated. But future research can contribute further pieces of the puzzle to better understand entrepreneurial individuals and their thoughts, feelings, and actions.





## 8 References

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## 9 German summary / Deutsche Zusammenfassung<sup>25</sup>

Diese Dissertation mit dem Titel „Entrepreneurial Behavior in Social Contexts: The Role of Families, Teams, and Employees for Entrepreneurial Individuals” verfolgt einen verhaltenswissenschaftlichen Ansatz, um die kognitiven und affektiven Prozesse von unternehmerischen Individuen in ihrem sozialen Umfeld zu verstehen. Einerseits knüpft diese Arbeit damit an die Forschungstradition an, die von der Faszination für die Person des Entrepreneurs geprägt ist, die zunächst die Persönlichkeitseigenschaften des Gründers (McClelland, 1961; Zhao & Seibert, 2006) und in jüngerer Zeit sein Erleben und Verhalten, wie z.B. Entscheidungsprozesse oder affektive Faktoren (R. A. Baron, 2004; R. A. Baron & Tang, 2011; Choi & Shepherd, 2004; Foo, Uy, & Baron, 2009) untersucht hat. Andererseits erweitert sie gleichzeitig diese Forschungstradition, indem der soziale Kontext von unternehmerischen Individuen in die Analyse einbezogen wird. Da unternehmerische Individuen oftmals nicht wie in der Literatur dargestellt einsame Helden sind, sondern von einer Vielzahl von Akteuren beeinflusst werden und diese beeinflussen (vgl. Gartner, Shaver, Gatewood, & Katz, 1994; Schindehutte, Morris, & Allen, 2006), hilft die Einbeziehung des sozialen Kontextes, unternehmerisches Verhalten besser zu verstehen und einzuordnen.

Diese Arbeit besteht aus fünf empirischen Studien, die sich mit verschiedenen Umfeldfaktoren von unternehmerischen Individuen befassen, die in unterschiedlichen Phasen des unternehmerischen Prozesses besonders relevant sind. In diesen Kontexten werden sowohl kognitive als auch affektive Variablen beleuchtet. Dabei werden verschiedene Forschungsmethoden verwendet, wie die Analyse von Primär- und Sekundärdaten und die Verwendung von querschnittlichen Fragebogenerhebungen sowie einem experimentellen Design.

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<sup>25</sup> Zur besseren Lesbarkeit wird in diesem Kapitel bei geschlechtsspezifischen Begriffen nur die maskuline Form verwendet. Sie soll jedoch sowohl die maskuline als die feminine Form einschließen.

Im Mittelpunkt der ersten Studie (Kapitel 2) steht der erste Schritt des unternehmerischen Prozesses, die Entstehung von unternehmerischen Intentionen. In der Studie wird ein Modell der intergenerationalen Weitergabe von unternehmerischen Intentionen unter Berücksichtigung des kulturellen Kontexts entwickelt. Dieses Modell wird anhand eines großzahligen und internationalen Datensatz mit mehr als 50.000 Individuen getestet. Ergänzend zur bisherigen Forschung, die bereits die Wichtigkeit der Eltern für die Entstehung von unternehmerischen Intentionen ihrer Kinder betont hat (Matthews & Moser, 1996; Wang & Wong, 2004), zeigt diese Studie einen zusätzlichen intra-familiären Effekt auf, der durch den Einfluss der unternehmerischen Tätigkeiten der Großeltern entsteht. Somit können Großeltern einen Einfluss auf die unternehmerischen Intentionen ihrer Nachkommen auswirken, allerdings zeigt sich auch die Komplexität der intergenerationalen Weitergabe dieser Intentionen, da sich die Einflüsse von Eltern und Großeltern teilweise gegenseitig ersetzen. Außerdem berücksichtigt diese Studie kulturelle Unterschiede in der Weitergabe von unternehmerischen Intentionen. Je nach Heimatland der Individuen variiert der Einfluss von Eltern und Großeltern auf die unternehmerischen Intentionen. Dies hilft besser zu verstehen, warum sich einige Individuen im Gegensatz zu anderen für eine unternehmerische Karriere entscheiden und könnte im nächsten Schritt dazu beitragen, ein Entrepreneurship-freundliches Klima zu schaffen.

