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# Creativity in organizations: Antecedents and outcomes of individual creativity

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Is approved by the final examining committee:

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CREATIVITY IN ORGANIZATIONS: ANTECEDENTS AND OUTCOMES OF  
INDIVIDUAL CREATIVITY

A Dissertation

Submitted to the Faculty

of

Purdue University

by

Goran Calic

In Partial Fulfillment of the

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of

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To Andreea and my parents.

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## ABSTRACT

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In this dissertation I set out to expand our collective understanding of creativity in organizations. I accomplish this through three related studies, each organized into independent chapters of this dissertation.

The first study explores how demands of organizations, particularly strategic contradictions faced by decision makers, affect creative processes and products. In this chapter I develop the theory of paradoxical creativity, which posits that creative discovery is a function of how strategic contradictions are perceived by decision-makers. The key insight of the theory of paradoxical creativity is that strategic contradictions have independent effects on the two stages of creative discovery (generation and evaluation of ideas) and that a strategic contradiction will result in creativity, as opposed to inertia, when these two cognitive indicators are balanced. This study adds to existing scholarship by describing potential individual differences in how strategic contradictions are perceived and how they can be managed for performance.

While the first study explored the antecedents of creativity, the second explores creativity as the antecedent condition. In this study I look at how creativity affects the

decision to act on innovative breakthroughs. The central argument of this study is that incremental creativity is more likely to result in innovative breakthroughs than is radical creativity and that more successful innovators are more likely to engage in incremental, rather than radical, creativity. Incremental creativity is more amendable to management, because its outcomes are more predictable. Resultantly, decision-makers are more likely to act on incremental ideas. Because incremental ideas survive transfer to the workplace, they provide an opportunity for creative elaboration. Elaboration feeds the earlier stages of idea generation by helping the innovator refine the idea and can result in better understanding of idea usefulness, new generation, more incubation, and further elaboration. This process creates a virtuous cycle that can result in breakthrough innovation and is more amenable to strategic management in conditions with limited resources and competition.

The third study explores creativity as the mediating variable. This study relies on crowdfunding data collected from the Kickstarter.com platform to test whether a sustainability orientation affects funding success of online projects and whether this relationship is moderated by creativity. Findings suggests that a hybrid approach, one combining a sustainability and profitability orientation, will result in higher product creativity and as such result in more funding for the new venture.

## CHAPTER 1. GENERAL INTRODUCTION

### 1.1 Why Creativity in Administrative Organizations?

*Today the economically significant industrial property is not the machine, but the design, and not so much the design as the capacity to innovate design in process and products. (Piel, 1961: 4)*

Dan Schendel, a Purdue Professor and founder of the first Strategic Management PhD program in the United States, opened his dissertation with the preceding quote. With it he aimed to highlight that “research and development, and the new products and processes it produces, are rapidly becoming the most important competitive weapon available to business management today” (Schendel, 1963: 1). Innovation and its first stage and constituent condition of *creativity* are as important today as they were in 1961 (Anderson, Potočník, and Zhou, 2014). In fact, in a recent survey of more than 1,000 CEOs from over 60 countries creativity was named the most important leadership quality (IBM 2010 Global CEO Study, 2010).

We are all creative. When contemplating ways to make our home or work life easier, we are engaged in a cognitive process that requires us to think of *new* and *useful* approaches to existing ways of doing things. This is creativity. Often we engage in



creativity for ourselves. But often we do it for organizations. Creativity in organizations can have big consequences – for instance, the men and women of the Manhattan project who invented the atomic bomb or the men and women of CERN who invented The NeXt machine, the original web server (Sternberg, 1988).

Creativity in organizations is exceptionally important. Organizations are the processes by which social action is largely accomplished (Barnard, 1968; March and Simon, 1958; Rumelt, Teece, and Schendel, 1996; Simon, 1965). From small businesses to governments, organizations are where individuals spend significant amounts of their mental energy. In organizations, emphasis is placed upon incisive action to achieve administrative goals. My dissertation explores creativity in such settings. Specifically, I study how organizing affects creativity (Chapter 2), how creativity affects the decision to act in organizations (Chapter 3), and lastly how creativity affects the relationship between decisions and organizational success (Chapter 4).

## **1.2 Unanswered Questions**

Much remains to be done to understand how creativity is affected by organizing and how creativity, in turn, affects organizations. This is made clear in a recent review of the creativity and innovation literature (Anderson *et al.*, 2014: 1318):

“...there remains a real need for more, and more radical, theory-building contributions. Some of the most influential theories in the field have been around 20 to 30 years or even longer now (e.g., Amabile, 1983, 1988; West, 1990), and yet more recent theoretical contributions, or for that matter, counterpoint articles critical of existing theories and models, remain notable only by their absence. For a subfield whose *raison d’être* is to advance understanding of how new and innovative ideas flourish into implemented and valuable innovations, this is both paradoxical and perplexing.”

The first unanswered question explored in this study is: How do strategic contradictions affect creative performance? While creativity is strategically important to organizations (Teece, Pisano, and Shuen, 1997), little is known about how a pervasive management recommendation – to be ambidextrous (to simultaneously pursue contradictory strategic imperatives) (Tushman and O’Reilly, 1996) – affects creativity. I develop a theory of *paradoxical creativity* to shed light on this question. Little is also known about the processes that result in the introduction of creative ideas. Particularly: What makes some innovators more successful at achieving breakthrough innovations? Extant studies explore either innovation or creativity, but rarely the two stages of innovation together (Anderson *et al.*, 2014). I explore both stages by studying the effect of creativity on the decision to act. In doing so I develop and defend a counterintuitive position, that decision-makers engaging in incremental search for ideas are more likely to achieve innovative breakthroughs than those engaging in distant search. Finally, while empirical studies have explored the antecedents of creativity, less is known about creativity as an antecedent (Amabile, 2014). In the last chapter of this study, I explore how a sustainability orientation can result in superior performance of nascent ventures by increasing the creativity of the products and services these ventures offer.

The relationship between the three essays can be represented using two simple functional forms: Achievement = f(Innovation) + controls ( $A=f(I)+c$ ) and Innovation = Creativity x Action ( $I=C*A$ ). First, organizational achievement is a function of innovation. Given an initial impetus for organizing (i.e., economic gain, solving social ills) and non-predictable exogenous shocks (e.g., technological, economic, demographic) organizations must innovate. That is to say their members must think of new ways to

compete, create value, solve problems, ensure organizational survival, and so on. In other words, organizational members must be creative. But, these individuals must not only think creatively, they must also put these ideas into action. Action in organizations is not trivial, especially action on creative ideas. Action requires forging one alternative for another and it requires spending resources, even if those resources are simply time. Creativity often precludes action because it veils outcomes under the cloak of uncertainty. In summary, organizations must innovate and innovation is the product of individual creativity and action. The relationship between these concepts and their study is outlined in Table 1-1.

Table 1-1 Integration of Three Essays

THREE STUDY APPROACH
<p><b>Antecedent</b> (<math>I = C \times A</math>)</p> <p>Chapter 2: How do competing strategic imperatives affect creative process and products?</p>
<p><b>Relationship</b> (<math>I = C \times A</math>)</p> <p>Chapter 3: Does creativity affect the decision to act on ideas?</p>
<p><b>Achievement</b> (<math>\Delta = f(C \times A) + \text{controls}</math>)</p> <p>Chapter 4: Does a sustainability orientation affect creativity? Does creativity affect crowdfunding success of early stage ventures?</p>

### 1.3 Evidence from Three Essays

In the next chapter I explore what happens when a decision-maker faces a strategic contradiction – a pair of equally important yet contradictory administrative imperatives. Reactions to strategic contradictions can range from inertia, which is the persistence of existing approaches, to creativity, which is thinking of new ways to compete. I describe this processes as *paradoxical creativity*, and drawing from literature on paradoxes and creative cognition, propose a theory of its conditions and implications on creative products.

Theory developed in Chapter 2 may have practical implication for managers seeking to enhance creative performance in environments that are especially likely to raise strategic contradictions, such as in environments characterized by divergent viewpoints and hybrid goals. I propose that differences in *how* strategic contradictions are perceived matters and that the relationship between strategic contradiction and creative outcomes is not obvious, and possibly misleading. In summary, if managers seek creative outcomes to strategic contradictions, they should not always look to increase the salience, the noticeability and importance, of these contradictions, because more salient strategic contradictions do not guarantee creative products. Instead, managers should focus on understanding which strategic contradictions are likely to be noticed and trigger creative cognition (a term I call affinity of the strategic contradictions) and which factors are likely to increase the relevance and thus motivation to solve the strategic contradictions (a term I call efficacy of the strategic contradiction).

In chapter 3 I explore how the degree of creativity moderates the decision to implement ideas. Idea implementation is a forward-looking process premised on a

decision-maker's beliefs about the linkages between alternatives and consequences. Yet, idea generation is a processes of blind variation, often inversely related with sightedness into future consequences. I describe this process and propose that, according to a number of theories of incubation, insight, and creative problem solving, a decision-maker engaging in incremental creativity is more likely to achieve a breakthrough – the introduction of radically creative ideas – than a decision-maker engaging in radical creativity.

This study contributes to behavioral management research, whose “key insight is that superior opportunities are cognitively distant” (Gavetti, 2012: 267), by tackling one of its complications: efficacious management is premised on accurate mental models of the world (Gavetti and Levinthal, 2000), yet the accuracy of a decision-maker's mental model decreases with cognitive distance. In other words, superior opportunities are less amenable to strategic management because they are cognitively distant.

In the penultimate chapter I suggest that a new venture's crowdfunding project creativity mediates the relationship between a sustainability orientation and funding success. My analysis produces two key findings: 1) a sustainability orientation positively affects funding success of crowdfunding projects, and 2) this relationship is partially mediated by project creativity and third party endorsements.

The significance of creativity that emerged in this study indicates that a sustainability orientation may matter for reasons not widely discussed or considered: its impact on creativity within new ventures. I highlight the effect of a sustainability orientation on creativity because this phenomenon has not been widely discussed by either academics or managers (Grégoire, Corbett, and McMullen, 2011). I believe that the

framing of entrepreneurial problems with a sustainability lens may encourage outside-of-the-box thinking, resulting in superior performance or at least more creative solutions to these problems.

In the last chapter I conclude with what I have learned, the dissertation's contribution to the organizational science and creativity literatures, its limitations, and future research.

## CHAPTER 2. CREATIVE SPARKS OR INERTIA TRAPS? THE EFFECTS OF STRATEGIC CONTRADICTIONS ON CREATIVE PROCESSING AND CREATIVE PRODUCTS

### 2.1 Chapter Summary

This chapter explores what happens when a decision-maker faces a strategic contradiction – a pair of equally important yet contradictory imperatives. Reactions to strategic contradictions can range from inertia, which is the persistence of existing approaches, to creativity, which is thinking of new ways to compete. I describe this processes as paradoxical creativity, and drawing from literature on paradoxes and creative cognition, propose a theory of its conditions and implications on creative products.

### 2.2 Introduction

*“Managing units that pursue widely different strategies and that have varied structures and cultures is a juggling act not all managers are comfortable with.” (Tushman and O’Reilly, 1996: 27)*

Strategic contradictions, pairs of equally important yet contradictory imperatives (Birkinshaw *et al.*, 2016; Smith and Tushman, 2005), can result in inertia or induce creativity and reinvention. Jay (2013) clearly articulated the effect of strategic

contradictions on decision-makers in his work on the Cambridge Energy Alliance (CEA), a public-private hybrid organization. As CEA's organizational members attempted to achieve their mission of a commercially sustainable approach to lowering energy consumption, they discovered that some strategies, such as a free home energy audit, raised contradictions: they were a successes when viewed through a public-service lens (i.e., they reduced energy consumption by increasing installation of energy efficient measures), but failures when viewed through a client-service lens (i.e., customers were calling CEA to do the free energy audits, then enlisting a lower price contractor to do the installation). It was only through a reinvention of existing approaches that CEA was able to position itself for future success. However, strategic contradictions must not result in better ways of doing things. Indeed, Jay's study also demonstrates that they can result in inertia, vicious cycles of "stuckness" to non-viable approaches. Although Jay's and others' (Smith and Tushman, 2005) studies of strategic contradictions are instructive, to date there is no theoretical account of the link between strategic contradictions and creativity (or inertia).

Despite the competitive significance of managing strategic contradictions<sup>1</sup> (i.e., ambidextrous organizations(Tushman and O'Reilly, 2006)) while at the same time maintaining "the firm's ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments" (i.e., dynamic capabilities (Teece *et al.*, 1997: 516), a theory of how strategic contradictions affect creativity remains undeveloped. Developing a theory of differences in individual responses to

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<sup>1</sup> For a list of empirical studies supporting the link between organizational ambidexterity and firm performance see section "The Present: What Does The Evidence Show" in O'Reilly and Tushman (2013).



strategic contradictions seems especially crucial in the face of evidence that dissimilarities exist in how individuals process information (Proctor and Vu, 2012), that not all individuals experience contradictions equally (Lewis, 2000; Smith and Lewis, 2011; Smith and Tushman, 2005), and “that variance among individuals matters much more in organizational performance than is generally assumed” (Mollick, 2012: 1001).

My theory may have practical implication for managers seeking to enhance creative performance in environments that are especially likely to raise strategic contradictions, such as in environments characterized by divergent viewpoints and hybrid goals. I propose that differences in how strategic contradictions are perceived matters and that the relationship between strategic contradictions and creative outcomes is not obvious, and possibly misleading. In summary, if managers seek creative outcomes to strategic contradictions, they should not always look to increase the salience, the noticeability and importance, of these contradictions, because more salient strategic contradictions do not guarantee creative products.

This study is divided into three sections. In the first section I introduce paradoxical creativity, the creative process response to strategic contradictions. In the second section I outline the conditions that result in paradoxical creativity and produce its outcomes – creativity or inertia. In the last section I conclude with the study’s contribution to the paradox and creativity literatures, its limitations, and future research.

## 2.3 Paradoxical Creativity

*Paradoxical creativity refers to creative cognition induced by pairs of equally important yet contradictory strategic imperatives.* Below I clarify the paradoxical and creative components of the construct.

### 2.3.1 The Paradoxical Component

Strategic contradictions are paradoxes of performing (Smith and Lewis, 2011). Hence, they refer to the existence of multiple and competing goals as stakeholders seek divergent organizational success. Three components of strategic contradictions are relevant to this study. The first is that strategic contradictions are products of organizing and, until perceived, exist as latent tensions, which are dormant or ignored contradictory but interrelated goals (Smith and Lewis, 2011). The second is the ontological nature of strategic contradictions, which are both inherent – existing in the external world – and socially constructed – created by an individual’s cognition (Smith and Lewis, 2011). That is, strategic contradictions are embedded in the process of organizing but brought into existence for decision-makers through environmental and cognitive forces. Finally, salient strategic contradictions are business challenges that demand creative resolution (Jay, 2013; O’Reilly and Tushman, 2013). As noted by Andriopoulos and Lewis (Andriopoulos and Lewis, 2009: 702) and Birkinshaw and co-authors (2016: 70) “managing paradox does not mean eliminating or resolving an underlying tension, it involves looking for creative ways of capturing both extremes.” Strategic contradictions arise from complications between existing approaches. Selecting one polarity intensifies

the need for the other<sup>2</sup>. It is only through new and better ways of doing things that strategic contradictions can result in competitive advantage. Next, I elaborate on processes that render latent strategic contradictions noticeable and individual variance in how noticed contradictions are experienced.

### **2.3.1.1 Awareness of Strategic Contradictions**

Strategic contradictions persist in organizations unnoticed by decision-makers. They remain dormant until they are accentuated by an individual's paradoxical frames – mental templates that allow decision-makers to recognize strategic contradictions (Smith and Tushman, 2005). Such templates are mental representations of the environment and can be identified through a decision maker's words and actions. For instance, because of cultural differences that underpin paradoxical frames<sup>3</sup>, Chinese students are more likely to simultaneously engage in both cooperating and competing processes than are American students (Keller and Loewenstein, 2010).

### **2.3.1.2 Experience of Strategic Contradictions**

The subjective experience of strategic contradictions resides within each decision-maker's mind (Keller and Wen, 2015; Lewis, 2000; Smith and Lewis, 2011). A decision-maker's subjective experience will depend on a relationship between organizational events and the individual's frame of reference, which will together determine the

---

<sup>2</sup> The strategic organizational tension between exploration and exploitation is a clearly articulated example (March, 1991). Too much of exploitation drives organizational rigidity, which makes it difficult for organizations to adapt to radical technological changes (Tripsas and Gavetti, 2000); while too much exploration crowds out efficiencies of economies of scale (Nelson and Winter, 1982).

<sup>3</sup> Traditional Eastern philosophies stress the need to avoid dichotomies and highlight the existence of contradictions in everyday life (Rothenberg, 1979). For instance, the Taoist symbol of the Ying and Yang is commonly used to illustrate tension. As such, one expects that adherents to traditional Eastern philosophies will hold a greater number of paradoxical cognitive frames than adherents to traditional Western philosophies.

subjective meaning of the event (Huy, 2002; Lüscher and Lewis, 2008). While one manager may feel that a strategic contradiction is frustrating or impossible to solve another may feel it is a mundane challenge of work life (Smith and Berg, 1997). For example, while employees may share many of the same expectations about future organizational change (e.g., downsizing), these will be conditioned by individual factors (e.g., the employee's age, skill scarcity, and organizational tenure).

Relying on cognitive tuning, or “Feelings-as-Information”, theory (Schwarz, 1989, 2002), scholars have argued that subjective experience signals to the individual what kind of environment she finds herself in. On the one hand, unusual environments result in a more complex cognitive strategy (Fong, 2006; Miron-Spektor, Gino, and Argote, 2011). This cognitive strategy “facilitates insight-related processing, bolstering the ability to break away from inappropriate initial assumptions and strategies, and enabling an unconstrained mental search for novel information” (Miron-Spektor *et al.*, 2011: 231). On the other hand, mundane environments result in simpler cognitive strategies and routine approaches.

### **2.3.2 The Creativity Component**

Creativity is the process that results in a novel and useful product (e.g., strategy, technology, service)(Hennessey and Amabile, 2010). The creative process is generally described using two sequential stages: the generation of creative ideas and the evaluation of creative ideas (Finke, Smith, and Ward, 1996). Creative individuals will process information differently than non-creative individuals (Amabile, 1983; Campbell, 1960; Csikszentmihalyi, 1996; Finke *et al.*, 1996): they are more likely to search broadly in memory for new ideas (stage 1) and take intellectual risks on new ideas (stage 2). The

creative product refers to the final outcome of the creative process, which is a novel idea that is deemed useful or appropriate (Runco and Jaeger, 2012). In the context of management, a creative product could mean thinking of new ways to compete by redefining the business (Markides, 1997) and the invention of better procedures, practices, or products (Anderson *et al.*, 2014). I designate paradoxical creativity as creative not because it will always result in a creative product, but because it induces the creative processes that enable decision-makers to resolve strategic challenges.