Die Studie, die in Kapitel 3 vorgestellt wird, befasst sich mit einem weiteren Schritt im unternehmerischen Prozess, der Bewertung und Auswahl einer unternehmerischen Geschäftsgelegenheit. Da dieser Entscheidungsprozess häufig in Teams erfolgt (Cooper & Daily, 1997; Gruber, MacMillan, & Thompson, 2008), wird in dieser Studie ein sozialpsychologisches Teamexperiment verwendet, um diesen Entscheidungsprozess zu beleuchten. Dabei handelt es sich um ein „verstecktes Profil“-Experiment (Stasser & Titus, 1985). Darunter versteht man eine Teamentscheidungssituation, in der eine Bestlösung auf Grundlage der Informationen der einzelnen Teammitgliedern nicht erkannt werden kann, sondern erst dann offensichtlich wird, wenn alle Informationen über die Mitglieder hinweg zusammengefügt werden. Vor der

Teamentcheidung in dieser Studie wurde die Unsicherheit der zugrunde liegenden Informationen experimentell manipuliert, um eine Rahmenbedingung abzubilden, mit dem unternehmerische Entscheidungsträger oftmals konfrontiert sind (Knight, 1946; McKelvie, Haynie, & Gustavsson, 2011; McMullen & Shepherd, 2006). Bisherige Forschung zu unternehmerischen Teams legt nahe, dass Teams wahrscheinlich eine höhere Entscheidungsqualität erreichen als Individuen (Chowdhury, 2005; Forbes, Borchert, Zellmer-Bruhn, & Sapienza, 2006; Simons, Pelled, & Smith, 1999). Diese Studie zeigt jedoch auf, dass Teamentscheidungen verzerrt sein können, und dass Teams oftmals keine hohe Entscheidungsqualität erreichen, was in Einklang mit sozialpsychologischer Forschung steht (Mesmer-Magnus & DeChurch, 2009; Schulz-Hardt, Brodbeck, Mojzisch, Kerschreiter, & Frey, 2006; Stasser & Titus, 1985). Für das Erreichen einer hohen Entscheidungsqualität ist für Teams der Austausch von ungeteilten Informationen förderlich, das heißt von Information, über die vor der Diskussion nur einzelne Mitglieder verfügen. Außerdem wird Varianz in der Beziehung zwischen dem Austausch von ungeteilten Informationen und der Entscheidungsqualität aufgeklärt, in dem das metakognitive Wissen der Teams berücksichtigt wird. Unter metakognitivem Wissen wird dabei die Fähigkeit eines Teams verstanden, seine kognitiven Prozesse, seine Aufgaben und die dafür nötigen Strategien zu verstehen (vgl. Flavell, 1979). Ein höheres metakognitives Wissen ist ebenfalls vorteilhaft für Teams, wenn sie einem hohen Ausmaß an Informationsunsicherheit ausgesetzt sind. Die Studie hilft somit, unternehmerische Entscheidungsprozesse in Teams und den Einfluss von metakognitivem Wissen auf diese Prozesse besser zu verstehen. Des Weiteren deuten die Ergebnisse darauf hin, dass durch die Anregung zum Austausch von ungeteilten Informationen und durch metakognitives Training unternehmerische Entscheidungsprozesse in Teams verbessert werden können.

Die dritte empirische Studie (Kapitel 4) befasst sich mit den Einschätzungen der Teamleistung aus der Perspektive der Teammitglieder sowie des Teams *nach* der unternehmerischen Teamentcheidung. Diese Selbsteinschätzungen können für Teams eine wertvolle Rückmeldung darstellen, vor allem wenn die Umwelt nur eingeschränkte