Creative products have been the focus of paradox research. Some examples include major organizational restructuring at the Danish Lego Company (Lüscher and Lewis, 2008), reinvention of CEA's organizational identity (Jay, 2013), and Softcorp's novel idea for a Dual Headquarter (Birkinshaw *et al.*, 2016). The creative cognition process has received less attention. The notable exception is Miron-Spektor, Gino, and Argote's (2011) laboratory test exploring the relationship between activating paradoxical frames and creativity. In four laboratory tests eliciting paradoxical frames, the authors find that participants that adopted paradoxical frames were more creative than their counterparts who did not. This view is consistent with the creativity and information processing literature, which suggests that individuals that perceive an environment as unusual are more likely to be more sensitive to unusual associations: to search broadly for solutions and to take intellectual risks (Fong, 2006). I extend the paradox and creativity literature by exploring individual differences in perception of strategic contradictions and subsequent outcomes on creative products.

Paradoxical creativity presupposes that a decision-maker is already aware of a strategic contradiction. Consistent with the definition of a strategic contradictions as

subjectively experienced, individuals will differ in the extent to which they engage in creative processing for a given contradiction. For instance, I assume that decision-makers experiencing a great deal of discomfort and unusualness resulting from the contradiction are more likely to search broadly for and be open to new ideas. Furthermore, paradoxical creativity may include multiple iterations of the creative process, each with different levels of utility and novelty. Lastly, an individual's subjective perception of a strategic contradiction may change over time, which will in turn affect the paradoxical creativity process.

Before proceedings, it should be said that the creative process is uncertain and does not guarantee that a creative product will be accepted by the organizational environment (Csikszentmihalyi, 1996). As a consequence, paradoxical creativity may result in an outcome that the organization rejects or that is not creative and/or may result in an outcome that harms/benefits the organization. Regardless of the final outcome, paradoxical creativity encompasses the cognitive processes induced by the awareness of a strategic contradiction. Therefore, I do not assume that paradoxical creativity is inherently positive or negative, but inherently uncertain.

## **2.4 Conditions of Paradoxical Creativity**

*“One function that organization performs is to place the organization members in a psychological environment that will adapt their decisions to the organizations objectives...” (Simon, 1997: 92)*

In this section I describe the conditions necessary for paradoxical creativity. I first focus on the process by which latent strategic contradictions are noticed by decision-makers: I discuss the construction of paradoxical frames, following this I discuss how these frames may be activated to trigger paradoxical creativity. Here I introduce the concept of *affinity*, the likelihood a decision-maker becomes aware of or notices a particular strategic contradiction. In the next part of this section I turn to changes in creative cognition resulting from paradoxical creativity: I argue that the subjective experience of the contradiction will moderate the extent to which a decision-maker engages in the generation of new ideas and in intellectual risk-taking on those ideas. Here I introduce *efficacy* as the potency of this subjective experience, the intensity or degree of paradoxical creativity a strategic contradiction can elicit. Following the introduction of affinity and efficacy, I use agent-based modeling to develop propositions about the effects of paradoxical creativity on creative products.

#### **2.4.1 Triggers of Paradoxical Creativity**

A strategic contradiction must not uniformly trigger paradoxical creativity. Strategic contradictions exist in the external environment until they are brought to the attention of decision-makers through appropriate paradoxical frames. The socially constructed nature of strategic contradictions naturally implies that there is individual variance in paradoxical frames and, consequently, conditions that trigger paradoxical creativity. For instance, research shows that individuals can endogenously, without any outside influence from the experimenters, trigger paradoxical creativity by thinking of private paradoxical statements (Miron-Spektor *et al.*, 2011: Study 2). An analogy using

molecular binding from biological systems can be used to illustrate the psychological process by which paradoxical creativity is triggered.

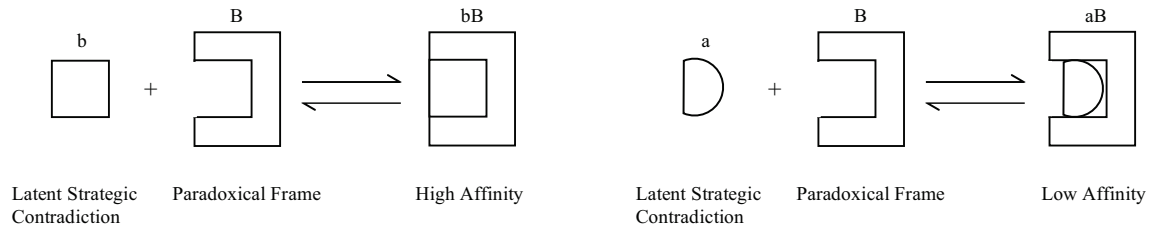


Figure 2-1. Triggering of Paradoxical Creativity

Molecular binding is an attraction between two molecules: a receptor, the molecule that provides the binding site, and a ligand, the molecule that binds to a site on the receptor. The molecular bind results when these two molecules are in close proximity to each other. Successful binding causes a biological response, such as altered behavior of the receptor. Similarly, paradoxical creativity is triggered when a latent tension “binds” to a compatible paradoxical frame. In the same way that ligands may be extracellular or intracellular, paradoxical creativity may be triggered externally (e.g., by managerial rhetoric) or internally (e.g., through knowledge recall) (Miron-Spektor *et al.*, 2011). The likelihood of triggering paradoxical creativity is conditional on *affinity*, or fit, between a strategic contradiction and a paradoxical frame (Figure 2-1). In other words, paradoxical creativity is a stochastic event, with the probability of the event increasing with affinity. In general, high affinity implies that a weak interaction of strategic contradiction and paradoxical frame will trigger paradoxical creativity. Low affinity implies that a decision-maker is likely to misperceive a contradiction as either a dilemma (competing choice) or



a dialectic (contradictory elements resolved through integration), or not perceive it at all.

Therefore:

***Proposition 1:***      *Affinity between strategic contradiction and paradoxical frame increases the likelihood paradoxical creativity is triggered.*

#### **2.4.2 Degree of Paradoxical Creativity**

High degrees of paradoxical creativity require that an individual both notice a latent strategic contradiction and perceive it as an unusual environmental state (Fong, 2006). Awareness of a strategic contradiction is a necessary but insufficient condition for paradoxical creativity. Noticed tensions will induce creative cognition if they have a significant and positive effect on search for ideas and intellectual risk-taking. Simply put, strategic contradictions promote individual creativity not only if they are salient to an individual, but also if they are in some way important to her. Calls for organizations to play a lead role in solving social ills has brought the imperative of social responsibility to the attention of nearly all strategic leaders (Margolis and Walsh, 2003) and corporate social responsibility confronts managers with tensions between environmental, social and economic issues. Yet only some embrace these tensions and look for new ways of doing things (Hahn *et al.*, 2014). We call the potency of a strategic contradiction to influence paradoxical creativity its *efficacy*. To illustrate a strategic contradiction's efficacy to increase paradoxical creativity we return to the analogy of molecular binding.

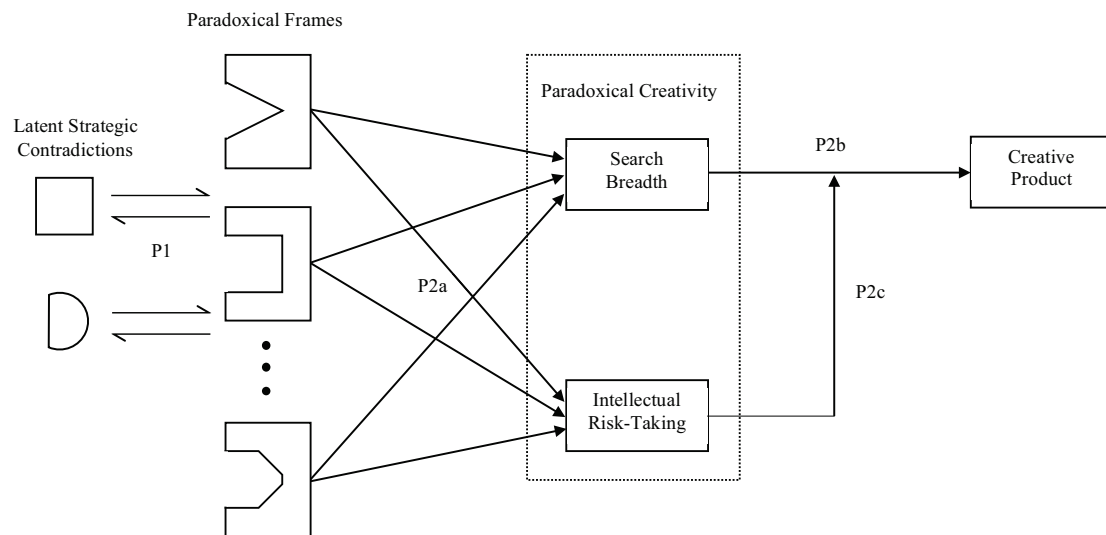


Figure 2-2 Conditions and implications of paradoxical creativity

In molecular binding, binding potential alone does not determine how much the ligand will alter receptor behavior. The potency of the ligand is conditional on ligand efficacy. Upon binding to the target receptor, ligand efficacy refers to the magnitude of the biological response produced by the bind. Efficacious strategic contradiction will produce a broader mental search and increased intellectual risk-taking.

A strategic contradiction's efficacy to broaden search and a strategic contradiction's efficacy to increase intellectual risk-taking are largely independent. Broadening search will increase accessibility and attention to domain-relevant knowledge. Domain-relevant knowledge comprises the total set of response possibilities from which a new response can be generated (Amabile, 1996; Csikszentmihalyi, 1996). This includes: facts, principles, rules, opinions about various issues in the domain, knowledge of paradigms, aesthetic criteria, and performance scripts for solving problems in the domain

(Amabile, 1996: 85). Strategic contradictions encourage juxtaposition of inconsistent knowledge and therefore increase breadth of attention and accessibility of knowledge related to different elements. Broader attention and more accessibility allow for synthesis of new ideas.

A strategic contradiction that lies outside a decision-maker's domain of expertise will not have the potential to draw from a deep pool of knowledge. Yet, it may still spur intellectual risk-taking. Strategic contradiction signals to the decision-maker that she finds herself in an unusual environment, that old knowledge may not be helpful, and that new solutions may be more useful than she previously thought (Fong, 2006; Schwarz, 2002). Independent of inducing the synthesis of new responses, strategic contradictions may encourage decision-makers to tolerate unusual possibilities and consequences. For example, decision-makers may reconsider the viability of a previous creative insight or reexamine the viability of an unpopular idea. Evidence suggesting that paradoxes can have independent effects on integration and differentiation supports this notion. Extant studies find that a product designer's written opinion of an invention, which was used as the paradox treatment condition, influenced independently subjects' willingness to tolerate different perspectives and integrate these perspectives by generating linkages between them (Miron-Spektor *et al.*, 2011: Study 4).

While a broader mental search will directly affect creative discovery, intellectual risk-taking will affect it indirectly. This is consistent with the two-stage model of creativity described earlier (Finke *et al.*, 1996). The model is sequential and the second stage depends on the first. Namely, intellectual risk-taking only matters if there are intellectual risks to take (Figure 2-2). As such, intellectual risk-taking will positively

moderate the relationship between search breadth and creative products. Therefore, I posit that:

***Proposition 2a:***      *The degree of paradoxical creativity is conditional on efficacy of the strategic contradiction.*

***Proposition 2b:***      *Efficacy will broaden cognitive search, which will increase the likelihood of creative products.*

***Proposition 2c:***      *Efficacy will increase intellectual risk-taking, which will positively moderate the relationship between cognitive search and creative products.*

### 2.4.3 Creative Products and Inertia

In the current section I use a formal cognitive architecture to simulate a range of creative products. A cognitive architecture specifies the essential mental mechanisms, structures, and processes in the form of a domain-generic computational model. The function of this model is to provide an infrastructure that enables a deeper understanding of various components and processes of creative cognition. In this way, it serves as the initial set of assumptions to be used for theory building (Sun and Hélie, 2015).

I employ a cognitive architecture that describes creativity based on the explicit-implicit interaction (EII) framework (Hélie and Sun, 2010). The EII framework integrates theories of incubation (e.g., unconscious work theory, conscious work theory, recovery from fatigue, forgetting of inappropriate mental sets, remote association, opportunities assimilation), insight (e.g., constraint theory, fixation theory, associationistic theory, evolutionary theory), and creativity (e.g., Geneplore, evolutionary theory of creativity). I

use a computational model based on the EII framework because, to my best knowledge, it provides the most complete integration of many existing theories of creative problem solving. A computer implementation of EII theory has been used to accurately account for creativity in several instances (Hélie and Sun, 2010). Next, I describe the simulation setup. The interested reader will find a more complete exposition of the computational model in the Appendix. Following the simulation setup, I develop propositions.

#### **2.4.3.1 Simulation Setup**

Each simulation models the following creativity task: given three clues, input or stimuli, discover, among seven possible solutions, the creative one. (Six solutions are conventional and one is creative). The desired solution obeys the usefulness property because it is linked with all clues. The desired solution obeys the originality property because it is rare and remotely associated with each clue. Computationally speaking, solution creativity is modeled using an incidence matrix. In graph theory, entries in an incidence matrix represents pairwise connections between nodes on a graph (Figure 2-3): such as connections between people in a social network, road connections between cities, or, in neuro-science, functional connections between memories or brain areas. The strength of the connection (remote or proximate) can be modeled using weighted indices (e.g., weak or strong tie in a social network, length of road, connection strength between memories or brain areas). In the focal model, I weigh connections between stimuli and non-creative, distractor ideas twice as heavily, thus, making them more accessible. Moreover, there are six times as many non-creative solutions as creative solutions, thus

making creative responses rarer. The agent's task is to discover the rare and distantly (or weekly) associated idea among a set of distractor, conventional, idea.

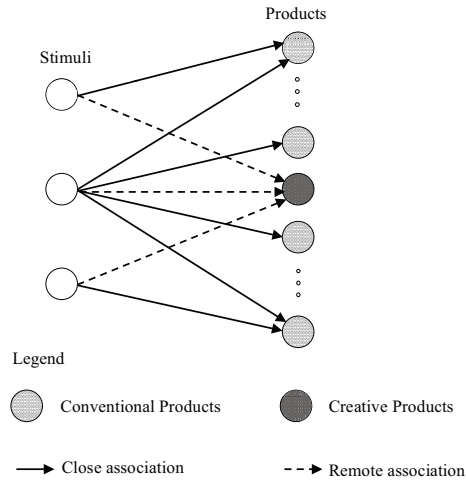


Figure 2-3 Graph representation of relationships between stimuli and conventional and creative products

### 2.4.3.2 The Computational Model

The equation of the computational model central to this article is the Boltzman (Gibbs) function. Extant literature has used the Boltzman function to describe exploratory behavior (Hart and Levinthal, 2011). The function formalizes the output decision by the decision-maker:

$$P(o_i) = e^{o_i/\alpha} \left( \sum_j e^{o_j/\alpha} \right)^{-1} \quad (1)$$

where  $o_i$  represents the decision-maker's initial belief in the appropriateness of strategy  $i$ .

In EII, the Boltzman function represents that strategy selection ( $P(o_i)$ ) is not just a

function of prior beliefs ( $o_i$ ), but is also conditional on the capacity to search in memory for unusual associations ( $\alpha$ ). Additionally, the result of the Boltzman function can be used to determine the decision-maker's confidence that an appropriate strategy was actually found and thus processing should stop. In EII, this stopping criteria is termed the internal confidence level (ICL) and is computationally defined as  $ICL = \max_i [P(o_i)]$ .

### 2.4.3.3 Simplified Two-Strategy Example

The following simplification illustrates how the Boltzman equation (Eq. 1) operates to produce creative products. In this example I will work with a decision-maker who has only two possible choices: the selection of *routine strategy*,  $r$ , or a *creative strategy*,  $c$ . I will assume that given the decision-maker's prior knowledge and experience, her support of the routine strategy ( $o_r = 0.80$ ) is higher than her support for the creative strategy ( $o_c = 0.20$ ). (Supports add to unity.) In this example, her prior knowledge has resulted in a stronger support of the routine approach. However, the ultimate selection of a strategy depends not only on prior knowledge, but also on the predispositions towards creative thinking: *search breadth* and *intellectual risk-taking*. These are modeled here using  $\alpha$  and  $\psi$ , respectively. I cover these parameters individually in the following sections.

#### 2.4.3.3.1 Search Breadth

Alpha ( $\alpha$ ) in Eq. (1) can be used to model the capacity to search in memory for new or unusual information. High  $\alpha$  levels in the Boltzman function increase search breadth and lower levels decrease it. For instance, in the example of a two-strategy selection problem, an  $\alpha$  value of 1 means the probability the routine strategy is selected falls to 65 percent

$\left( P(r) = \left( \frac{e^{0.8/1}}{e^{0.8/1} + e^{0.2/1}} \right) \cong 0.65 \right)$  and the probability the creative strategy is selected

increases to 35 percent. In other words, the decision-maker is more likely to select the unusual approach. The internal confidence level (i.e.,  $Max[o_i]$ ) in this example is 0.55 (i.e.,  $Max[P(o_r), P(o_c)] = P(o_c)$ ). In contrast, lower  $\alpha$  values will decrease breadth of memory search, which means that more conventional solutions will be preferred, and as such increase confidence in the action-outcome linkage (e.g.,  $\alpha = 0.10$ ;  $P(r) = \left(\frac{e^{0.8/0.1}}{e^{0.8/0.1} + e^{0.2/0.1}}\right) \cong 0.99$ ;  $ICL \cong 0.99$ ) (Hart and Levinthal, 2011), while higher  $\alpha$  values will increase search breadth but decrease confidence that a solution is appropriate (e.g.,  $\alpha = 10$ ;  $P(r) = \left(\frac{e^{0.8/10}}{e^{0.8/10} + e^{0.2/10}}\right) \cong 0.51$ ;  $ICL \cong 0.51$ ).

#### 2.4.3.3.2 Intellectual Risk-Taking

Psi ( $\psi$ ) is a threshold on the internal confidence level. That is, it represents the decision-maker's willingness to tolerate novel strategies. If her ICL is above the threshold ( $ICL \geq \psi$ ), a strategy is stochastically output and processing stops; if the ICL is below the threshold ( $ICL < \psi$ ), no strategy is selected, and given there is sufficient time, processing continues. Hence,  $\psi$  is used to model willingness to tolerate intellectual risk. Low  $\psi$  levels represent a low hurdle and willingness to tolerate novel strategies, while high  $\psi$  represents a higher output hurdle and preference for existing approaches. Hence, if the output threshold in the two-strategy example is 0.70, a strategy would be output in the low search breadth ( $\alpha = 0.10$ ) scenario ( $0.99 \geq 0.70$ ), but not in the high search breadth ( $\alpha = 10$ ) scenario ( $0.51 < 0.70$ ). If the output threshold is changed to 0.40 a strategy would be output in both scenarios.



### 2.4.3.4 Creative Products

Strategic contradictions may evoke many gradations of search breadth and intellectual risk-taking – the decision-maker may find herself anywhere along the spectrum of these two cognitive indices for a given contradiction.

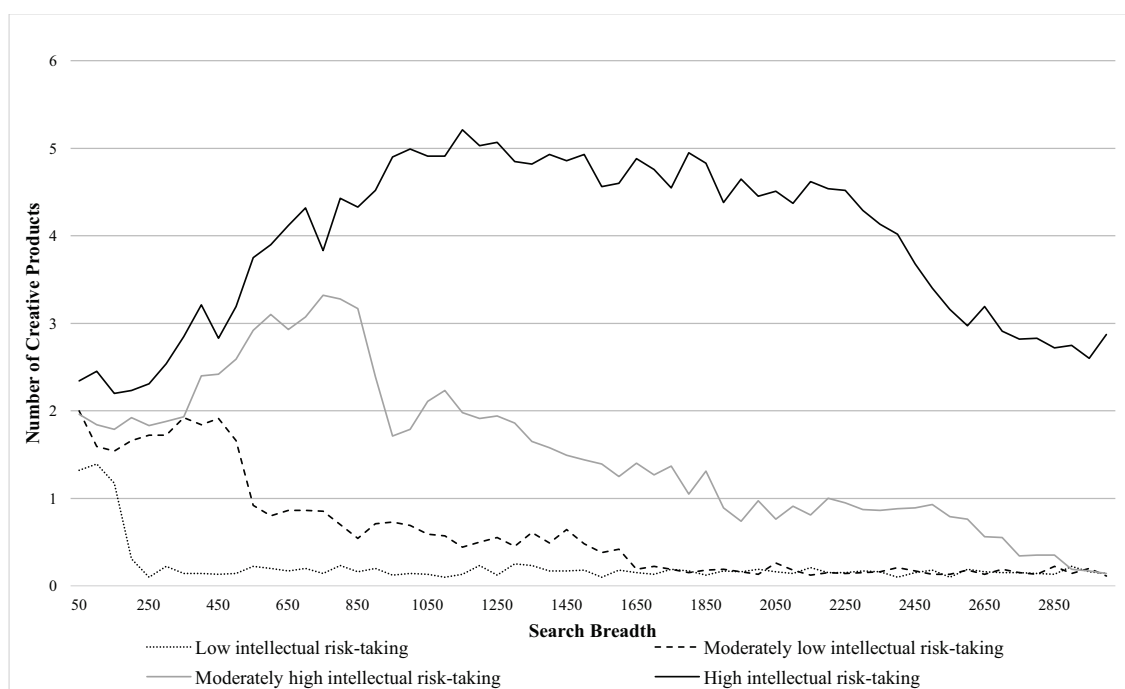


Figure 2-4 Comparison of creative output (measured as number of creative products) between four levels of intellectual risk-taking across the search breadth continuum.

I ran 1,000 simulations for each 1 of 60 gradations in search breadth, from  $\alpha = 50$  to  $\alpha = 3,000$ , and four levels of intellectual risk-taking:  $\psi_{low} = 0.25$ ,  $\psi_{moderately\ low} = 0.50$ ,  $\psi_{moderately\ high} = 0.75$ , and  $\psi_{high} = 0.99$ <sup>4</sup>. Simulation results support a positive effect of paradoxical creativity on creative output, measured as the number of creative ideas

<sup>4</sup> The reader will notice that in Figure 5 the lowest level of intellectual risk-taking occurs at an index of 0.99 (the agent must be 100% certainty the strategy is appropriate before selecting one) while the highest occurs at the opposite end of the continuum, at 0.01 (the agent must only be more than 1% certain it has found a solution before selection occurs).

generated by each agent (Figure 2-4). Search breadth increases the number of creative products, but only up to a point, after which likelihood of creative products decreases, suggesting the effect is non-monotonic. Additionally, the relationship between search breadth and creative products is positively moderated by intellectual risk-taking: higher levels of intellectual risk-taking positively moderate the effect of search breadth on creative products. The non-monotonicity of the relationship between search breadth and creative products implies paradoxical creativity may have negative consequences on creative output, particularly at low levels of intellectual risk-taking and at low and high levels of search breadth.

***Simulation Results 1:** The relationship between search breadth and creative products is parabolic, with lowest and greatest degrees of search breadth resulting in inertia.*

I ran 1,000 simulations for each of 99 gradations in intellectual risk-taking, from a  $\psi = 0.99$  to  $\psi = 0.01$ , and four levels of search breadth,  $\alpha_{low} = 500$ ,  $\alpha_{moderately\ low} = 1,000$ ,  $\alpha_{moderately\ high} = 2,000$ , and  $\alpha_{high} = 3000$ . Intellectual risk-taking is modeled as the inverse of the threshold on the ICL, and as such higher levels of intellectual risk-taking occur at lower indices of the threshold parameter. The simulation results (Figure 2-5) demonstrate the interaction between search breadth and intellectual risk-taking. High search breadth will produce lower creativity than low search breadth when intellectual risk-taking is low.

**Simulation Results 2:** *The relationship between intellectual risk-taking and creative products follows a threshold effect. Below this threshold greater search breadth reduces creativity, above it search breadth increases creativity.*

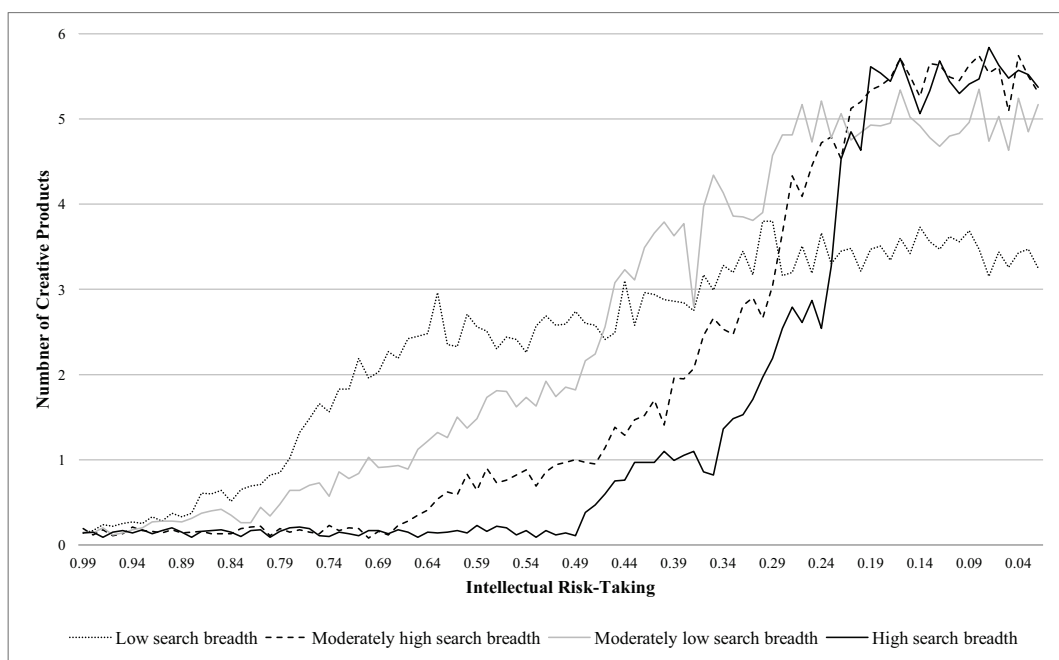


Figure 2-5 Comparison of creative output (measured as number of creative products) between four levels of search breadth across the intellectual risk-taking continuum.

Figure 2-6 presents possible creative outcomes for a range of degrees of paradoxical creativity – graphed along the two dimensions of search breadth and intellectual risk-taking. The overall finding is that higher degrees of paradoxical creativity *do not* imply more creative products. The creativity of decision-makers is a non-monotonic function of how they experience a strategic contradiction. While classification of strategic contradictions is beyond the scope of this study, idiosyncratic effects of strategic contradictions on decision-makers is not an unreasonable assumption.

For instance, one can imagine an ideologically driven social entrepreneur would be more deeply affected by the strategic contradiction of fulfilling his ideological goals and the economic survival of his social venture than would a commercial entrepreneur facing a situation where she needs to work in a context of seemingly contradictory goals, such as individual responsibility and team solidarity. While the current study focuses on refining the picture of how strategic contradictions influence creativity, similar work remains to be done on the classification of strategic contradictions.

***Simulation Results 3:** The relationship between paradoxical creativity and creative products is non-monotonic.*

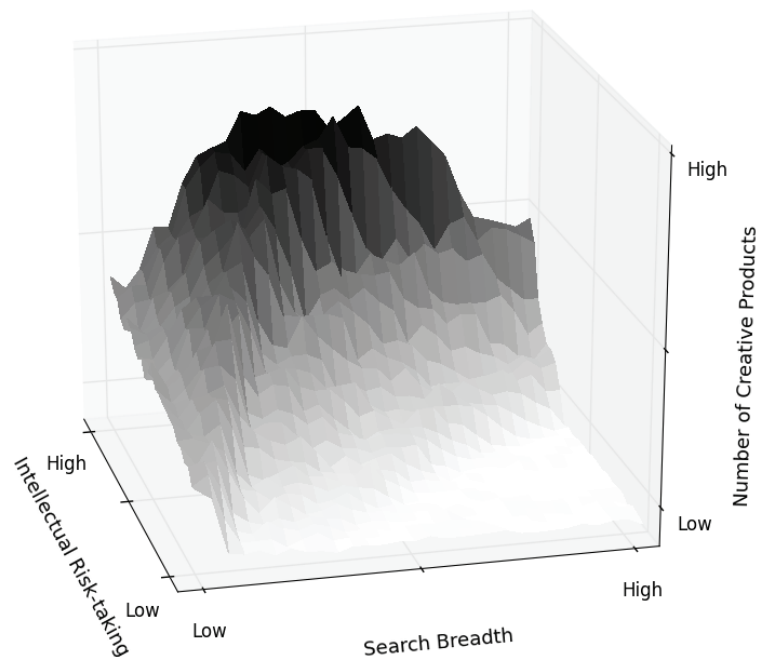


Figure 2-6 The effect of degree of paradoxical creativity on the number of creative products

## **2.5 Discussion**

This study develops a theory of the conditions and effects of strategic contradictions on creative processes and products. I argue that strategic contradictions have non-monotonic and non-obvious effects on creative products.

I rely on the paradox and creative cognition literatures to describe conditions that would trigger paradoxical cognition. I describe this process as affinity. Higher affinity between a latent strategic contradiction and a paradoxical frame should increase the likelihood a focal decision-maker engages in creative cognition. Once a decision-maker is aware of a strategic contradiction, the degree of paradoxical creativity will depend on the potency of the strategic contradiction to drive creative problem solving. I describe this process as efficacy. Lastly, I describe how efficacy may affect the generation of creative products. In this final section, I rely on explicit-implicit interaction theory (EII) to simulate a range of possible outcomes for varying levels of the two dimensions of paradoxical creativity – search breadth and intellectual risk-taking. The assumptions and simulation results of an EII based cognitive architecture allow me to build the final three propositions.

### **2.5.1 Limitations and Future Research**

While differences in perception explored here increase the rate of paradoxical creativity, other individual differences can explain why some people generate more creative responses when faced with strategic contradictions. Personality traits such as risk-taking, independence, overconfidence, autonomy, are known to play a role in creative performance and may explain why creative products of some people are affected less or more by strategic contradictions. Research has also shown that intrinsic motivation has

played a role in creativity and may explain differences in degree of paradoxical creativity to strategic contradictions. Moreover, people differ in their ability to adapt and may have different responses to strategic contradictions over time. Insofar as an individual adapts quickly she may only be marginally affected by a strategic contradiction and as a result not engage in paradoxical creativity.

Future studies should also explore the influence managers can exercise to change the perception of strategic contradictions. Paradox studies show that managers, researchers, and consultants can have a significant effect on how strategic contradictions are perceived by organizational insiders (Jay, 2013; Lüscher and Lewis, 2008). Managers can influence decision making of organizational members “from the inside out” through training and “from the outside in” through advice and information (Simon, 1997: 12–13). Advice, information, and training may alter how strategic contradictions are perceived by changing paradoxical frames of organizational members. Managers can also to some extent control the inherent strategic contradiction. Smith and Lewis (2011) argue paradoxes result from a scarcity of resources, plurality of views, and organizational change. Future research should explore how managers can use organizational resources, diversity of opinion, organizational change, training, information and advice to induce paradoxical creativity.

Future research should explore the value of paradoxical creativity. While we argue that the creative result from paradoxical creativity is neither positive nor negative, future research should explore whether and under what circumstances paradoxical creativity is desirable. Past studies exploring creativity resulting from conflict have found that while conflict may increase creativity, the conflict can result in negative outcomes

for team cohesion and objective clarity (Chen, Liu, and Tjosvold, 2005). As summarized by Anderson and Gasteiger, “Truly, there is a dysfunctional aspect to innovation, less visible or managerially appealing, but an aspect nevertheless that has surfaced repeatedly across empirical studies” (Anderson and Gasteiger, 2008: 422). We suggest future research should explore both the negative and positive sides of paradoxical creativity and integrative models should encapsulate both the positive and negative consequences of paradoxical creativity.

With our discovery of a more fine-grained relationship between on the one-hand, strategic contradictions and, on the other hand, creativity, we believe that more fine-grained research into the effect of strategic contradictions is also warranted. Not all strategic contradictions will be alike in intensity, relevance, and salience to a given decision-maker. Future work should attempt to distinguish between different types of strategic contradictions (Gonin, Besharov, and Smith, 2013). Some strategic contradictions may be more salient to specific individuals than are others. One can imagine that an ideologically driven social entrepreneur would be more deeply affected by the contradiction of fulfilling his ideological goals and the economic survival of his social venture than would a commercial entrepreneur facing a situation where she needs to work in a context of seemingly contradictory goals, such as individual responsibility and team solidarity. While the current study focuses on refining the picture of how strategic contradictions influence creativity, similar work remains to be done on strategic contradictions.

## CHAPTER 3. BREAKTHROUGHS, ONE SMALL IDEA AT A TIME: THE POWER OF INCREMENTAL SEARCH TO DRIVE ACTION ON BREAKTHROUGH INNOVATIONS

### 3.1 Chapter Summary

This chapter explores how the search for alternatives moderates the decision to implement ideas. Idea implementation is a forward-looking process premised on a decision-maker's beliefs about the linkages between alternatives and consequences. Yet, idea generation is a processes of blind variation, often inversely related with sightedness into future consequences. I describe this process and propose that, according to a number of theories of incubation, insight, and creative problem solving, a decision-maker engaging in incremental search is more likely to achieve a breakthrough – the introduction of radically creative ideas – than a decision-maker engaging in broad search for new ideas.



### 3.2 Introduction

*“The term ‘brain drain’ is not fully appreciated. The drain is not from one country to another – the emigration of talent from less rewarding places of employment to more rewarding is a small and not very important adjustment. The real drain is the loss of the creativity that stays at home but is not employed properly. And that is a worldwide waste: brains down the drain.” (Barron, 1988: 95)*

The generation of creative ideas does not imply that those ideas are put to work. Implementation requires the decision to act (Anderson *et al.*, 2014), the process by which one alternative is selected to be carried out. Yet the very nature of creative ideas is likely to cause hesitation (Baer, 2012). New ideas, especially highly creative ones, may not be implemented because they have unknowable outcomes – their future consequences are not based upon known empirical relationships. This makes it challenging for managers to reliably turn highly creative ideas into breakthroughs. In other words, creativity may stifle breakthrough innovation because it precludes knowledge about future consequences.

By offering a deeper examination of individual and environmental factors, extant creativity implementation studies (Baer, 2012; Somech and Drach-Zahavy, 2013) have lead to the formulation of better, holistic innovation strategies. Yet, these studies have not by themselves answered how value can be systematically derived from highly creative ideas. Perhaps an important omission is the lack of attention to creativity – the idea generating process itself.

Acknowledging the importance of sightedness into future outcomes to the decision to act (Simon, 1965), I explored search breadth as the moderator of the generation-implementation relationship. This is consistent with creativity research arguments that more creative processes are associated with lower levels of sightedness than more incremental processes (Simonton, 2013). The link between sightedness and creativity is also consistent with the logic of risk in alternative sampling (March and Simon, 1958). Local search, searching among alternatives in close proximity to current ways of doing things, should yield outcomes that do not vary greatly from current approaches and should therefore produce relatively knowable consequences. In contrast, distant search, searching among alternatives that represent significant variation, is typically associated with unanticipated consequences.

This study contributes to behavioral strategy research, whose “key insight is that superior opportunities are cognitively distant” (Gavetti, 2012: 267), by tackling one of its complications: efficacious management is premised on accurate mental models of the world (Gavetti and Levinthal, 2000), yet the accuracy of a decision-maker’s mental model decreases with cognitive distance. In other words, superior opportunities are less amenable to strategic management because they are cognitively distant. All the same, because breakthrough innovations matter for competitive advantage (Girotra, Terwiesch, and Ulrich, 2010; Singh and Fleming, 2010) a deeper study of how they can be achieved provides a powerful aid to rationality. In this study, I argue one strategy used by successful decision-makers is to engage in incremental, rather than distant cognitive search. While I do not dispute the importance of surprising breakthroughs resulting from cognitively distant ideas nor the unpredictability of more mundane forms of everyday

creativity, I argue that superior innovators begin with smaller, more predictable parts and through a process of creative elaboration turn incremental creativity into breakthrough innovation. This approach makes creativity amenable to strategic management and allows individuals to reduce blindness about future consequences of creative ideas.

### **3.3 Creativity, Blindness, and Innovation**

*“Creative people are constantly surprised.”*

*(Csikszentmihalyi, 1996: 363)*

#### **3.3.1 Definitions**

Creativity and innovation at work are often regarded as two stages in the process of attempts to develop and introduce new ways of doing things (Anderson *et al.*, 2014). The creativity stage of the process refers to idea generation, whereas the innovation stage refers to the introduction of ideas. I refer to the first stage of the creativity and innovation at work process as generation or creativity and the second stage as implementation, innovation, or introduction. The decision to act, as it is defined here, is the process by which one idea from the creativity stage is selected for implementation in the subsequent innovation stage. While the decision to act is a necessary condition and first step of innovation, it does not guarantee that the innovation will be successful. Nevertheless, all else equal, an increase in the propensity to act will increase innovation.

Not only are idea generation and idea introduction distinct, but the interplay between them creates tension (Bledow *et al.*, 2009). This tension results from blindness into future consequences. Blindness is the lack of prior knowledge of whether or not an idea will be beneficial. The tension arises from the fundamental differences between

these stages. While the generation of new ideas is positively associated with blindness about the future, introduction demands that the consequences of ideas are, at least to some reasonable extent, knowable.