Informationen aufgrund von einer hohen Unsicherheit bereit hält (Gifford, Bobbit, & Slocum, 1979; Lawrence & Lorsch, 1967). Insofern kann eine genaue Selbsteinschätzung der Teamleistung hilfreich sein, um von der eigenen Erfahrung für zukünftige Entscheidungsaufgaben zu lernen. In dieser Studie wird ein Mehrebenenmodell der Genauigkeit der selbsteingeschätzten Teamleistung entwickelt und getestet. Dieses Modell berücksichtigt den sozialen Kontext, in dem die Selbsteinschätzungen abgegeben werden. Dabei zeigt sich, dass die Genauigkeit der eingeschätzten Teamleistung sowohl auf der Ebene der Individuen als auch auf der Ebene des Teams von Beziehungskonflikt, worunter Konflikte in Bezug auf interpersonelle Spannungen im Team verstanden werden (Jehn, 1995), profitiert. Des Weiteren werden die Leistungseinschätzungen aus der Perspektive der Mitglieder und des Teams miteinander verglichen. Dabei interagieren die individuelle Wahrnehmung und die Teamwahrnehmung von Beziehungskonflikten, so dass sich die Genauigkeit der einzelnen Mitglieder nur dann durch den wahrgenommenen Beziehungskonflikt verbessert, wenn das gesamte Team die Beziehungskonflikte als eher gering einschätzt. Somit identifiziert diese Studie eine besondere Rolle von Beziehungskonflikten. Während bisherige Studien den schädlichen Einfluss von Beziehungskonflikten auf die Leistung eines Teams demonstriert haben, zeigt sich hier, dass Beziehungskonflikte einen positiven Einfluss auf die Fähigkeit von Teams und deren Mitgliedern haben können, die Teamleistung treffend einzuschätzen. Des Weiteren trägt die Studie dazu bei, einen entscheidenden Aspekt des unternehmerischen Lernen besser zu verstehen, und zwar das Lernen über sich selbst (Cope, 2005).

Im Gegensatz zu den ersten drei beschriebenen Studien, die kognitive Prozesse in den Mittelpunkt stellten, stehen in der vierten Studie (Kapitel 5) affektive Prozesse im Zentrum. Es wird die Entstehung von negativen Affekten durch unternehmerische Entscheidungen in Teams und die damit verbundenen Teamkonflikte untersucht. Das Verständnis der Entstehung von negativem Affekt ist besonders im unternehmerischen Kontext relevant, da dieser Aspekt beeinträchtigt, die für das Funktionieren von unternehmerischen Teams entscheidend sind, wie Kreativität, kooperatives Verhalten

und die Leistung in Entscheidungssituationen (George, 1990; Hirt, Levine, McDonald, Melton, & Martin, 1997; Staw & Barsade, 1993). In Anlehnung an die Literatur zu Teamkonflikten unterscheidet diese Studie zwischen Beziehungs- und Aufgabenkonflikten. Während erstere interpersonelle Spannungen im Team beinhalten, beziehen sich letztere auf Meinungsverschiedenheiten bezüglich der Aufgabe des Teams (Jehn, 1995). Auf der Grundlage dieser Unterscheidung wird ein Modell der negativen affektiven Reaktion auf Konflikte in Abhängigkeit des Entscheidungskontexts und von Teameigenschaften entwickelt. Es zeigt sich, dass die beiden Konfliktarten zu entgegengesetzten affektiven Reaktionen der Teammitglieder führen. Des Weiteren wird basierend auf der attributionalen Emotionstheorie (Siemer & Reizenzein, 2007; Weiner, 1985) vorhergesagt, dass ein reduziertes Verantwortlichkeitsgefühl aufgrund von hoher Unsicherheit und niedrigerer Teamwirksamkeit die affektive Reaktion der Teammitglieder auf Konflikte mindern wird. Die Ergebnisse zeigen, dass Unsicherheit den negativen Einfluss von einem hohen Maß an Beziehungskonflikten und den negativen Einfluss von einem geringen Maß an Aufgabenkonflikten dämpft. Dieser positive Effekt von Unsicherheit ist besonders für das unternehmerische Umfeld bemerkenswert, da hier Unsicherheit meist als negativer Faktor für den Erfolg von Unternehmen gesehen wird (Chandler, McKelvie, & Davidsson, 2009; McMullen & Shepherd, 2006). Weiterhin verstärkt Teamwirksamkeit den negativen Einfluss von einem hohen Maß an Beziehungskonflikten, wohingegen sich kein signifikanter Einfluss von Teamwirksamkeit auf die Wirkung von Aufgabenkonflikten fand. Dennoch ist dieses Ergebnis, dass Teamwirksamkeit auch negative Aspekte für das Team mit sich bringen kann, interessant für die Team- und die Entrepreneurship-Forschung, da normalerweise Teamwirksamkeit als förderlich für die Teamleistung (Gibson & Earley, 2007; Gully, Joshi, Incalcaterra, & Beaubien, 2002) aber auch den Unternehmenserfolg (Ensley, Carr, & Sajasalo, 2004) gesehen wird. Damit ergibt sich eine Vielzahl von weiteren Forschungsmöglichkeiten, die das Wechselspiel von affektiven Prozessen der Teammitglieder, Konflikten, Teamwirksamkeit, Unsicherheit und Unternehmenserfolg im Kontext Entrepreneurship fokussieren könnten.