Blindness subsumes the concepts of uncertainty, but it alone does not tell the whole story. First, uncertainty, and by extensions blindness, is importantly differentiable from risk. Risk represents a situation with a known or knowable underlying probability distribution of possible events. The distinction between risk and uncertainty is the classification or knowability of possible instances, which is not possible under uncertainty. The implication is that risk is insurable, while uncertainty and blindness are not. Outcomes such as “a house burns down” or “a house does not burn down” can be classified, shared, and agreed upon, while novel outcomes cannot. Second, blindness is also concerned with the “fitness” values of outcomes, not just their probability distribution. Even if a decision-maker were to know with certainty the outcome, she will still be surprised if the utility of the outcome is unknown. In a coin-flip wagering game, a person who can perfectly call the flip of the coin but does not know the prize value of each wager would be more blind than sighted. The alternative, for instance, is knowing the prize value of each wager, the utility of each outcome, but being unaware the coin is unfairly loaded more towards heads. In this game any bias to select heads rather than tails on multiple trials would be considered a lucky guess, not sightedness.

We conceptualize creativity as involving gradual quantitative transitions along a continuum from radical and incremental creativity (Gilson *et al.*, 2012). At one end, radical creativity can be defined as the process of generating completely new ideas that have the potential to be revolutionary to a field and are risky and surprising in nature.

Therefore, radical creativity results in the generation of radical, cognitively distant ideas. In contrast, incremental creativity is the processes of generating ideas that are less surprising and more predictable than completely new ideas. Incremental creativity results in the generation of more cognitively proximate ideas. Drawing from research on creativity (Simonton, 2013) and alternative sampling (March and Simon, 1958), cognitively distant ideas represent higher levels of unpredictability than do cognitively proximate ideas.

Before moving on, it is important to note that although the current treatment of innovation has organizational implications (the efficacy of internal innovation, such as Google Labs), the focus here is on the individual (e.g., front line employee, employee in R&D, senior executive) trying to solve a problem in his or her own head. In this sense, my decision-maker is like Daniel Dennett's (1995) "Popperian creature" testing action-outcome conjectures against a mental representation of the world in an internalization that "permits our hypotheses to die in our stead" (1995: 357).

### **3.3.1.1 Blindness: Tension Between Creativity and Innovation**

Idea implementation is a forward-looking process premised on a decision-maker's beliefs about the linkages between alternatives and consequences. Greater fidelity between the alternative-consequence linkage will lead to a more favorable strategy. That is, if a decision-maker can predict the outcome of her decisions, she will only choose beneficial, value creating alternatives. Yet, idea generation is a processes of blind variation (Campbell, 1960) often inversely related with sightedness into future consequences

(Simonton, 2013). To understand the inverse relationship between creativity and sightedness, I turn to a recent conceptualization of creativity by Simonton (2012).

To capture the full complexity of creativity, Simonton uses a three pronged conceptualization that, in addition to the “standard definition” of novelty and value (Runco and Jaeger, 2012), includes the element of *surprise*. Amabile’s (1996: 35) statement that a creative product or response is judged to be creative when it is (a) novel, (b) appropriate or useful, and (c) “the task is heuristic rather than algorithmic” is comparable. Likewise, the U.S. Patent Office requires that an invention be (a) novel, (b) useful, and (c) nonobvious in order to receive patent protection<sup>1</sup>. The positive relationship between blindness and creativity is echoed in Simonton’s (2013: 254) argument that “Creativity and blindness have a necessary and positive connection that cannot be denied without redefining either term in a vague or arbitrary manner.” In summary of the above discussion of generation and implementation, while idea implementation processes attempt to reduce blindness, idea generative processes increase it.

The tension between generation and implementation of ideas is exemplified by the recent shutdown of Google Labs, Google’s internal idea playground, in an attempt to sharpen the focus and streamline delivery of their services. “Putting more wood behind fewer arrows”, meaning focusing more resources on fewer ideas, is the CEO’s new prerogative (Efrati, 2011b). Specifically, Larry Page, Google’s CEO, is described to have asked every product manager to email him a 60-word explanation of whatever project they were working on. Page would then select only projects that he judged to be worthwhile (Efrati, 2011a). In other words, Larry Page wants to change Google’s

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<sup>1</sup> <http://www.uspto.gov/inventors/patents.jsp>

creativity and innovative culture from bottom-up empowerment to top-down alignment.

A top-down culture overwhelmingly focuses on implementation, not originality (Schrage, 2013).

### 3.3.1.2 Radical Ideas

While Schumpeter (Schumpeter, 1942: 82–85) was perhaps the first to highlight that opportunities need not lie in incremental and rigid conditions, Gavetti (2012: 269) more recently uses competition to demonstrate why cognitively distant ideas are valuable:

The line of argument goes as follows. Heavy competition for a given opportunity progressively erodes an opportunity's value. Thus, in heavily competitive environments, existing superior opportunities tend to be those that most firms have an especially hard time pursuing. The difficulty of pursuing them therefore isolates them from competition. It will be shown that central to this limitation are behavioral failures: *mental processes that the average strategic leader has a hard time managing*. On the one hand, these failures play an important role to the existence of superior opportunities; on the other hand, a superior ability to counter them results in superior performance. (emphasis is my own)

Because highly creative ideas are hard to identify a competitive advantage should be conferred to organizations that can identify these ideas. However, seeing an opportunity does not mean it will be pursued. Sinfield, Gustafson, and Hindo (2014: 24) make this explicit by arguing that “creative ideas on demand is only part of the answer. Just as crucial is how ideas link to action.” The centrality of action to innovation is demonstrated by examples such as Xerox Parc, which developed many innovations in software, computer hardware, and PC connectivity. Xerox Parc was exceptionally creative, but it was Apple and Microsoft that introduced many of these innovations. As far as innovation is concerned, new ideas introduced in an organization may be generated by highly creative employees outside the focal organization (Zhou and Shalley, 2010).

Yet, even if identified and judged to have a positive expected value, such ideas are likely to be met with hesitation when there is a lot at stake (Mueller, Melwani, and Goncalo, 2011). That is to say the range of possible outcomes of a radical idea makes consequences highly unpredictable (Taylor and Greve, 2006). This is illustrated by Eastman Kodak's top management decision not to invest in digital photography for fear it would threaten their photographic film business. Eastman Kodak filed for bankruptcy in 2012 primarily because it failed, for 37 years, to invest in a technology invented by its own engineers<sup>2</sup>. Hesitation to act on radical ideas is not unique to incumbent organizations. Google met Gmail with similar reluctance. A lot of people, from inside and outside of Google, believed Gmail was a bad idea, from both a product and strategic point of view, and it wasn't certain that Gmail would ever reach the public (McCracken, 2014). Moreover, radical ideas are notoriously difficult to plan for and some are the result of accident rather than strategy. For instance, Post-it Notes are the result of a failed attempt to create a super-strong adhesive (Audia and Goncalo, 2007). Thus, although breakthroughs may be desirable in organizations, the very nature of radical ideas may result in a reluctance to act.

### **3.3.1.3 Incremental Creativity**

Incremental creativity should result in more implementation. Incremental ideas are more predictable and have a lower likelihood of resulting in extreme losses. In addition, a focus on generating incremental ideas does not mean ignoring breakthroughs. On the contrary, I propose that incremental creativity is not simply additive, but interacts with and supports

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<sup>2</sup> Steve Sasson invented the digital camera in 1975 and Kodak patented the technology in 1978.



previously generated ideas through elaboration. The proposition that the pursuit of cognitively proximate ideas is potentially strategically superior to the pursuit of cognitively distant ideas is due to creative elaboration and greater sightedness.

#### **3.3.1.3.1 Sightedness**

At each moment in time the decision-maker is confronted with a large number of alternatives. The decision to act is the choice to select and carry out one of these alternatives. The task of a good decision-maker is to select an alternative which is followed by a preferred set of consequences (Walsh, 1995). *All* of the consequences that follow from a chosen decision are relevant to the evaluation of its correctness, not just those consequences that were anticipated. Therefore, a good decision-making has an *accurate* and *complete* cognitive representation of alternative-consequence linkages.

Because blindness is inversely related to knowledge of possible consequences (Simonton, 2013), it automatically follows that creativity has a negative connection to a manager's ability to select a desirable strategy. Accordingly, any set of alternatives that contains a creative idea will increase the decision-maker's difficulty in evaluating the possible consequences.

Creativity results in variable degrees or amounts of sightedness, conceptualized as the sightedness (or blindness) continuum (Simonton, 2013). At one end of the continuum decision-makers have accurate and complete knowledge about the utility of a strategy (perfect sightedness), while at the other they have no knowledge about the value of any strategy (perfect blindness). The implication is that highly creative ideas cannot have

high sightedness. In fact, sightedness is only maximized when creativity is minimized (Simonton, 2013). Therefore:

***Hypothesis 1:** Incremental creativity is more likely to result in implementation than is radical creativity.*

### **3.3.1.3.2 Elaboration**

The argument that incremental ideas can lead to breakthroughs is supported by research on idea elaboration (Csikszentmihalyi, 1996). Idea elaboration involves the transfer of a new idea from an individual's mind to a work context, where the individual checks whether the idea will proceed as intended (Mainemelis, 2010). During elaboration an actor notices new insights and problems out of the idea's interaction with the workplace and then further develops and refines the new idea, usually through a process of hypothesis testing or trial and error. This is a stage where many details are worked out. Consequently, elaboration feeds the earlier stages of idea generation and can result in new generation, more incubation, and further elaboration. As a result, elaboration creates a virtuous cycle of creativity and action – “incrementally radical ideas”. Implicit in this argument is that that cognitively proximate ideas can result in radical changes through incremental progress. In a sense, multiple small ideas are greater than the sum of their parts.

Take again as an example the success of Google's email breakthrough, Gmail. Even within Google, Gmail was regarded as a huge and improbable deal. As McCracken (2014) writes in Gmail's 10<sup>th</sup> anniversary TIME magazine article, “It's not hard to envision an alternate universe in which the effort fell apart along the way, or at least

resulted in something a whole lot less interesting.” But, Gmail succeeded, and no one radical idea can mark the “Aha!” moment. Rather, it was a large set of incremental ideas elaborated over three years. First, Gmail was not incidental, but, according to Paul Buchheit, Gmail’s creator, “an official charge”. The project started with Buchheit solving a simple, but useful problem that took him only one day to accomplish: a search engine for his own email. Next, he sought feedback from other engineers. They insisted his invention be able to search their emails. Soon, it also did. Intentional small steps also led to generation of new ideas. For instance, Buchheit soon realized that the serious kind of search capacity Google was capable of was not practical when applied to a couple of megabytes of storage space, as was offered by Hotmail and Yahoo email servers at the time. Serious search capacity opened up the possibility for serious storage. That led to the possibility of keeping email forever, another incremental idea, and the eventual decision to offer 1GB of free email storage space, 500 times what Microsoft’s Hotmail offered. For most of its life, Gmail was not guaranteed launch. It is likely that it was the continuous generation and elaboration of incremental ideas during Gmail’s development that resulted in Google’s breakthrough invention.

***Hypothesis 2:** Incremental creativity is more likely to result in breakthroughs than is radical creativity.*

### **3.4 Methods**

The current study seeks to utilize a computer simulation to examine the effect of level of creativity on the decision to act. The EII framework provides this opportunity. To test the hypotheses of this study I rely on the same simulation setup as described in the previous chapter, with on addition: the conceptualization of the decision to act.

The decision-maker will only act if she is reasonably assured her actions will result in desirable outcomes. In EII, the decision to act is simulated by the internal confidence level crossing the threshold,  $\psi$  (Hélie and Sun, 2010). This output threshold is used to differentiate knowledge that is externalized by the agent from knowledge that is kept private. This is consistent with risk taking in alternative sampling and the assumption of human docility, which posits that a person will search for knowledge until a certainty threshold is reached (Simon, 1965). For the purpose of this study, the ICL represents the propensity to act. The output threshold was held constant across all simulations. This controls for a decision-maker's tolerance of blindness.

### 3.5 Results

To test **H1** I observed an agent's ICL as a function of search breadth. I ran a total of 60,000 trials: 1,000 simulations for each of 60 increments of search breadth. In support of H1, findings reveal the likelihood to act decreases with radicalness of creative ideas (Figure 3-1).

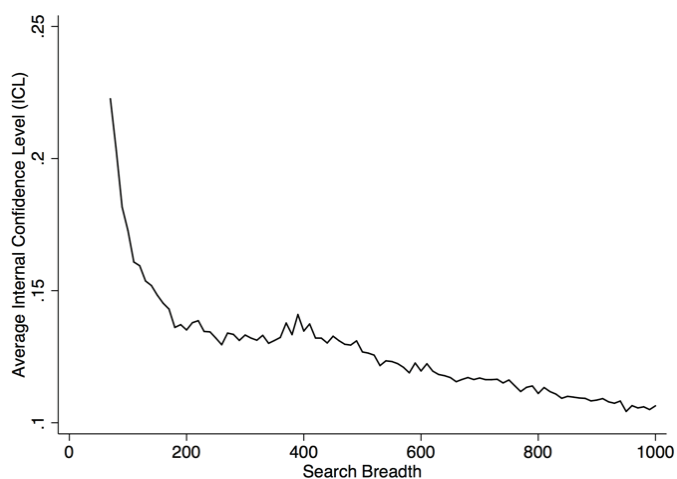


Figure 3-1 ICL as a function of search breadth

To test **H2** I observed the output of ideas as a function of search breadth. Findings reveal that more radical creativity simultaneously increased the number of generated and unattempted creative ideas (Figure 3-2). Results also suggests that introduction is most likely at moderate levels of creativity, with half of all creative output occurring between the dotted lines in Figure 3-3. Hypothesis 2 is also supported.

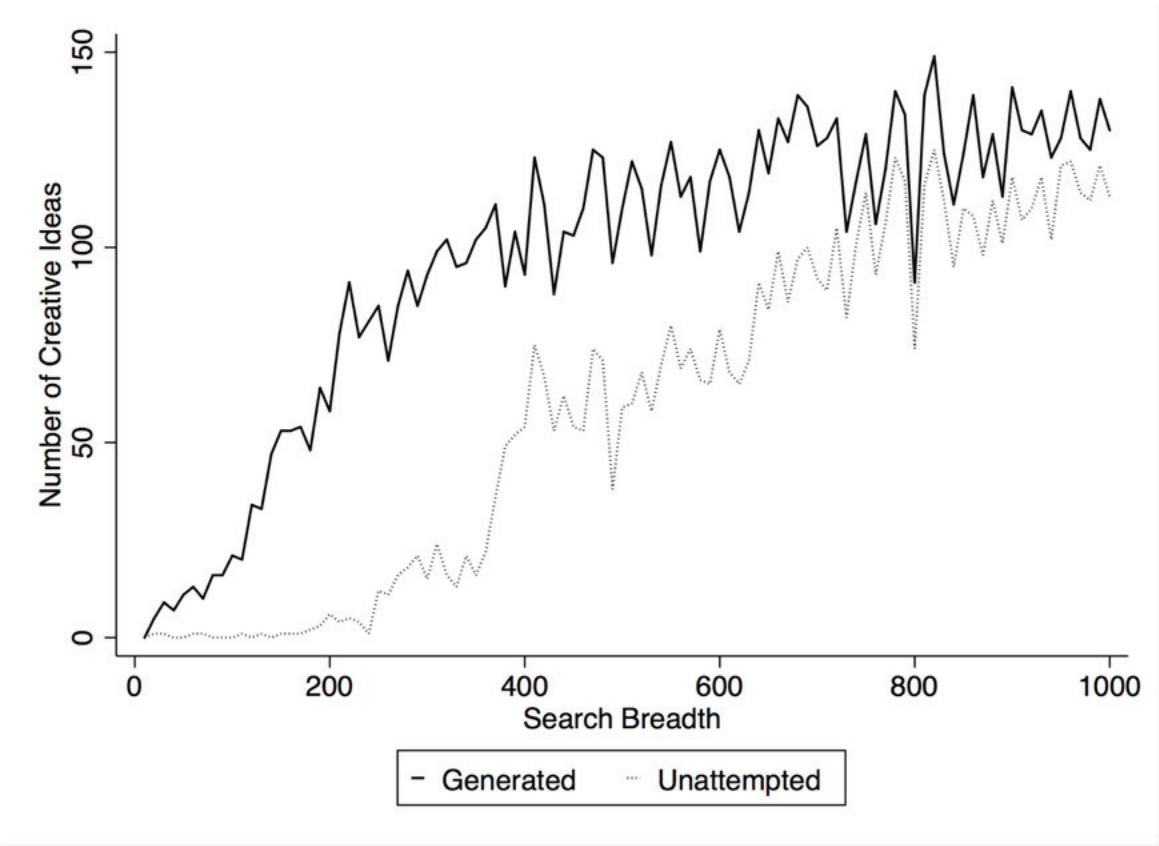


Figure 3-2 Idea output as a function of search breadth

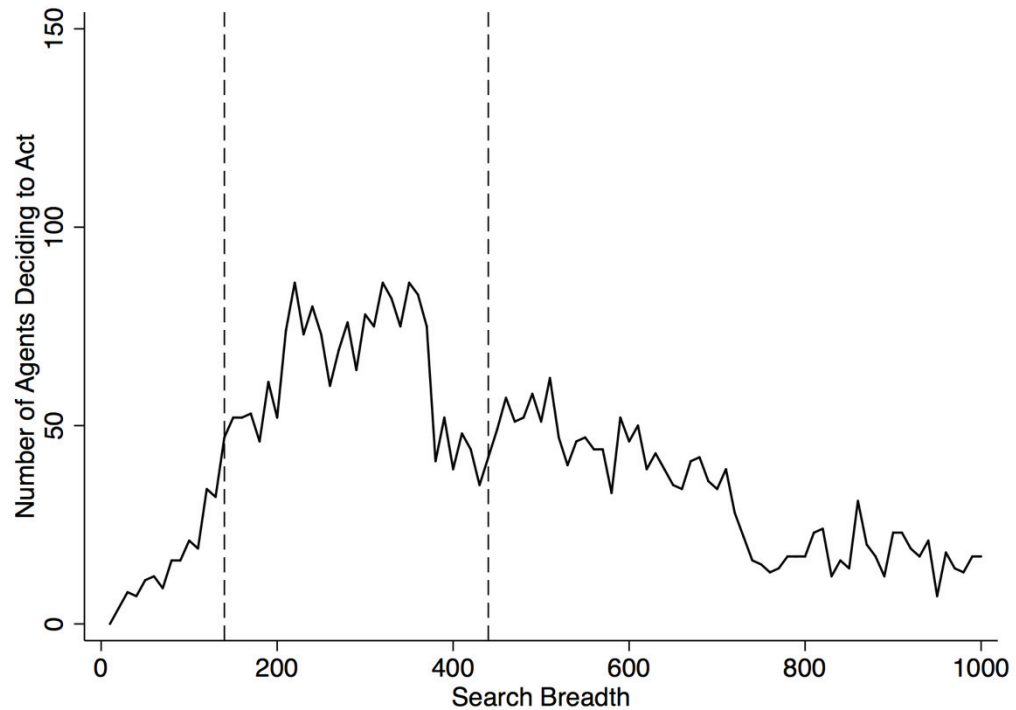


Figure 3-3 Number of agents deciding to act on their creative ideas

### 3.6 Discussion

This study contributes to behavioral management research by tackling one of its complications: efficacious management of the creativity process. Because creativity is negatively related to sightedness into future outcomes it presents a decision-making problem. In this study, I argue one strategy used by successful breakthrough innovators is to engage in incremental, rather than radical creativity. I argue that superior innovators begin with smaller, more predictable parts and through a process of creative elaboration turn incremental creativity into breakthrough innovation. This approach makes creativity amenable to strategic management and allows individuals to reduce blindness about future consequences of creative ideas.