Die letzte empirische Studie dieser Arbeit bezieht noch einen weiteren, wichtigen Kontextfaktor für Entrepreneur\*innen ein, und zwar die Mitarbeiter in Gründungsunternehmen. Während die bisherige Forschung die positiven Effekte von unternehmerischer Leidenschaft auf die Motivation, den Einsatz und das Engagement von Entrepreneur\*innen betont (Cardon, Wincent, Singh, & Drnovsek, 2009; Chen, Yao, & Kotha, 2009; Smilor, 1997), ist wenig über Auswirkungen dieser Leidenschaft auf deren Mitarbeiter bekannt. In dieser Studie wird der Einfluss von drei identifizierten Arten unternehmerischer Leidenschaft, der Erfinder-, Gründer- und Managerleidenschaft (cf. Cardon, et al., 2009), auf das Engagement der Mitarbeiter in Gründungsunternehmen untersucht. Sowohl für die Entrepreneurship-Forschung als auch -Praxis ist der Verbleib von engagierten Mitarbeitern in Gründungsunternehmen relevant, da diese einen zentralen Erfolgsfaktor für Unternehmen darstellen (J. N. Baron & Hannan, 2002; Deshpande & Golhar, 1994). Unter Berücksichtigung eines Führungsmodells der sozialen Identität (van Knippenberg & Hogg, 2003) wurde postuliert, dass die Erfinder-, die Gründer- und die Managerleidenschaft unterschiedlich auf das Engagement der Mitarbeiter wirken. Des Weiteren wurden zwei verschiedene Mechanismen postuliert, wie die Wahrnehmung unternehmerischer Leidenschaft das Engagement der Mitarbeiter in Gründungsunternehmen beeinflusst. Es zeigt sich, dass die Erfinder- und die Managerleidenschaft einen positiven Effekt auf das Engagement haben, während die Gründerleidenschaft einen negativen Effekt hat. Die jeweilige Wirkung der unternehmerischen Leidenschaft wird über den erlebten positiven Affekt der Mitarbeiter bei der Arbeit und die Klarheit ihrer Ziele vermittelt. Die Studie erweitert damit nicht nur die Literatur zur unternehmerischen Leidenschaft um die Komponente des sozialen Umfelds, sondern auch die Literatur zur Führungsrolle von Entrepreneur\*innen.

Zusammenfassend unterstreicht diese Dissertation, dass unternehmerisches Handeln nicht von Individuen in einem Vakuum vollzogen wird, sondern dass der soziale Kontext einen relevanten Einfluss auf unternehmerische Entscheidungen, die Beurteilung dieser Entscheidungen und auf affektive Prozesse im unternehmerischen Umfeld hat. Obwohl die einzelnen Studien, wie jede empirische Arbeit auch,



bestimmten Einschränkungen ausgesetzt sind, leistet diese Dissertation einen entscheidenden Beitrag dazu, das Wechselspiel von sozialem Umfeld und kognitiven und affektiven Prozessen von unternehmerischen Individuen besser zu verstehen. Des Weiteren zeigt sie neue Forschungsmöglichkeiten auf, die darüber hinaus helfen werden, die Rolle von unternehmerischen Akteuren und ihr Erleben und Verhalten besser zu verstehen.



## **10 Appendix**

The appendix contains the instructions and information sets for the entrepreneurial decision making task on the team level. The data from this team experiment were used in Chapter 3, 4, and 5. The documents are presented in German, the language in which they were administered.

### 10.1.1 Instructions for team decision making task

These instructions were presented to the participants before the team decision making task. First, I will present the instructions for low information uncertainty, then for high information uncertainty

Liebe Teilnehmerin, lieber Teilnehmer,

im Folgenden bitten wir Sie, dass Sie sich in die folgende Situation versetzen: Sie und die anderen beiden Teilnehmer bilden ein dreiköpfiges Team, das eine **technologische Erfindung** gemacht hat, nämlich das sogenannte 3D Printing. Das ist ein **spezielles Druckverfahren, durch das dreidimensionale Objekte erzeugt werden** können. Schichtweise wird ein spezielles Pulver aufgetragen, auf das anschließend an vorgegebenen Stellen ein Bindemittel gegeben wird. An diesen Stellen härtet das Pulver aus, das restliche Pulver bleibt ungebunden. Dieser Prozess wird so lange wiederholt, bis die letzte Schicht aufgetragen ist, und das ungebundene Pulver entfernt wird. Dadurch lassen sich bestimmte Formen z.B. auch mit Hohlräumen darstellen, die dem erwünschten dreidimensionalen Objekt entsprechen.