I do not dispute the importance of radical ideas to breakthrough innovations nor the limitations of incremental creativity. Incremental creativity may lead to local minima and sub-optimal solutions, while radical ideas can help break out of such inertial conditions. However, the purpose of this study is not to compare radical and incremental creativity in some absolute or general sense of goodness to every organization or individual, but specifically to organizations and individuals with limited resources. My aim is to suggest that incremental ideas are more amenable to strategic management and as such are more likely to lead to intentional breakthrough innovations, especially in situations where there is something at stake. This represents a critical boundary condition that separates the situations I am interested in from other situations where creativity and innovation may also be desirable, such as in art for personal pleasure or in publicly funded basic science research.

### **3.6.1 Limitations**

This study suffers from external validity limitations. That is, operationalizing the complexity of human cognition using a computer is limited by the assumptions of the cognitive architecture. Nevertheless, the use of simulations allows for new insights testing of unobservable or challenging to measure relationships – such as how private cognitive processes affect decision-making. I utilize a computational model verified in cognitive science to address empirically challenging phenomenon in organizational science. The results reveal an interesting and, as of yet, empirically unobserved relationship. Furthermore, EII has been validated using similarly complex phenomena in social and psychological science (Sun, 2002; Sun and Hélie, 2015).

### 3.6.2 Future Research

Developing boundary conditions of the above theory is left for future work. For instance, is the moderating effect of search breadth conditioned by individual differences? Evidence suggests domain knowledge plays an important role in idea selection (Amabile, 1996; Csikszentmihalyi, 1996). It could also play an important role in the decision to act on highly creative ideas. For instance, do greater levels of domain knowledge improve a decision-maker's capacity to derive breakthroughs from radical ideas? Or do greater levels of domain knowledge improve a decision-maker's decomposition of big ideas into smaller, more tractable sub-idea? Developing boundary conditions could help us further understand how decision-makers apply creativity to administrative problems.



## CHAPTER 4. KICKING OFF SOCIAL ENTREPRENEURSHIP: HOW A SUSTAINABILITY ORIENTATION AFFECTS CROWDFUNDING SUCCESS

### 4.1 Chapter Summary

Research generally suggests that, relative to commercial entrepreneurs, social entrepreneurs stand at a disadvantage at acquiring resources through traditional financial institutions. The current chapter advances the argument that an innovative institutional form – crowdfunding – has emerged to address the needs of social entrepreneurs and challenges extant arguments. To examine this, I study *whether* and *how* a sustainability orientation affects entrepreneurs' ability to acquire financial resources through crowdfunding and hypothesize that a venture's sustainability orientation will enhance its fundraising capability. I suggest that projects creativity mediate the relationship between a sustainability orientation and funding success.

### 4.2 Introduction

While social entrepreneurship activities continue to grow in importance and number (Lumpkin *et al.*, 2013; Margolis and Walsh, 2003; McMullen and Warnick, 2015; Zahra and Wright, 2015), access to resources constrains the founding and growth of socially-oriented organizations. Austin, Stevenson, and Wei-Spillern (2006) suggest that, compared to profit-focused or commercial ventures, social ventures face difficulties in resource mobilization. Their reasoning is that “the nondistributive restriction on

surpluses generated by nonprofit organizations and the embedded social purpose of for-profit or hybrid forms of social enterprise limits [*sic*] social entrepreneurs from tapping into the same capital markets” (Austin *et al.*, 2006: 3). Whereas commercial entrepreneurs can attract the attention of commercial lenders or private equity investors, social entrepreneurs often appear less attractive to traditional capital providers. Such curtailed access to resources becomes especially onerous when social ventures need capital to invest in commercial activities that generate earned income.

The dearth of support from capital markets stands in contrast to the increasing societal support for social entrepreneurs. The popularity of books like David Bornstein’s (2007) How to Change the World: Social Entrepreneurs and the Power of New Ideas is one illustration of how popular culture has embraced the notion of social entrepreneurship. Writing from broader sociological and historical perspectives, Meyer (2010: 6) goes onto to describe those social changes that encouraged the rise of social entrepreneurship:

Many of the social structures that expanded rapidly in the postwar world are conspicuous for their absence of claimed selves and interests and for their claimed agency for such universal or highly collective goods as world peace, the environment, human rights, or models of economic growth (Meyer & Jepperson 2000). And their social authority derives from their disinterested reflection of transcending purposes, not from their own interests. Adopting the stance of rising above the self, they are not mainly interested actors, so much as Others, in the old Meadian sense, and they derive their agentic authority from roots that would once have been considered religious.

With traditional financial institutions being generally incompatible with ventures that seek to “rise above the self,” it is reasonable to predict the emergence of new financial institutions that parallel societal support for social entrepreneurship. I suggest

that this has happened in the form of a relatively novel and increasingly important source of capital: crowdfunding. With the needs of social entrepreneurs being unmet or underserved by traditional capital markets, crowdfunding offers a distinct avenue for acquiring resources that may exhibit a preference for funding social entrepreneurs over commercial-only entrepreneurs.

Over five billion dollars was raised on crowdfunding platforms in 2013 – a 188% growth rate over 2012 (Montini, 2014). While entrepreneurial funding by a loose collection of individuals is not new, recently developed on-line crowdfunding platforms introduce an institutional setting that differs from that of traditional funding sources. Crowdfunding platforms create financial opportunities for early-stage entrepreneurial ventures with little track record or little available data, while simultaneously increasing the anonymity of the relationship between funders and entrepreneurs and democratizing the financial decision by drawing upon a large number of relatively small contributions (Mollick, 2014; Ordanini *et al.*, 2011). Some platforms, such as Kickstarter, are reward-based and, as a result, move away from the traditional model of investors either acquiring equity in, or making a loan to, a venture. For reward-based crowdfunding, backers' motivations shift from pecuniary returns to other types of benefits.

Based on these institutional characteristics of crowdfunding, the current paper proposes that, contrary to the findings for traditional capital markets, entrepreneurs with a sustainability orientation will experience greater levels of crowdfunding success, relative to commercial-only entrepreneurs. By an entrepreneur's sustainability orientation, I refer to the entrepreneur embracing goals or objectives that “focus on the preservation of nature, life support, and community in the pursuit of perceived opportunities to bring into

existence future products, processes, and services for gain, where gain is broadly construed to include economic and non-economic gains to individuals, the economy, and society” (Shepherd and Patzelt, 2011: 137). Drawing upon theoretical work on the changing nature of institutions, research on social movements, and data that shed light on the beliefs and values of crowdfunders, I suggest that the collection of individuals engaged in crowdfunding generally share a “loose ideology” ((McCarthy and Zald, 1977; Überbacher, 2014) that is supportive of a sustainability orientation. In addition to the hypothesis that a sustainability orientation will enhance a venture’s access to capital through crowdfunding, I also hypothesize two mechanisms that mediate the relationship between a sustainability orientation and funding success: project legitimacy and creativity.

I test my hypotheses in a sample of crowdfunding campaigns on the Kickstarter platform. Kickstarter’s stated mission is to bring creative projects to life, by funding activities that produce or create output to be shared with others. It operates with explicit rules against donating money to charity or paying out financial incentives. Because of Kickstarter’s prohibition of philanthropic donations, I assume that projects are necessarily commercial in nature but vary in whether or not they also adopt a sustainability orientation.

Results indicate that, in samples of two distinct Kickstarter categories of projects – technology projects and film/video projects – a sustainability orientation increases funding success. Findings reveal that project with either a social orientation or an environmental one, relative to commercial-only projects, are not only more likely to achieve their funding goals but also are more likely to receive higher total pledge

amounts. In both technology and film/video samples, I find that the direct effect of a sustainability orientation on funding success is partially mediated by the creativity of crowdfunding projects, but find mediating effect for project legitimacy only in the technology sample. For technology projects, the mediating effect of creativity appears for environmental and social orientation and the mediating effect of third party endorsements for a social orientation; for film/video projects, the mediating effect of creativity appears for social orientation.

In the next section, I develop hypotheses based on a theoretical discussion of a sustainability orientation and its significance in the crowdfunding context. I follow this with description of the research methods used to test these hypotheses, present the results of these tests, and discuss my findings and make recommendations for future research.

### **4.3 Theoretical Development**

Kuckertz and Wagner (2010: 524) describe sustainable entrepreneurs as focused on a double or triple bottom line “by balancing economic health, social equity and environmental resilience through their entrepreneurial behavior.” As defined in the introduction, the sustainability orientation of entrepreneurs also relates closely to the term “social entrepreneur,” where “social entrepreneurship can be loosely defined as the use of entrepreneurial behavior for social ends rather than for profit objectives, or alternatively, that the profits generated are used for the benefit of a specific disadvantaged group” (Hibbert, Hogg, and Quinn, 2005: 159). I do not accept a hard distinction between commercial and social entrepreneurs because sustainability goals are important for some commercial entrepreneurs, as are profitability goals, for a growing number of social entrepreneurs (Wilson and Post, 2013). This approach allows for social entrepreneurs to

adopt commercial (earned-income) strategies and for commercial entrepreneurs to adopt strategies that include a social mission (Maurer, Bansal, and Crossan, 2011; Wilson and Post, 2013).

To address the new institutional role that crowdfunding plays in broader financial, economic, and social ecosystems, this section of the current paper addresses the theoretical question of how adopting a sustainability orientation influences a new venture's chances of crowdfunding success. This context of reward-based crowdfunding raises several theoretical issues. The due diligence conducted by crowdfunders is minimal because available information is limited, many ventures have little history, many entrepreneurs have little experience, and data are typically self-reported. In addition, social capital generally plays a limited role in mitigating any information asymmetries between entrepreneur and investors in crowdfunded projects. With the diffuse and global nature of the "crowd," most backers are geographically and socially distant from the entrepreneurs they support. Thus, considerable uncertainty often surrounds a backer's assessment of a venture's likelihood of success; while a factor in funding success, this assessment may not dominate other factors.

For reward-based crowdfunding, the desirability of both the rewards offered and a venture's mission strongly influence financial contributions from backers. Reward-based funding can be seen as treating backers as customers with benefits, such as early access to products or access to products at better prices (Mollick, 2014). In addition, crowdfunders often donate money (or more money than necessary to receive a reward) because they believe in or share the entrepreneur's goals. When this happens, funding success will be

influenced by the socio-cultural values represented by the “crowd”<sup>1</sup> frequenting a particular crowdfunding platform, as well as their beliefs or assumptions about the causes and solutions to different social needs. Different crowdfunding platforms may have different loose ideologies, depending on the mission of the platform and the values and beliefs of individuals frequenting the platform.

For the above reasons, I anticipate that an entrepreneur’s goals and the ideology, values, and beliefs implied or associated with these goals will influence funding success in the institutional context of reward-based crowdfunding. It would be unfair to say, however, that around the globe or even within a single cultural context, individuals uniformly support the efforts of entrepreneurs possessing a sustainability orientation. The ideology behind the title of Milton Friedman’s well-cited 1970 NY Times article – “The Social Responsibility of Business Is to Increase Its Profits” (Friedman, 1970) – is entrenched in many belief systems about the optimal interplay of business, society, and government. Within and across cultures, I find differing adherence to the belief that free markets and unobstructed capitalism generate powerful incentives that can improve the social welfare of disadvantaged parties. Conversely, belief that top-down decision making, planning, and governmental intervention can solve societal and environmental problems is taken-for-granted by others. While social entrepreneurship may reasonably be viewed as one of many institutional forms (alongside markets, governments, and other institutions) striving toward economic, social, and environmental progress, an

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<sup>1</sup> We intentionally refer to potential crowdfunders as “the crowd” in this paper because they represent a relatively disjointed and unconnected set of individuals associated with any particular crowdfunding platform. It is important to note that they do not necessary share a common set of beliefs or values.

individual's perception of the efficacy and appropriateness of social entrepreneurship as a vehicle for progress often turns on ideology, instead of analysis.

Therefore, the relevant question becomes what is the loose ideology of most crowdfunders. Demographics shed some light. They tend to be young (25-34), male, primarily from North America and Europe, and with considerable earning power (over \$100,000) (*The American Dream Composite Index*, 2012). At Kickstarter, their average age suggests many belong to generation Y and the millennial generation. These generations have indicated preferences for working for employers that are socially or environmentally friendly (Cahill and Sedrak, 2012; Eversole, Venneberg, and Crowder, 2012; Hewlett, Sherbin, and Sumberg, 2009), and they prefer to buy from suppliers of green or socially responsible products (Beaton, 2007). Given the crowd of potential backers associated with Kickstarter, I assert that the loose ideology of crowdfunding will generally support a sustainability orientation, and hypothesize that the overall effect of a sustainability orientation on funding success will be positive.

Before offering a formal hypothesis, I consider two elements of a sustainability orientation: a social orientation and an environmental orientation.<sup>2</sup> Along with economic returns, these correspond to the components of a triple bottom line. In making this distinction, the question arises as to whether these will be a notable preference for one

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<sup>2</sup>While we distinguish between social and environmental orientations in the current paper, one must acknowledge that social and environmental phenomena are interrelated. For example, increasing wealth among the poorest in a community may lead to investments in better sanitation, with environmental effects. Decreasing carbon emissions in heavily polluted communities may enhance the health and family lives of individuals living in poverty. Our focus, however, is how the entrepreneur describes the needs, solutions, and goals of the project, not on unanticipated consequences or results to which the entrepreneur does not attach importance.



type of sustainable orientation over the other? Can one ex ante predict to which aspects of a sustainability orientation a crowd will lend its greater support?

It seems relatively obvious that not all social or environmental problems are viewed as equally legitimate and feasible because of political and social constraints (Austin *et al.*, 2006; Frank *et al.*, 1999; Meyer, 2010; Meyer and Jepperson, 2000; Meyer and Rowan, 1977). For example, the social cause of “fighting poverty” is likely to be viewed as more legitimate than “eliminating prejudices against or stereotypes about having blonde hair.” In addition, both the cause and the proposed solution will influence the support obtained from the crowd. Attempts to reduce urban poverty by encouraging birth control usage in teenagers are more controversial in the U.S. than are job training programs for unemployed youths. Given the breadth of the categories with which I am working, I cannot predict ex ante whether projects with social orientations or those with environmental orientations will command more support from the crowd.

I offer the above discussion to distinguish between the two sustainability orientations, but I do not posit whether a sustainability orientation targeting social goals versus one targeting environmental goals will be preferred by the crowd.<sup>3</sup> I hypothesize that:

***Hypothesis 1a:*** *Projects with a social orientation are more likely to succeed at crowdfunding than are projects with no sustainability orientation, ceteris paribus.*

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<sup>3</sup> Few projects embraced both social and environmental causes, so such projects were assigned to the cause that represented their primary focus.

***Hypothesis 1b:*** *Projects with an environmental orientation are more likely to succeed at crowdfunding than are projects with no sustainability orientation, ceteris paribus.*

Organization theorists, sociologists, and entrepreneurship scholars have all noted the importance of legitimacy for entrepreneurial ventures in general and for entrepreneurial resource acquisition in particular (Dowling and Pfeffer, 1975; Lounsbury and Glynn, 2001; Singh, Tucker, and House, 1986; Stryker, 1994; Zimmerman and Zeitz, 2002; Zott and Huy, 2007).<sup>4</sup> I employ Suchman's (1995: 574) definition of legitimacy as:

... a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions.

Mobilizing resources is a challenge for new ventures because they lack the credibility and proven track record of established ventures (Schoonhoven and Romanelli, 2001; Singh *et al.*, 1986). Building legitimacy during early stages of a venture's formation has been shown to be an important strategy that enables resource acquisition (Aldrich and Fiol, 1994; Lounsbury and Glynn, 2001; Zimmerman and Zeitz, 2002). Research on entrepreneurial action has identified activities that entrepreneurs can engage in to increase legitimacy of their venture – such as creating rules, norms, and values (Zimmerman and Zeitz, 2002), leveraging friendship and obligations (Starr and MacMillan, 1990), and managing impressions through symbolic action (Zott and Huy, 2007) – and to facilitate the acquisition of resources.

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<sup>4</sup> There remains a difference of opinion as to whether legitimacy itself is a resource or whether it is something that is achieved that helps entrepreneurs acquire other resources (Zimmerman and Zeitz, 2002).

Research suggests that a sustainability orientation may increase a venture's legitimacy. Dart (2004) argues that the legitimacy of social enterprises is enhanced by their mix of social and commercial strategies because they draw upon ideological values of creating collective social goods combined with neo-conservative, pro-business, and pro-market values. The unique hybrid form of social enterprise is limited primarily to organizations that pursue multiple bottoms lines (as studied in the current paper), and while innovative and potentially upsetting to the status quo, they appear to appeal broadly to individuals holding a wide range of ideologies.

Because potential funders receive only limited and often self-reported information on many crowdfunding platforms from entrepreneurs and because nascent entrepreneurs often lack the social capital that potential funders would value, the legitimacy of third party endorsers also serves to mitigate information asymmetry between the entrepreneur and the funder. Because legitimacy is conferred status, it is often controlled by those outside the organization (Pfeffer and Salancik, 1978). I use legitimacy to mean that the organization has its actions endorsed by external actors (Deephouse and Suchman, 2008, 2008; Doh *et al.*, 2010). Third-party endorsements may serve as important signals of the viability of projects, and reduce the uncertainty surrounding a backer's assessment of a venture's likelihood of success (Freeman, Carroll, and Hannan, 1983; Singh *et al.*, 1986; Stinchcombe, 1965; Suchman, 1995).

Therefore, I expect that a sustainability orientation will increase the legitimacy of a new venture in the form of endorsements, and these endorsements will serve as a signal of project quality, increasing the likelihood of funding success. This legitimacy argument theoretically implies a mediation model: a sustainability orientation will increase the

legitimacy of a new venture, which will increase the ability to acquire resources. I expect that the model will be partially mediated. Hypotheses 1a and 1b suggest a direct effect of sustainability orientation on funding success and this direct effect should remain when the mediating variables are incorporated into the analysis. Therefore:

***Hypothesis 2:***            *The positive effect of a sustainability orientation (environmental or social) on funding success will be partially mediated by the project's perceived legitimacy (endorsements).*

As noted earlier, Kickstarter's stated mission is to bring creative projects to life, and it has been persuasively argued that creativity lies at the heart of the theory of entrepreneurship (Gilad, 1984). By creativity, I refer to the development of products or processes that are both novel and useful (Hennessey and Amabile, 2010). Something (product, service, process) is judged to be novel when no one is aware of it; it is judged to be useful when it has some social value (Finke *et al.*, 1996). Projects that are more creative will be in closer alignment with Kickstarter's mission and with the expectations of potential funders, and I expect, will be more successful at raising funds.