Nun besteht die Möglichkeit, diese Erfindung unternehmerisch auszuschöpfen und auf der Basis des 3D Printings ein Unternehmen zu gründen. Die Technologie ist vielseitig einsetzbar. Sie und Ihr Team haben **vier unternehmerische Gelegenheiten identifiziert, wie Sie die 3D Printing-Technologie vermarkten können**. Sie können eine von vier verschiedenen Firmen gründen, denen Sie die „Arbeitstitel“ **Specific Surface Corporation, Z Corp, Metcast** und **3D Partners** gegeben haben. Im Folgenden finden Sie Kurzbeschreibungen zu diesen vier alternativen unternehmerischen Gelegenheiten aufgelistet:

#### **Specific Surface Cooperation**

Bei dieser Alternative würden Sie eine Firma gründen, die **speziell geformte Keramikfilter für Industrieanlagen** (z.B. für Abgasrohre) produziert. Dank der 3D-Printing-Technik können diese Filter schneller und kostengünstiger als auf herkömmliche Weise produziert werden.

#### **Z Corp**

Bei dieser Alternative würden Sie eine Firma gründen, die **büro-taugliche Maschinen für Architekten oder Design-Ingenieure** produziert. Diese Maschinen erstellen dreidimensionale Konzepte, die Entwicklungen im frühen Design-Prozess z.B. für Kunden veranschaulichen. Dank der 3D-Printing-Technik können diese Modelle schneller und kostengünstiger erzeugt werden als herkömmlich entwickelte Prototypen.

#### **Metcast**

Bei dieser Alternative würden Sie eine Firma gründen, die **Maschinen für Metallgießereien** produziert. Diese Maschinen vereinfachen das Erstellen von Gussformen. Dank der 3D-Printing-Technik können diese Gussformen schneller und kostengünstiger hergestellt werden als auf herkömmlichen Wegen.

#### **3D Partners**

Bei dieser Alternative würden Sie eine Firma gründen, die **als Dienstleistung architektonische Modelle erstellt**. Die Architekten schicken Entwürfe ein und erhalten konkrete, dreidimensionale Modelle. Dank der 3D-Printing-Technik erhalten Architekten ihre Modelle schneller und günstiger, als wenn sie diese auf herkömmliche Weise herstellen.

Zu diesen Geschäftsideen hat Ihr Team Informationen von der renommierten Unternehmensberatung Evans Freeman & Shane erhalten. Da Markt und Technologie jeweils sehr sicher sind, war es möglich, zuverlässige Vorhersagen zu diesen Gelegenheiten zu machen. Die Beratungsfirma hat für Sie **intensive Marktstudien** durchgeführt und **Experten im Bereich technologiebasierte Gründungen** über Chancen und Risiken der Alternativen befragt. Mit **Forschern, die mit der Technologie ebenfalls gut vertraut** sind, wurden **Durchführbarkeitsstudien** vorgenommen. Des Weiteren konnten **Branchenkenner für Interviews** gewonnen werden, die ihre **fachlich fundierten Schätzungen und Bewertungen** zur Verfügung stellten.

Für Ihr Team konnten aus diesen Quellen **viele Informationen** gewonnen werden. Jedes Teammitglied erhält von der Unternehmensberatung eine kurze Übersicht mit verschiedenen Informationen. In Ihrem Team sind **Sie der Experte für die Vermarktung der verschiedenen, alternativen Produkte**. Schwerpunktmäßig werden Sie Informationen zu Absatzmöglichkeiten und potentiellen Kunden der Produkte erhalten, allerdings erhalten Sie auch allgemeine Informationen zu den verschiedenen alternativen Geschäftsideen. Die anderen Teammitglieder sind Experten für Technologien und für Finanzierung. Aufgrund Ihrer verschiedenen Expertise werden **einige Informationen nur Einzelne** von Ihnen haben, **andere Informationen** haben Sie **alle**.

Bitte machen Sie sich bei Ihrer Entscheidung bewusst, dass Sie **sehr sichere Informationen vorliegen** haben. **Experten halten** die von der Unternehmensberatung gewonnen **Informationen für sehr zuverlässig**. Ihnen wird von allen Seiten **empfohlen, sich auf diese Informationen zu verlassen**.