Evidence suggests that adopting a sustainability orientation may stimulate creativity (Gonin *et al.*, 2013; Grant and Berry, 2011; Hahn *et al.*, 2014; Lefebvre and Lefebvre, 2012). Hahn *et al.* (2014) argue that a sustainability orientation forces managers to confront the tensions that exist between complex economic, social, and environmental considerations, and that confronting these tensions leads to more creativity.

They describe these elements of the double bottom line as frames or lenses that differ in their structures, contents, goals, and logics. Being forced to confront contradictions or paradoxes across these different frames may promote creative insights that allow managers to recognize and accept contradictions simultaneously. This will result in cognitive processes that generate more recombinations of information in memory that should lead to the discovery of more useful and novel products.

Therefore, I hypothesize that entrepreneurs adopting a sustainability orientation will be more likely to discover creative products/services and, consequently, attract more funding.

***Hypothesis 3:** The positive effect of a sustainability orientation (environmental or social) on funding success will be partially mediated by product/service creativity.*

In conclusion, I hypothesize that a sustainability orientation will increase the likelihood that a project will successfully raise capital on a crowdfunding platform. I anticipate finding that the positive effect of a social/environmental orientation on funding success will be partially mediated by third-party endorsements and product/service creativity.

The next section describes the research design that I used to test my hypotheses.

#### **4.4 Methodology**

The data for this study were collected from the Kickstarter website using a web crawling algorithm programmed in Python, a general purpose, high-level programming language.

The algorithm was designed to collect all projects posted on Kickstarter from its inception in April 2009 to July 2013. Automating the data collection made possible the retroactive collection of information on failed projects (those that have not reached their funding goal). A total of 87,261 projects were collected from Kickstarter for this roughly four-year period. Although Kickstarter has several project categories (art, comics, dance, design, fashion, film and video, food, games, music, photography, publishing, technology and theater), I focused on taking a random sample of technology projects and film and video projects. I sampled technology projects because Kickstarter treats technology projects somewhat differently in its requirements. Because technology projects are expected to deliver concrete rewards to funders (i.e., products or services), Kickstarter mandates the inclusion of a manufacturing plan and a delivery date for rewards (Mollick, 2014). Given this requirement, technology projects are more likely to evolve into commercial ventures than are projects from other categories. To increase the generalizability of my findings, I also sampled projects from the film and video category. Film and Video represents a large and, much like technology, a prominent category. These projects represent 26% of all Kickstarter projects and have generated influential videography/film.<sup>5</sup>

Given the anonymity, large number, and diversity of potential funders associated with most crowdfunding platforms like Kickstarter, I relied upon the public information provided on a funding campaign's website as indicative of the information potential funders used to make their funding decisions. I assumed an objectivist perspective where

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<sup>5</sup> The following films have received backing through Kickstarter and have been nominated for (or won) the Academy Award: "Finding Vivian Maier", "The Square", "Inocente", "Kings Point", "Buzkashi Boys", "Incident in New Baghdad", "The Barber of Birmingham", "Sun Come Up."

the perceptions of potential funders as to a project's sustainability orientation, its legitimacy, and its creativity were the same as the perceptions of the data coders employed in this study. This is consistent with other empirical research on crowdfunding (Mollick, 2014).

Since the magnitude of funding goals varies widely across Kickstarter projects, factors that affect the achievement of small versus large goals may differ (Mollick, 2014). To address this possibility, I limited the population of projects to those with a funding goal greater than or equal to \$5,000. At or above this funding level, crowdfunding is more likely to compete with funding through more established or traditional sources of capital for early stage ventures, such as angel investors and financial institutions. This reduced my population size to a total of 15,075 projects (1,476 technology projects and 13,599 film/video projects). I then randomly selected 450 projects from the technology category and 350 from the film and video category. After accounting for missing data and outliers, the final dataset consisted of 392 projects from the technology category and 315 from the film and video category. Two-tailed t-tests indicate that sampled projects do not differ significantly from the population based on funding goal ( $p = 0.30$  for technology projects;  $p = 0.83$  for film/video projects), pledge amount ( $p = 0.68$ ;  $p = 0.78$ ), duration ( $p = 0.82$ ;  $p = 0.61$ ), number of backers ( $p = 0.99$ ;  $p = 0.93$ ), number of words in project description ( $p = 0.98$ ;  $p = 0.97$ ), success rate ( $p = 0.64$ ;  $p = 0.88$ ), pledge amount ( $p = 0.83$ ;  $p = 0.77$ ), or number of reward levels ( $p = 0.75$ ;  $p = 0.66$ ). I emphasize that, as suggested for any research on nascent ventures in the field of entrepreneurship and especially social entrepreneurship (Gras, Moss, and Lumpkin, 2014), my sample was not biased against failed efforts.

The next section describes the operationalization of constructs.

#### **4.4.1 Dependent Variables**

Kickstarter releases funding to entrepreneurs on an all-or-nothing basis. If a project creator does not reach her funding goal by the deadline that she has chosen, all money is returned to backers and she gets nothing. Should she exceed her goal, she keeps all of the money pledged. Kickstarter projects are not limited in the amount of capital they can raise above their funding goal. To operationalize funding success, I created two variables: 1) *goal attainment*, which is a dichotomous variable that indicates whether a project reached or exceeded its funding goal (1=goal attained; 0=goal not attained), and 2) *log of pledge amount*, which is a continuous variable equal to the log of total amount of capital raised. Due to a high degree of skewness, I take the log of the variable pledge amount. If the distribution of a variable has a positive skew, a natural transformation of the variable makes the variable more normal (Manning and Mullahy, 2001).

#### **4.4.2 Independent Variables**

The independent variables in this study are sustainability orientation (social and environmental), endorsements by third parties, and project creativity. After collecting all the information from each project's Kickstarter campaign page, I tasked nine independent coders/judges with coding the projects on their sustainability orientation and creativity. Three coders judged the sustainability orientation of all projects; three judges rated the technology projects on creativity and two control variables (technical goodness and project complexity); three judges rated the film and video projects on creativity and two control variable (aesthetic appeal and project complexity).



#### 4.4.2.1 Operationalizing Sustainability Orientation

I operationalized the social sustainability orientation (S.O.-Social) construct and the environmental sustainability orientation (S.O.-Environmental) construct with dichotomous variables representing whether or not a project indicated primarily social or environmental objectives. My selecting of these two categories is informed by Shepherd and Patzelt's (2011) research that suggests the goal of sustainable entrepreneurship is to sustain nature, life support systems (i.e., environmental) and community (i.e., social). The separation of sustainability into environmental and social causes is also concomitant with efforts to characterize and measure sustainable development. The Wellbeing Index, sponsored by the World Conservation Union and published in "*The Wellbeing of Nations: A Country-by-Country Index of Quality of Life and the Environment*" (Prescott-Allan, 2001), aggregates into two subindices: human wellbeing and ecosystem wellbeing. The ecosystem wellbeing index is a composite of indices for land, water, air, species and genes, and resource use. The human wellbeing index is a composite of indices for health and population, wealth, knowledge and culture, community, and equity.

Three coders were recruited from the undergraduate program at the authors' university. (In general, many of the coders' demographic characteristics were similar to those in the crowdfunding community, with the exception of income.) Coders did not communicate with each other, and the authors met with each to explain the constructs and answer any questions. I provided the coders with definitions for each construct and a list of keywords likely to be associated with each construct. Coding instructions followed examples of sustainability orientations in Parris and Katers (2003) and Shepherd and Patzelt (2011). Appendix B provides examples of instructions provided to the coders.

Ten practice projects outside of the sample were chosen by the authors to illustrate each sustainability construct to coders. Each coder was instructed to read the project descriptions, review project videos, and code each project with a 1 or 0 for both social orientation and environmental orientations. After completing the coding of these ten projects, each coder met with the authors to discuss any ambiguities. (Note that the coders' evaluations of these ten projects perfectly matched that of the authors.) Coders completed their work within four weeks and approximately 40 hours of work per coder.

I calculated Cronbach's alpha across the three coders to measure inter-rater reliability (Krippendorff, 1980). The Cronbach's alpha for *environmental orientation* was 0.81, and for *social orientation* was 0.71. These statistics fall above an acceptability cutoff of 0.70 found in the entrepreneurship literature (Davidsson, 2006). In instances of disagreement among the coders, the majority rating was used (i.e. two out of three).

A small number of projects represented some aspects of both a social and environmental orientation (8 technology projects and 3 film and video projects). Based on the primary goal of the projects, these cases were classified as having either an environmental or social orientation. One such case from my sample is a technology project called "Balloon Mapping Kits" created by Mathew Lippincott. Balloon Mapping Kits use balloons to take aerial photographs and a browser application "MapKnitter" to stitch the photographs together into an aerial map. Balloon mapping was developed with a particular interest "in applying this [technology] to civic and environmental issues"<sup>6</sup>, indicating the potential to solve both social and environmental ills. However, while balloon mapping has recently been used to further social issues, such as for protest

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<sup>6</sup> <https://publiclab.org/wiki/balloon-mapping>

mapping, aerial mapping is more commonly used to take high-resolution images of environmental issues<sup>7</sup>, such as oil spills, deforestation, landfill incineration, and wetland conservation<sup>viii</sup>. Because the primary use of this particular technology is resolution of environmental issues, I code this project as having an environmental orientation. Reviews of other projects coded as having both an environmental and social orientation indicate these projects are primarily either socially or environmentally oriented, I therefore code these projects according to their primary sustainability orientation.

The transparency of Kickstarter projects ensures a high degree of content validity allowing us to tease apart a project's sustainability orientation from its sustainability message. High content validity demands a category be described with enough detail to allow coders to judge the category accurately (Trochim and Donnelly, 2006). Because every project on Kickstarter is a new creation, creators must describe in detail what their project does and what makes it new ("Kickstarter is not a store" (Strickler, Chen, and Adler, 2012)). Creators are asked "to share with backers exactly what's been done so far, show how the product currently works, and explain how it will be completed" (Strickler *et al.*, 2012). Project descriptions provide sufficient detail to allow for the separation of projects with a sustainability orientation from those that claim to do no harm to people or no damage to the environment.

#### **4.4.2.2 Operationalizing Creativity**

To test for the mediating effects of *creativity*, I relied on ratings of expert judges (Amabile, 1996). The three judges that coded the creativity of technology projects were

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<sup>7</sup> Based on my review of the 326 publically available aerial maps, less than 5% of the maps unambiguously address social issues.

recruited from doctoral programs in computer science and electrical engineering in the authors' university. The three judges that rated the film and video projects were recruited from the industrial design department at the authors' university. The judges were not preselected on any dimensions other than their expertise in the area in question. One of the most widely accepted instruments for measuring creativity is the consensual assessment technique (CAT), developed by Amabile (1983, 1996). The CAT is especially appropriate for the rating of product creativity because it has generated reliable and valid results in hundreds of studies of creative products, including ideas for computer programs (Conti and Amabile, 1995), ideas for high-tech products (Amabile, 1996), and business solutions (Conti, 1992).

I assume that expert judgments will to some reasonable extent mirror those of the crowd. There are two possibilities when this assumption may be wrong. First, because judges are highly knowledgeable, they have higher standards than the crowd; second, the crowd cannot distinguish between good projects from bad ones. Both of these cases are true for all judged variables (technical goodness, creativity, aesthetic appeal, etc.). Next, I address why these possibilities are unlikely.

Addressing the assumption of high judge standards. As is mentioned in the following paragraphs, the judges were instructed not to rank the projects against some absolute standard but to rank projects against one another. Thus, the highest standard is not one held by the judges themselves, but one set by the Kickstarter.com creator community and observable by the crowd. Addressing the assumption about crowd knowledge about project "quality". Backers face a high opportunity cost of making an uninformed purchase decision. As such, backers presumably don't randomly select

rewards to purchase, but make informed decision (a stage of exploration and inquiry (Simon, 1965)) before parting with their money. Furthermore, according to theories of information asymmetry, if quality of the projects and products were unknowable to backers it would pose a problem for the theory of markets (Akerlof, 1970). (Quality in this instance subsumes the creativity, aesthetic appeal, and technical goodness of products, as well as other qualities desirable by backers.) In other words, if backers are uninformed or uncertain about the quality of a product, they are unlikely to engage in trade or funding for rewards. As a result, before purchasing a reward, the crowd must themselves be knowledgeable about the product, and thus, at least partially, mirror the judgment of an expert.

Each judge made his or her assessments independently and was blind to the hypotheses of the study and to the projects' ratings on social and environmental sustainability orientations. The reliability of the consensual assessment technique relies on the assumption that experts in a domain can recognize creativity when they see it. If they can reliably agree with one another that a product (or service) is creative, we must accept it as such (Amabile, 1996). The integrity of the assessment depends on the judges not being trained by the experimenters; thus the judges in this study were asked to use their own subjective criteria to evaluate whether a product was creative or not. (Appendix B presents the judging instructions for the creativity variables.) The same procedure was followed for technical goodness, aesthetic appeal, and technical complexity of projects, variables that were used as controls (Amabile, 1996). Technical goodness was a control unique to technology projects and aesthetic appeal a control unique to the film and video category. Judges were instructed to rate each product relative to other products in the

sample on the dimension in question, not against some absolute standard. To accomplish this, each judge was asked to first read 20 randomly assigned projects, before beginning to assign ratings. Finally, to control for methodological artifacts, each judge rated projects in a different random order and considered the various dimensions in a different random order. Judges completed the rating during five consecutive day sessions (between 43 and 45 hours per judge). Coding instructions follow those outlined by Amabile (1996).

The goal of this coding scheme was to discriminate across projects with regard to the judges' attitudes about the creativity, technical goodness, aesthetic appeal and complexity of projects. Most CAT studies employ successive ratings of stimuli, rather than asking judges to evaluate pairs of projects. This offers a practical advantage because absolute responses are much easier and faster to obtain than are paired comparisons (Bock and Jones, 1968). In addition, following previous research, we averaged judges' ratings to obtain my final project scores for creativity, technical goodness, and complexity.

As before and as implied by the consensual assessment technique, a critical criterion is that the ratings are reliable, and with this method, the reliability of judges' ratings is equivalent to construct validity. Interjudge reliabilities for creativity ( $\alpha = 0.68$ ), technical goodness ( $\alpha = 0.65$ ), aesthetic appeal ( $\alpha = 0.66$ ) and complexity ( $\alpha = 0.66$ ) are acceptable and comparable to values in other studies of creativity (for examples, see Amabile, 1983, 1996).

#### 4.4.2.3 Operationalizing Third Party Endorsements

With the text from each project's Kickstarter page, the construct *endorsements* was operationalized with a count of independent third-parties that had endorsed a project. Technology projects may be endorsed by tech media websites or blogs, such as CNET, PcMag, Wired, or Gizmodo. Film and video projects were similarly endorsed by newspapers, websites, or blogs, such as Huffington Post, TimeOut Chicago, Culture Vulture, WindyCityTimes. I acknowledge that, in addition to reflecting project quality, endorsements may increase exposure of the project to a larger audience.

#### 4.4.3 Control Variables

Fifteen control variables were included in my analysis of the technology subsample, and fourteen were included in my analyses of the film and video subsample. Two controls – whether a project had progressed beyond a prototype and whether a project was rated as technically good – were used only for projects in the technology sample. Creation of a prototype reflected the project's feasibility and reduced uncertainty about the delivery of rewards, and was coded as 1 if a prototype existed, and 0 otherwise. Technical goodness was used to control for the degree to which the technology was technically sophisticated, and was coded as described above in the discussion of the creativity variable. One control - whether a project was rated as aesthetically pleasing – was used only for projects in the film and video category. Aesthetic appeal reflected the extent to which the project, or a trailer or teaser of the video, was aesthetically appealing to coders.

The following thirteen controls were included in The analyses for both samples and reflect commonly used controls of creator and project level heterogeneity in other

crowdfunding studies (Cholakova and Clarysse, 2015; Mollick, 2014): project complexity, whether the project was created by a team or a single individual, the number of projects launched by the creator, the number of Facebook friends, age in days of Kickstarter at project launch, number of projects previously backed by project creator, project quality, funding goal, duration of funding period, and number of reward levels. The control variable *complexity* was described as part of the methodology for the coding creativity (see also Appendix A). *Duration of funding period* was measured by the number of days between the day the project was posted on Kickstarter and the day funding ended or the project was taken down from the Kickstarter website.

To control for project *quality* I adopted the approach of Mollick (2014) and Chen, Yao, and Kotha (2009), which focuses on preparedness. Quality/preparedness was measured by the effort reflected in a project's campaign pages. Three different measures were averaged to create a composite measure of the campaign quality; these were the count of images posted, count of videos posted, and the length in words of the project description. Because these variables were highly skewed, each of these measures was first logged. Although all campaigns typically include at least one image and most include one video, considerable variation exists across projects. Some particularly complex or innovative projects include a long description and multiple schematics (measured as images) to describe the technology.

Previous crowdfunding studies have found that *funding goal* has a significant impact on funding success (Mollick, 2014). Intuitively, projects with smaller funding goals are more likely to reach this goal. I logged the size of each project's funding goal to control for level of funding sought by the project creator.



Many crowdfunders will back a Kickstarter project because of the rewards offered to backers. A project with a large number of possible reward offers backers more choice. By catering to a broader potential audience or a broader set of needs or wants of an audience, a project with many reward possibilities is likely to raise more funding capital and have a greater chance at success. A log of the count of *number of reward levels* was incorporated into the analysis to control for this effect.

I use three variables to control for creator heterogeneity. These are number of projects backed, whether the creator is a team or a single individual, and the number of projects he or she created on Kickstarter. On Kickstarter, one can observe the extent to which the creator of a project has previously backed others' projects (Cholakova and Clarysse, 2015). I measured the *log of the number of projects backed* to control for the creator's involvement with the Kickstarter community and experience using the Kickstarter platform. I also use *projects created* to measure a creator's experience with developing Kickstarter projects. Because a team of people can more successfully pool cognitive resources for creativity (Taylor and Greve, 2006), leverage social ties for venture performance (Vissa and Chacar, 2009), and is more likely to survive and achieve faster growth than are ventures started by individuals (Cooper and Bruno, 1977; Eisenhardt and Schoonhoven, 1990), I measure whether the project was created by a team or a single individual using a dichotomous variable *team*.