Sie und Ihr Team stehen nun gerade **unmittelbar vor der Entscheidung, welche dieser Geschäftsideen Sie verfolgen** wollen. Bitte machen Sie sich zunächst mit Ihren Informationen vertraut. Anschließend bitten wir Sie um Ihre **persönliche Einschätzung**, welche Alternative Sie persönlich bevorzugen. Als nächstes findet die **Entscheidungsfindung in der Gruppe** statt. Hier diskutieren Sie für **maximal 30 Minuten** gemeinsam mit den anderen Mitgliedern Ihres Teams (die Experten für die Technologien und für Finanzierung) und kommen bitte **abschließend** zu einer **Gruppenentscheidung, welche Geschäftsidee Sie als unternehmerisches Team verfolgen** wollen.

Im Anschluss daran bitten wir Sie noch einmal um die **Beantwortung von zwei Fragebögen**, die insgesamt **maximal 30 Minuten** Ihrer Zeit in Anspruch nehmen wird.

**Vielen Dank für Ihre Mithilfe und viel Spaß bei der Gruppendiskussion!**

Liebe Teilnehmerin, lieber Teilnehmer,

im Folgenden bitten wir Sie, dass Sie sich in die folgende Situation versetzen: Sie und die anderen beiden Teilnehmer bilden ein dreiköpfiges Team, das eine **technologische Erfindung** gemacht hat, nämlich das sogenannte 3D Printing. Das ist ein **spezielles Druckverfahren, durch das dreidimensionale Objekte erzeugt werden** können. Schichtweise wird ein spezielles Pulver aufgetragen, auf das anschließend an vorgegebenen Stellen ein Bindemittel gegeben wird. An diesen Stellen härtet das Pulver aus, das restliche Pulver bleibt ungebunden. Dieser Prozess wird so lange wiederholt, bis die letzte Schicht aufgetragen ist, und das ungebundene Pulver entfernt wird. Dadurch lassen sich bestimmte Formen z.B. auch mit Hohlräumen darstellen, die dem erwünschten dreidimensionalen Objekt entsprechen.

Nun besteht die Möglichkeit, diese Erfindung unternehmerisch auszuschöpfen und auf der Basis des 3D Printings ein Unternehmen zu gründen. Die Technologie ist vielseitig einsetzbar. Sie und Ihr Team haben **vier unternehmerische Gelegenheiten identifiziert, wie Sie die 3D Printing-Technologie vermarkten können**. Sie können eine von vier verschiedenen Firmen gründen, denen Sie die „Arbeitstitel“ **Metcast, 3D Partners, Specific Surface Corporation** und **Z Corp** gegeben haben. Im Folgenden finden Sie Kurzbeschreibungen zu diesen vier alternativen unternehmerischen Gelegenheiten aufgelistet:

#### **Metcast**

Bei dieser Alternative würden Sie eine Firma gründen, die **Maschinen für Metallgießereien** produziert. Diese Maschinen vereinfachen das Erstellen von Gussformen. Dank der 3D-Printing-Technik können diese Gussformen schneller und kostengünstiger hergestellt werden als auf herkömmlichen Wegen.

#### **3D Partners**

Bei dieser Alternative würden Sie eine Firma gründen, die **als Dienstleistung architektonische Modelle erstellt**. Die Architekten schicken Entwürfe ein und erhalten konkrete, dreidimensionale Modelle. Dank der 3D-Printing-Technik erhalten Architekten ihre Modelle schneller und günstiger, als wenn sie diese auf herkömmliche Weise herstellen.

#### **Specific Surface Cooperation**

Bei dieser Alternative würden Sie eine Firma gründen, die **speziell geformte Keramikfilter für Industrieanlagen** (z.B. für Abgasrohre) produziert. Dank der 3D-Printing-Technik können diese Filter schneller und kostengünstiger als auf herkömmliche Weise produziert werden.

#### **Z Corp**

Bei dieser Alternative würden Sie eine Firma gründen, die **büro-taugliche Maschinen für Architekten oder Design-Ingenieure** produziert. Diese Maschinen erstellen dreidimensionale Konzepte, die Entwicklungen im frühen Design-Prozess z.B. für Kunden veranschaulichen. Dank der 3D-Printing-Technik können diese Modelle schneller und kostengünstiger erzeugt werden als herkömmlich entwickelte Prototypen.

Zu diesen Geschäftsideen hat Ihr Team **keine Informationen aus verlässlichen Quellen** gewinnen können. Es ist **nicht möglich zuverlässige Vorhersagen** zu diesen Gelegenheiten zu machen, da **Markt und Technologie** jeweils **unsicher** sind. Sie haben deshalb **Informationen aus Ihrem Umfeld** erhalten. **Freunde und Bekannte** von Ihnen haben ihre **Einschätzungen und Meinungen** zu den verschiedenen Alternativen abgegeben. Die **Personen aus Ihrem Umfeld** haben **keine Erfahrung mit der Technologie, mit Unternehmensgründungen** oder mit den verschiedenen **Branchen** und **können die Marktlage kaum einschätzen**. Für ihre **fachlich wenig fundierten Überlegungen** mussten sie sich deshalb auch auf ihr **Bauchgefühl** verlassen.

Für Ihr Team konnten aus diesen Quellen Informationen gewonnen werden. Jedes Teammitglied erhält eine kurze Übersicht mit verschiedenen Informationen. In Ihrem Team sind **Sie der Experte für Technologien und die Produkte** der potentiellen zukünftigen Unternehmen. Schwerpunktmäßig werden Sie Informationen zu Eigenschaften der Produkte und ihrer Herstellung erhalten, allerdings erhalten Sie auch allgemeine Informationen zu den verschiedenen alternativen Geschäftsideen. Die anderen Teammitglieder sind Experten für Finanzierung und die Vermarktung. Aufgrund Ihrer verschiedenen Expertise werden **einige Informationen nur Einzelne** von Ihnen haben, **andere Informationen** haben Sie **alle**.

Bitte machen Sie sich bei Ihrer Entscheidung bewusst, dass Sie nur **sehr unsichere Informationen vorliegen** haben. **Experten halten** die aus Ihrem Umfeld gewonnenen Informationen **für nicht sehr zuverlässig**. Ihnen wird von vielen Seiten **empfohlen, sich nicht auf diese Informationen zu verlassen**.

Sie und Ihr Team stehen nun gerade **unmittelbar vor der Entscheidung, welche dieser Geschäftsideen Sie verfolgen** wollen. Bitte machen Sie sich zunächst mit Ihren Informationen vertraut. Anschließend bitten wir Sie um Ihre **persönliche Einschätzung**, welche Alternative Sie persönlich bevorzugen. Als nächstes findet die **Entscheidungsfindung in der Gruppe** statt. Hier diskutieren Sie für **maximal 30 Minuten** gemeinsam mit den anderen Mitgliedern Ihres Teams (die Experten für die Technologien und für Finanzierung) und kommen bitte **abschließend** zu einer **Gruppenentscheidung, welche Geschäftsidee Sie als unternehmerisches Team verfolgen** wollen.

Im Anschluss daran bitten wir Sie noch einmal um die **Beantwortung von zwei Fragebögen**, die insgesamt **maximal 30 Minuten** Ihrer Zeit in Anspruch nehmen wird.

**Vielen Dank für Ihre Mithilfe und viel Spaß bei der Gruppendiskussion!**

### 10.1.2 Pieces of information of team members

In this section I present the pieces of information that were distributed over the decision alternatives. These pieces are divided in positive and negative pieces. Further, the pieces are labeled with *FM* if they were in the financial manager's information set, *OM* stands for the operations manager's information set, and *MM* for the marketing manager's information set. Pieces labeled with *all* were in all information sets.

#### **Specific Surface Cooperation**

Bei dieser Alternative würden Sie eine Firma gründen, die speziell geformte Keramikfilter für Industrieanlagen (z.B. für Abgasrohre) produziert. Dank der 3D-Printing-Technik können diese Filter schneller und kostengünstiger als auf herkömmliche Weise produziert werden.

#### **Positive Pieces**

- FM* Es gibt einen potentiellen Investor.
- FM* Ein verlässlicher Zulieferer wurde bereits gefunden.
- OM* Es kann ein Patent auf das Produkt angemeldet werden, um es vor Nachahmung zu schützen.
- OM* Ein ausgereifter Prototyp des Produktes ist bereits entwickelt.
- MM* Es besteht bereits Kontakt zu einer Firma, die bei der Vermarktung helfen würde.
- MM* Bei diesem Produkt wäre auch ein internationales Absatzpotential vorhanden.