Entrepreneurial studies in general (Hsu, 2007) and crowdfunding studies specifically (Agrawal, Catalini, and Goldfarb, 2013; Mollick, 2014) have noted the importance of social networks to venture success. To control for social network effects, I collect Facebook connections of project creators. Because not all creators link their

Facebook account to Kickstarter, a non-zero amount of Facebook friends is available for slightly under half of my observations (46%). As note by Mollick (2014), the decision to not link Facebook to Kickstarter may be strategic, as having no Facebook account is better than a linked account with few online connections. Therefore, I follow Mollick's example and include no Facebook connection as the base case, and compare it to accounts where individuals had a number of friends in the bottom quartile, 25-50<sup>th</sup> percentile, 50-75<sup>th</sup> percentile, and top quartile.

Finally, because my data span about a four-year period, I control for time period effects by including the age of Kickstarter (calculated in days since its inception in April 2009) at the time of a project's initiation. Participation (both by funders and entrepreneurs) in Kickstarter and crowdfunding in general has increased significantly over time, and I control for this having a possible effect on project success.

Table 4-1 shows descriptive statistics for both samples. The next section presents the results of my analysis of the effects of a sustainability orientation on funding success.

Table 4-1 Summary Statistics

Variable	Technology Projects				Film and Video Projects			
	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
1. Goal Attainment	0.30	0.46	0	1	0.39	0.49	0	1
2. Log of Pledge Amount	8.02	2.04	3.04	11.94	7.62	1.99	2.77	11.82
3. S.O. – Environmental	0.05	0.21	0	1	0.05	0.22	0	1
4. S.O. – Social	0.20	0.40	0	1	0.12	0.33	0	1
5. Creativity	2.79	1.15	0	5	3.76	0.75	0	5
6. Count of Endorsements	0.17	0.82	0	5	0.04	0.31	0	5
7. Prototype Available	0.50	0.50	0	1	-	-	-	-
8. Technical Goodness	2.69	1.14	0	5	-	-	-	-
9. Aesthetic Appeal	-	-	-	-	3.71	1.01	0	5
10. Complexity	2.64	1.00	0	5	3.47	0.64	0	5
11. Team	0.38	0.49	0	1	0.37	1.01	0	1
12. Projects Created	1.36	0.86	1	7	1.37	0.86	1	9
13. Facebook Friends	255.55	555.12	0	1555	528.46	896.07	0	5000
14. Kickstarter.com Age (days)	1170	275	198	1555	1026.89	286.51	145	1541
15. Log of Projects Backed	1.12	1.12	0	4.19	1.08	1.04	0	4.22
16. Quality	8.33	1.38	5.76	11.04	7.37	1.16	5.76	10.83
17. Log of Funding Goal	9.89	1.02	8.52	13.46	9.50	0.94	8.52	12.77
18. Duration of Funding Period	38.02	12.90	10	90	40.48	17.07	10	90
19. Log of Count of Reward Levels	1.84	0.82	0	3.14	2.22	0.37	0.69	2.71
n			392				315	

Note: S.O.: Sustainability Orientation

#### 4.5 Analysis of Direct and Indirect Effects

Figure 4-1 depicts the hypothesized relationship between a sustainability orientation and funding success. In this figure, path  $c$  represents the direct relationship between a sustainability orientation (social or environmental) and funding success. Should path  $c$  not be statistically significant, I would have no evidence for a relationship (direct or otherwise) between a sustainability orientation and funding success. Paths  $a_1$  and  $a_2$  represent the effects of a sustainability orientation on endorsements and creativity, respectively, while paths  $b_1$  and  $b_2$  represent the effects of endorsements and creativity, respectively, on funding success. To support the existence of the hypothesized mediated relationships between a sustainability orientation and funding success, paths  $a_1$  and  $b_1$

(H2: third-party endorsements as mediator) and paths  $a_2$  and  $b_2$  (H3: creativity as mediator) should be significant.

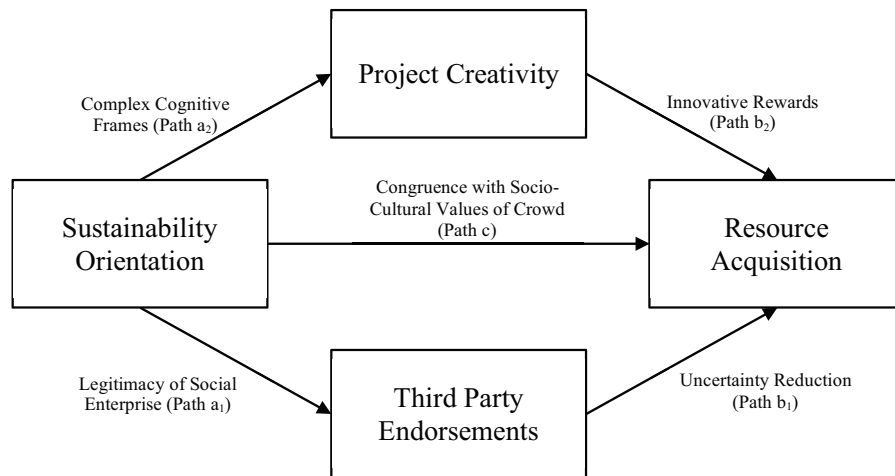


Figure 4-1 Mediating Model and Theory Map of Sustainability Orientation on Resource Acquisition

To test for mediation, we use a two-step approach. The first step begins with a logistic regression analysis (for the dichotomous variable, goal attainment) or OLS regression analysis (for the continuous variable, pledge amount) to estimate coefficients on the independent variables to the dependent variables (the direct path; columns 2 and 5 in Table 4-3a/4-3b). Note that I used logistic regression for the dichotomous dependent variable because this analysis is a special case of generalized linear models with a conditional Bernoulli distribution and thus analogous to linear regression. I also estimated the coefficients on the independent variables to the mediator variables (indirect path; Table 4-3 columns 2, 4, 6, 8), and the coefficients on the independent and mediator variables to the dependent variables (columns 3 and 6 in Table 4-3a/4-3b). Based upon a general decomposition method developed by Karlson and Holm (2011), the second step

compares the estimated coefficients of two nested nonlinear probability models (Kohler, Karlson, Holm, 2011). This method estimates the degree to which a variable mediates or explains the relationship between an independent and dependent variable. (Note that this method is available in STATA with the *khb* command.)

#### 4.6 Results

Table II presents correlation results for the two samples (Table 4-2 and 4-3). Similar to previous studies of Kickstarter crowdfunding projects (Mollick, 2014), I find a negative correlation between funding goal and funding success and a positive relationship between the number of reward levels and funding success and a positive relationship between funding success and Facebook friends of founders. Also, similar to existing creativity research (for examples, see Amabile, 1996), I find positive correlations between creativity and technical complexity and, in the technology sample, between creativity and technical goodness.

Tables 4-4 and 4-5 presents the results of the OLS regression analysis for technology (Table 4-4) and film/video (Table 4-5) categories. Equations 1 and 4 in Tables 4-4 and 4-5 show the estimated effects of the control variables on goal attainment and pledge amount, respectively. Equations 2 and 5 include the estimated effects of the sustainability orientations on the dependent variables, and the mediator variables of creativity and third party endorsements are added in equations 3 and 6. The introduction of the mediator variables reduced the estimated effect size and the statistical significance of the sustainability predictors, indicating a mediation effect.

Table 4-2 Cross-correlations for Sample of Technology Projects

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1 Goal Attainment	1.00																
2 Log of Pledge Amount	0.66***	1.00															
3 S.O. – Environmental	0.12**	0.08	1.00														
4 S.O. – Social	0.12**	0.03	-0.11**	1.00													
5 Creativity	0.19***	0.34***	0.07	-0.04	1.00												
6 Count of Endorsements	0.14***	0.20***	0.04	0.04	0.04	1.00											
7 Prototype Available	0.15***	0.17***	0.05	-0.09*	-0.06	0.06	1.00										
8 Technical Goodness	0.15***	0.34***	0.05	-0.20***	0.54***	0.02	0.04	1.00									
9 Complexity	0.11**	0.27***	0.04	-0.10*	0.54***	0.02	-0.02	0.73***	1.00								
10 Team	0.13**	0.22***	0.00	0.06	0.09*	-0.01	0.06	0.14***	0.14***	1.00							
11 Projects Created	-0.02	0.02	0.02	-0.01	0.12**	-0.05	-0.07	0.03	-0.01	0.00	1.00						
12 Facebook Friends	0.13**	0.08	0.06	0.16***	-0.06	0.09*	-0.06	-0.04	0.02	0.01	0.00	1.00					
13 Kickstarter.com Age (days)	-0.02	-0.02	0.00	0.11**	0.02	0.00	-0.06	-0.03	0.01	0.00	-0.10**	0.06	1.00				
14 Log of Projects Backed	0.14***	0.25***	-0.03	0.03	0.16***	-0.03	-0.20***	0.15***	0.11**	-0.03	0.25***	0.10	0.06	1.00			
15 Quality	0.15***	0.43***	-0.02	-0.10*	0.23***	0.15***	0.26***	0.26***	0.17***	0.09*	0.05	-0.06	-0.14***	0.08	1.00		
16 Log of Funding Goal	-0.23***	0.21***	-0.07	-0.08	0.19***	0.11**	-0.04	0.20***	0.22***	0.07	-0.10*	0.00	-0.03	0.02	0.30***	1.00	
17 Duration of Funding Period	0.00	-0.07	0.04	0.01	-0.05	0.02	-0.04	-0.03	-0.03	-0.03	-0.09*	-0.04	-0.05	-0.09*	-0.08	-0.01	1.00
18 Log of Count of Reward Levels	0.27***	0.25***	-0.07	0.14***	-0.08	0.09*	0.00	-0.05	-0.06	-0.05	0.02	0.09	0.02	0.11**	-0.04	-0.08	0.00

Note: S.O.: Sustainability Orientation; \*\*\* p<0.01, \*\* p<0.05, \* p<0.10; n = 392

Table 4-3 Cross-correlations for Sample of Film and Video Projects

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 Goal Attainment	1.00															
2 Log of Pledge Amount	0.69***	1.00														
3 S.O. – Environmental	-0.04	-0.04	1.00													
4 S.O. – Social	0.14***	0.19**	-0.08	1.00												
5 Creativity	0.29***	0.33**	0.13**	0.18***	1.00											
6 Count of Endorsements	0.04	0.04	0.02	-0.01	-0.03	1.00										
7 Aesthetic Appeal	0.31***	0.33***	0.17***	-0.03	0.51***	-0.06	1.00									
8 Complexity	0.26***	0.29***	0.12*	0.19***	0.44***	-0.05	0.45***	1.00								
9 Team	0.06	0.07	0.06	0.05	0.16***	-0.02	0.02	0.05	1.00							
10 Projects Created	-0.05	-0.10*	-0.08	-0.07	-0.08	0.14**	-0.05	0.02	0.03	1.00						
11 Facebook Friends	0.01	0.04	-0.05	-0.09*	0.07	-0.05	0.09	0.03	-0.08	0.16***	1.00					
12 Kickstarter.com Age (days)	-0.02	0.07	0.02	-0.05	0.09	0.11**	0.18***	0.14**	-0.07	0.00	0.09	1.00				
13 Log of Projects Backed	0.35***	0.42***	0.03	0.07	0.18***	0.06	0.17***	0.12**	-0.07	0.10*	0.10*	0.02	1.00			
14 Quality	0.12**	0.28***	0.10*	0.09*	0.20***	0.00	0.21***	0.25***	-0.02	-0.06	0.07	0.39***	0.23***	1.00		
15 Log of Funding Goal	-0.25***	-0.04	0.10*	-0.01	0.04	-0.03	0.03	0.06	0.02	-0.03	0.05	0.17***	-0.04	0.18***	1.00	
16 Duration of Funding Period	-0.07	-0.10*	-0.05	0.11*	-0.03	-0.05	-0.08	-0.02	0.01	-0.06	-0.12**	-0.48***	-0.07	-0.18***	0.07	1.00
17 Log of Count of Reward Levels	0.12**	0.22***	-0.03	0.09*	0.12**	-0.04	0.15***	0.07	-0.06	0.00	0.01	0.04	0.18***	0.28***	0.09*	-0.07

Note: S.O.: Sustainability Orientation; \*\*\* p<0.01, \*\* p<0.05, \* p<0.10; n = 315

Table 4-4 Results of the effect of sustainability orientation (independent variables) on attainment of funding goal and pledge amount (dependent variables)

Predicted Variables: Path: Equation:	Technology Projects					
	Goal Attainment (c)		Goal Attainment (b <sub>1</sub> & b <sub>2</sub> )	Log of Pledge Amount (c)		Log of Pledge Amount (b <sub>1</sub> & b <sub>2</sub> )
	(1)	(2)	(3)	(4)	(5)	(6)
<u>Predictor Variables</u>						
S.O. – Environmental		1.80***	1.64***		0.99***	0.83***
S.O. – Social		0.71**	0.61**		0.33*	0.24
Creativity			0.55***			0.34***
Count of Endorsements			0.33**			0.25***
<u>Control Variables</u>						
Prototype Available	0.74**	0.72**	0.81***	0.48***	0.48***	0.53***
Technical Goodness	0.34*	0.41**	0.27	0.32***	0.34***	0.24**
Complexity	0.10	0.05	-0.14	0.08	0.07	-0.04
Team	0.83***	0.85***	0.91***	0.69***	0.67***	0.70***
Projects Created	-0.37**	-0.39**	-0.45**	-0.08	-0.09	-0.12
FBF lower 25%	0.27	0.30	0.32	0.02	0.02	0.06
FBF 25%-50%	0.58	0.45	0.34	0.19	0.13	0.07
FBF 50%-75%	0.45	0.47	0.43	0.41	0.41	0.40
FBF top 25%	2.44***	2.23*	2.24***	0.87*	0.72	0.76
Kickstarter.com Age (days)	0.00	0.00	0.00	0.00	0.00	0.00
Log of Projects Backed	0.36***	0.37***	0.37***	0.35***	0.35***	0.34***
Quality	0.42***	0.44***	0.37***	0.47**	0.47***	0.41***
Log of Funding Goal	-1.15***	-1.11***	-1.20***	0.15*	0.17*	0.14
Duration of Funding Period	0.01	0.00	0.00	0.00	0.00	0.00
Log of Count of Reward Levels	1.16***	1.23***	1.26***	0.65***	0.65***	0.65***
Constant	2.34	1.63	2.51	-0.50	-0.73	-0.21
Adj. R-squared	0.28	0.30	0.33	0.40	0.41	0.44
p-value	0.00	0.00	0.00	0.00	0.00	0.00
Observations	392	392	392	392	392	392

\*\*\* p<0.01, \*\* p<0.05, \* p<0.10; one-tailed *t*-tests for hypothesized effects, two-tailed for control variables.



Table 4-5 Results of the effect of sustainability orientation (independent variables) on attainment of funding goal and pledge amount (dependent variables)

Predicted Variables: Path: Equation:	Film and Video Projects					
	Goal Attainment (c)		Goal Attainment (b <sub>1</sub> & b <sub>2</sub> )	Log of Pledge Amount (c)		Log of Pledge Amount (b <sub>1</sub> & b <sub>2</sub> )
	(1)	(2)	(3)	(4)	(5)	(6)
<u>Predictor Variables</u>						
S.O. – Environmental		-0.93	-1.05		-1.09	-1.16
S.O. – Social		0.76*	0.60		0.66**	0.56**
Creativity			0.40*			0.27**
Count of Endorsements			0.52*			0.39**
<u>Control Variables</u>						
Aesthetic Appeal	0.56***	0.65***	0.57***	0.32***	0.40***	0.33***
Complexity	0.93***	0.81***	0.76***	0.50***	0.42**	0.37*
Team	0.64**	0.62**	0.57*	0.50**	0.51***	0.45**
Projects Created	-0.29	-0.28	-0.29	-0.28	-0.28	-0.29
FBF lower 25%	-0.03	-0.09	-0.06	-0.53	-0.55*	-0.52
FBF 25%-50%	0.20	0.07	0.16	-0.10	-0.21	-0.16
FBF 50%-75%	0.26	0.23	0.19	-0.02	-0.04	-0.07
FBF top 25%	0.19	0.19	0.24	-0.26	-0.25	-0.24
Kickstarter.com Age (days)	0.00	0.00	0.00	0.00	0.00	0.00
Log of Projects Backed	0.79***	0.79***	0.78***	0.66***	0.65***	0.63***
Quality	0.03	0.05	0.05	0.19**	0.20**	0.20**
Log of Funding Goal	-1.04***	-1.04***	-1.03***	-0.17	-0.14	-0.14
Duration of Funding Period	-0.01	-0.01	-0.02	-0.01	-0.01	-0.01
Log of Count of Reward Levels	0.82*	0.68	0.66	0.45	0.33	0.32
Constant	2.39	2.80	1.94	4.03***	4.11***	3.66***
Adj. R-squared	0.28	0.29	0.30	0.35	0.38	0.39
p-value	0.00	0.00	0.00	0.00	0.00	0.00
Observations	315	315	315	315	315	315

\*\*\* p<0.01, \*\* p<0.05, \* p<0.10; one-tailed *t*-tests for hypothesized effects, two-tailed for control variables.

Equations 2 and 5 in Table 4-4 and 4-5 describe the effects of a sustainability orientation on funding success without incorporating the mediating variables. The effects of social and environmental sustainability orientations on the funding success of technology projects are estimated to be positive and statistically significant (*support H1a and H1b*). Within the film and video category, only the social sustainability orientation is estimated to positively influence funding success (*support H1a, reject H1b*).

Next Table 4-6 presents estimates of whether the sustainability orientations have an effect on the mediating variables. I estimate partial support of a sustainability orientation on third party endorsements (*partial support H2*). Hypothesis two is only supported for technology projects and only the effect of an environmental orientation is mediated.