#### **Negative Pieces**

- all* Die Zielgruppe für das Produkt ist unklar.
- all* Es sind hohe Investitionskosten nötig, um das Produkt auf den Markt zu bringen.

#### **Z Corp**

Bei dieser Alternative würden Sie eine Firma gründen, die büro-taugliche Maschinen für Architekten oder Design-Ingenieure produziert. Diese Maschinen erstellen dreidimensionale Konzepte, die Entwicklungen im frühen Design-Prozess z.B. für Kunden veranschaulichen. Dank der 3D-Printing-Technik können diese Modelle schneller und kostengünstiger erzeugt werden als herkömmlich entwickelte Prototypen.

#### **Positive Pieces**

- all* Durch die Hausbank wird wahrscheinlich ein Kredit gewährt.
- all* Durch eine potentielle Kooperation mit einer Firma aus der Umgebung können zusätzliche Ressourcen gewonnen werden.
- all* Das Produkt entspricht den Wünschen und Bedürfnissen von vielen potentiellen Kunden.

#### **Negative Pieces**

- FM* Die benötigten Ausgangsmaterialien sind oft nicht in ausreichend guter Qualität erhältlich.
- FM* In dieser Branche hat kein Mitglied des Managementteams bereits Erfahrungen gesammelt.
- OM* Es muss noch viel in die Entwicklung des Produktes investiert werden.
- OM* Es ist davon auszugehen, dass es schnell Konkurrenten geben wird.
- MM* Es wird lange dauern, bis kostendeckend produziert werden kann.



### **Metcast**

Bei dieser Alternative würden Sie eine Firma gründen, die Maschinen für Metallgießereien produziert. Diese Maschinen vereinfachen das Erstellen von Gussformen. Dank der 3D-Printing-Technik können diese Gussformen schneller und kostengünstiger hergestellt werden als auf herkömmlichen Wegen.

#### **Positive Pieces**

- all* Es bestehen Kontakte zur naheliegenden Universität für potentielle Forschungsk Kooperationen.
- all* Die Technologien zur Herstellung des Produkts sind schon weit entwickelt.
- all* Im Erfolgsfall wäre der zu erreichende Profit hoch.

#### **Negative Pieces**

- FM* Die bisherige Suche nach Investoren war erfolglos.
- FM* Es wird schwierig werden, für die anfallenden Aufgaben geeignete Mitarbeiter einzustellen.
- OM* Bei dem Versuch einer Patentierung ist mit Rechtsstreitigkeiten zu rechnen.
- MM* Der Vertrieb des Produktes macht umfangreiche Schulungen des Verkaufspersonals nötig.
- MM* Die Nachfrage nach dem Produkt wird eher begrenzt sein.

### **3D Partners**

Bei dieser Alternative würden Sie eine Firma gründen, die als Dienstleistung architektonische Modelle erstellt. Die Architekten schicken Entwürfe ein und erhalten konkrete, dreidimensionale Modelle. Dank der 3D-Printing-Technik erhalten Architekten ihre Modelle schneller und günstiger, als wenn sie diese auf herkömmliche Weise erstellen.

#### **Positive Pieces**

- all* Mit dieser Alternative kann ein spezielles staatliches Förderprogramm genutzt werden.
- all* Ein Experte hat zugesagt, dass er als Berater für das Unternehmen tätig werden würde.
- all* Die Geschäftsidee kann von potentiellen Konkurrenten kaum imitiert werden.

#### **Negative Pieces**

- St* In diesem Bereich gibt es nur sehr wenige Investoren.
- Tc* Es besteht kein Potential für Erweiterungen des Angebots.
- Tc* Eine teure Produktionsanlage muss noch gekauft werden.
- Ma* Es wurden bisher noch keine potentiellen Auftraggeber identifiziert.
- Ma* Vor der Umsetzung dieser Geschäftsidee sind noch kostenintensive Marktstudien nötig.



## Ehrenwörtliche Erklärung

Hiermit erkläre ich,

1. dass mir die geltende Promotionsordnung bekannt ist;
2. dass ich die Dissertation selbst angefertigt, keine Textabschnitte eines Dritten oder eigener Prüfungsarbeiten ohne Kennzeichnung übernommen und alle von mir benutzten Hilfsmittel, persönlichen Mitteilungen und Quellen in meiner Arbeit angegeben habe;
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Jena, 28. März 2011

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(Nicola Breugst)