In both samples, my results indicate that a social sustainability orientation has positive effects on project creativity. In the technology sample, an environmental and social sustainability orientation has a positive effect on project creativity (*support H3*). I also tested the significance of this indirect effect using the Kohler et al. (2011) method to test for mediation as previously described. For technology projects, creativity mediated the relationship between environmental orientation and goal attainment and the relationship between environmental orientation and pledge amount. 9.26% of the total effect of an environmental sustainability orientation on goal attainment is mediated by project creativity; 11.90% of the total effect of an environmental sustainability orientation on pledge amount is mediated by project creativity. Third party endorsements partially mediated the effect of an environmental orientation on goal attainment and pledge

Table 4-6 Results of the effect of sustainability orientation (independent variables) on creativity and third party endorsements (mediator variables)

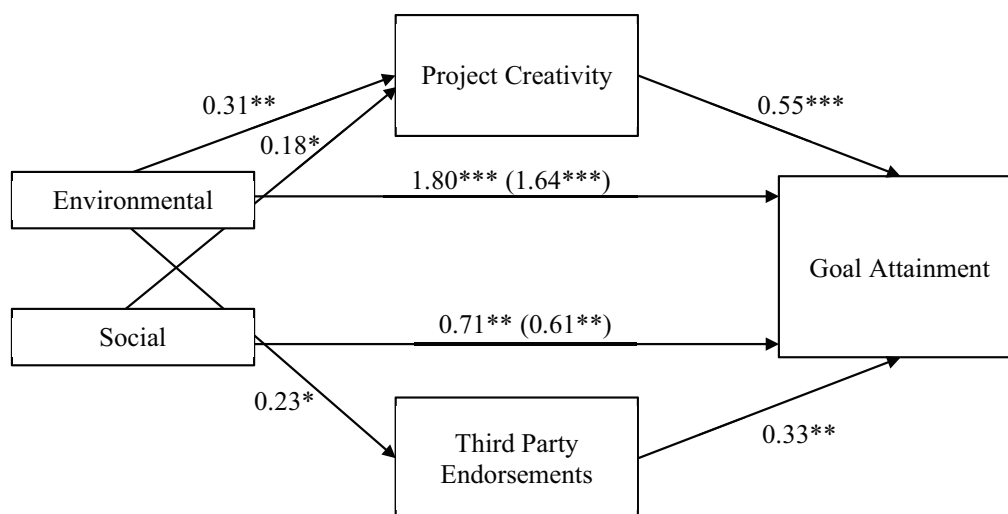
Predicted Variables: Path: Equation:	Technology Category				Film and Video Category			
	Count of Endorsements (a <sub>1</sub> )		Creativity (a <sub>2</sub> )		Count of Endorsements (a <sub>1</sub> )		Creativity (a <sub>2</sub> )	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<u>Predictor Variables</u>								
S.O. – Environmental		0.23*		0.31**		0.07		0.16
S.O. – Social		0.09		0.18*		0.01		0.36***
Creativity	0.02	0.02			0.01	0.01		
Count of Endorsements			0.03	0.02			0.05	0.04
<u>Control Variables</u>								
Prototype Available	0.04	0.04	-0.17	-0.16				
Technical Goodness	-0.01	0.00	0.28***	0.29***				
Aesthetic Appeal					-0.02	-0.02	0.25***	0.27***
Complexity	-0.01	-0.01	0.35***	0.34***	-0.03	-0.03	0.30***	0.25***
Team	-0.05	-0.06	-0.03	-0.04	-0.01	-0.01	0.23***	0.22***
Projects Created	-0.03	-0.03	0.13**	0.13**	0.05	0.06	-0.08	-0.06
FBF lower 25%	0.05	0.05	-0.15	-0.15	-0.05	-0.05	0.00	-0.02
FBF 25%-50%	0.20	0.19	0.08	0.05	-0.02	-0.02	-0.12	-0.16
FBF 50%-75%	0.35	0.35	-0.23	-0.23	-0.07*	-0.07*	0.16	0.19*
FBF top 25%	0.24	0.20	-0.19	-0.26	-0.10	-0.10	0.08	0.09
Kickstarter.com Age (days)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Log of Projects Backed	-0.04*	-0.04*	0.05	0.05	0.02	0.02	0.06	0.06
Quality	0.08	0.09	0.10**	0.10**	0.00	-0.01	0.02	0.01
Log of Funding Goal	0.05*	0.06*	0.05	0.06	-0.01	-0.02	0.01	0.01
Duration of Funding Period	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Log of Count of Reward Levels	0.10****	0.10**	-0.06	-0.07	-0.03	-0.03	0.11	0.09
Constant	-1.38**	-1.43**	-0.33	-0.43	0.12	0.13	1.27***	1.47***
Adj. R-squared	0.06	0.06	0.37	0.38	0.06	0.06	0.35	0.38
p-value	0.07	0.07	0.00	0.00	0.31	0.31	0.00	0.00
Observations	392	392	392	392	315	315	315	315

\*\*\* p<0.01, \*\* p<0.05, \* p<0.10; one-tailed t-tests for hypothesized effects, two-tailed for control variables.

amount. 14.18% of the total effect of an environmental sustainability orientation on goal attainment is mediated by third party endorsements; 20.15% of the total effect of a environmental sustainability orientation on pledge amount is mediated by third party endorsements.

For film and video projects, creativity mediated the relationship between social orientation and goal attainment (19.21% of the total effect) and between social orientation and pledge amount (14.67%). For film and video projects, I did not estimate a statistically significant mediation effect for creativity in the relationship between an environmental sustainability orientation and funding success. Thus, my results support hypothesis 3 in the case of environmental and social orientation for technology projects and in the case of social orientation for film and video projects (*partial support H3*).

Figures 4-2 through 4-5 summarize the findings of the mediating relationships explored in the study.



*Note: Two coefficients are included for the effects of social and environmental sustainability orientations on goal attainment. Coefficients in parentheses represent the effects after the introduction of project creativity and third party endorsements into the regression equations.*

Figure 4-2 Significant direct and indirect effects of environmental and social orientation on goal attainment of technology projects

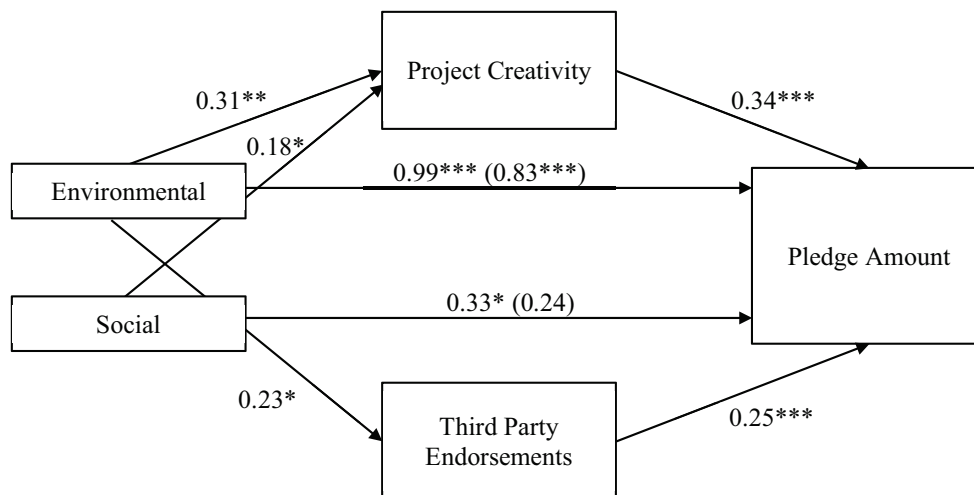


Figure 4-3 Significant direct and indirect effects of environmental and social orientation on pledge amount of technology projects

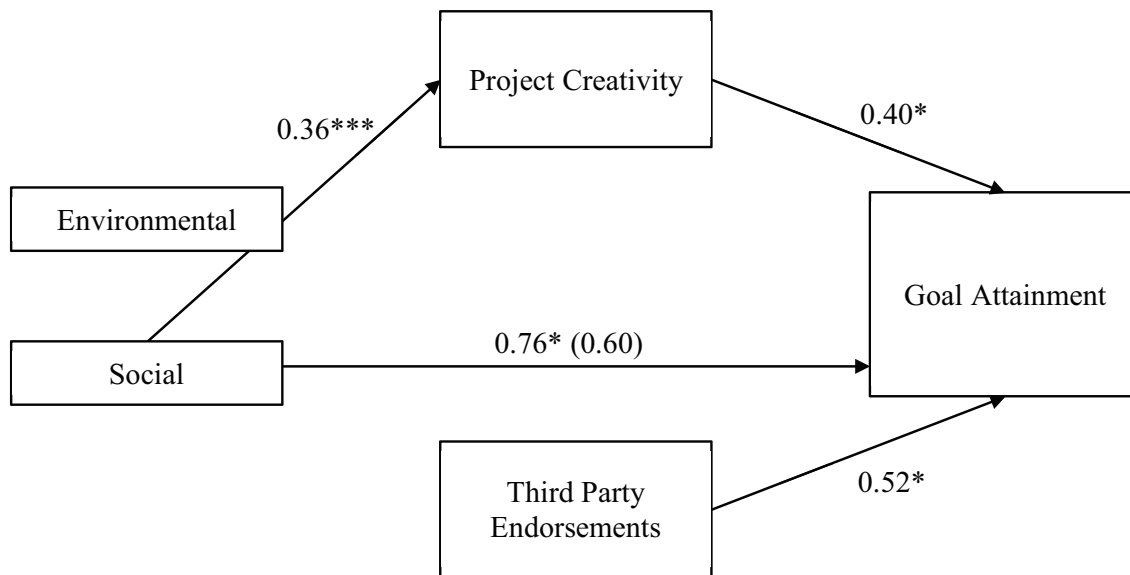


Figure 4-4 Significant direct and indirect effects of environmental and social orientation on goal attainment of film and video

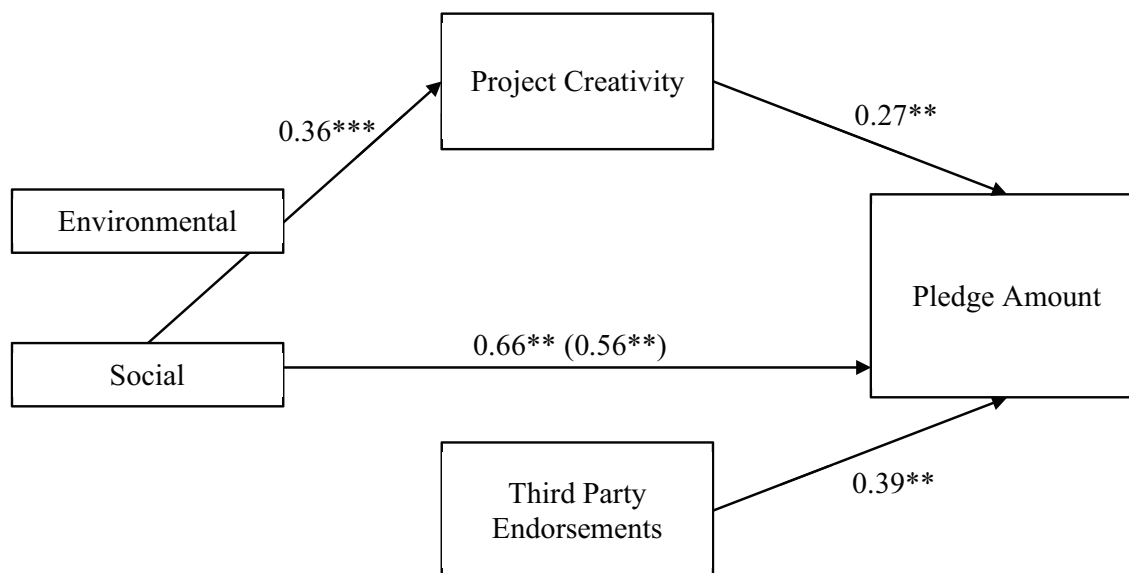


Figure 4-5 Significant direct and indirect effects of environmental and social orientation on pledge amount of film and video

#### 4.7 Discussions and Conclusions

An entrepreneurs' ability to acquire resources influences the success of both commercial and social ventures. Traditional financial institutions have, however, been more generous with the former type of ventures, rather than the latter. The current paper queries whether new financial institutions like crowdfunding have emerged to address the increasing societal demand for and support of social entrepreneurship. To address this question, I sought to understand whether and how a sustainability orientation influences an entrepreneur's ability to raise funds in the context of reward-based crowdfunding. Focusing on early-stage ventures that differ in whether they incorporate social and/or environmental sustainability orientations, my theoretical and empirical approaches attempted to unpack the effects of each orientation on crowdfunding success. The results of the empirical analysis supported hypothesis 1a across the two samples (technology

projects and film/video projects on the Kickstarter platform) and the two operationalizations of funding success (goal attainment and total pledges raised). The adoption of a social orientation appears to facilitate crowdfunding success in reward-based platforms like Kickstarter. My results also indicate support for hypothesis 1b for both operationalizations of the dependent variable, but only in the technology sample of projects, indicating that for these types of nascent ventures, an environmental orientation may also contribute to crowdfunding success. A similar finding was not observed for film/video projects.

In addition, my analyses reported mixed results of my mediating hypotheses. I had anticipated that project legitimacy (represented by third-party endorsements) and creativity would both partially mediate the relationship between sustainability orientation and funding success. My expectations of a partially mediated model was supported for creativity – meaning that adopting a sustainability orientation may enhance the creativity of the resulting projects that the entrepreneur develops, as suggested by Hahn and co-authors (2014) – and, in turn, sustainability orientation and creativity may contribute directly to funding success. This interpretation is consistent with the results for environmental and social orientation in technology projects and for social orientation in film/video projects. My results only partially support the mediation effect for legitimacy.

While my theorizing emphasized that I could not *a priori* hypothesize about specific differences between a social orientation and an environmental one, I anticipated differences to emerge and they did. The pattern of results reflects the significance of a sustainability orientation among technology projects: not only does the crowd appear to value (in terms of their financial contributions) technology projects that adopt a

sustainability orientation, they also value the creativity that this orientation may produce in the venture.

The distinction between social and environmental orientation proved relevant in the sample of film/video projects. In this case, the results for social orientation followed the anticipated pattern both in their direct and indirect (mediated) effects. When a project adopts a social orientation, it may be more likely to be creative, and funders appear to support both the social orientation and the creativity (in part resulting from this social orientation) of a project. I found little effect associated with an environmental orientation in the film/video projects. Certainly interest in and preferences for different film/videography content are influenced by recent events.

These differences in my results across the two samples highlight the likely context-specific nature of results that reflect upon the very nature of crowdfunding. Not only might the values and beliefs of members of the crowd change over time, who participates in the crowd is also likely to change. I also see continual evolution and innovation among the types of crowdfunding platforms and their operational practices. Traditional capital sources, while influenced by changing legal requirements and other relatively exogenous factors, nonetheless, maintain relatively stable practices, preferences, institutional arrangements, etc. The preferences of crowdfunders and the structure of the crowdfunding industry instead represent moving targets.

The significance of creativity that emerged in this study indicates that a sustainability orientation may matter for reasons not widely discussed or considered: *its impact on creativity within new ventures*. I highlight the effect of a sustainability orientation on creativity because this phenomenon has not been widely discussed by



either academics (Grégoire *et al.*, 2011) or managers. I believe that the framing of entrepreneurial problems with a sustainability lens may encourage outside-of-the-box thinking, resulting in superior performance or at least more creative solutions to these problems. My findings are consistent with extant literature on the positive relationship between cognitive complexity and creativity, and they reveal the relevance of problem framing and potentially paradoxical thinking for entrepreneurial performance.

While the argument remains attractive that sustainability projects are more legitimate because of moral and ideological reasons, I found only partial evidence to support this within my data (only environmental orientation and only in the technology sub-sample). In part, this may be due to the types of projects I sampled. Third-party endorsements of firms or videos may be influenced more by the personnel involved in the projects rather than any moral or ideological message underlying the content. This arguably relates more to the nature of third-party endorsements, rather than the overall concept of legitimacy.

While I believe this study has raised many relevant and potentially provocative issues associated with a sustainability orientation and crowdfunding, I must now draw attention to the limitations of my study.

#### **4.7.1 Limitations**

As already mentioned, the current study selected only two types of projects and only one crowdfunding platform. I began this study with technology-only projects because of Kickstarter's requirement that a technology project have a prototype and having a prototype facilitates the judgment of a project's creativity. I expanded my sample to increase the generalizability of my results, and in so doing, confirmed that aspects of the

model were context-specific. As noted above, I do not necessarily see this as a significant limitation of the current study but rather as characteristic of the dynamic crowdfunding environment. I cannot speak to, however, whether my results could generalize to other reward-based crowdfunding platforms or to non-reward-based platforms. Early research suggests that reward-based and equity-based crowdfunding may be complementary, serving different needs (Cholakova and Clarysse, 2015). If true, the impact of ideology, values, and beliefs may differ across reward-, equity-, and debt-based crowdfunding. Arguably, this impact may be less important in non-reward-based platforms where pecuniary gain may drive funders' decisions.

In addition, I acknowledge that my assumption that an entrepreneur's decision to adopt a sustainability orientation preceded other variables in my model, such as the creativity of the project. The opposite causality could occur, where an entrepreneur identifies a creative product or service, which just happens to serve social or environmental needs. My assumption is grounded in the idea that an entrepreneur's personal goals (or those of her team) influence whether she restricts her sights to ideas that have positive social and/or environmental impact. Nonetheless, technological trajectories, customer feedback, and other forces may lead to an entrepreneur adopting a sustainability orientation during the discovery process. In this case, it is possible that the search for a creative idea may lead to the adoption of a sustainability orientation, rather than the reverse.

#### **4.7.2 Future Research**

The current paper raised the question of *why* a sustainability orientation matters and the results suggested that a sustainability orientation influenced funding success directly as

well as through a project's creativity. I hope that my findings may help to fuel a larger discussion. Understanding the mechanisms through which sustainability orientations influence entrepreneurial behavior and outcomes will illuminate processes that distinguish social and environmental entrepreneurs from commercial ones, rather than simply identifying differences. Different mechanisms may operate in different funding settings, different types of entrepreneurs, and different types of resources. If entrepreneurs are attempting to attract human capital rather than financial capital, for example, mechanisms such as organizational commitment and person-organization fit may drive success for sustainable ventures. Understanding how adopting a sustainability orientation influences entrepreneurs and organizations/firms in general will be significant for future academic and practical work in the areas of social entrepreneurship, sustainability, corporate social responsibility, social movements, social innovation, and beyond. In addition, it can provide a window into how different types of institutions may emerge or adapt to support the work of a growing cadre of social entrepreneurs.

Despite increased interest in crowdfunding from both academic and practical perspectives, we still know little about the dynamics of online resource acquisition. I see potential in other research methodologies that could delve into decisions within the crowd by both funders and entrepreneurs. Experimental and/or field research techniques could shed light on how entrepreneurs choose to frame their projects and on how potential funders react to key words, images, and narratives. Because of the emotional association with social and/or environmental efforts, research approaches that can observe and possibly manipulate these emotions could prove insightful. I also see promise in a direct comparison between the funding practices and outcomes of traditional financial

institutions versus new financial institutions like crowdfunding; such a comparison could shed light on how decision processes differ across the two institutional settings, reflecting the new societal role that the emergent institutions play.

Another potentially fruitful avenue for future work lies in studying how socio-cultural context influences the response to sustainability projects by the crowd. Are people more likely to fund projects that address concerns widely held in their culture, that is, concerns that stir little controversy, such as eliminating poverty or reducing infant mortality? Or are adherents of causes associated with counter-cultural views more zealous in their support of related projects? How do shifts in socio-cultural values play out in the expression of minority-group values in crowdfunding arenas?

In general, questions that lie at the intersection of sustainable entrepreneurship, ideology, and capital markets may provide research opportunities for a broad range of scholars. Not only are these questions relevant to scholars of entrepreneurship, social enterprise, and crowdfunding, but they can shed light more broadly on the role of emotion versus information in financial decisions, the influence of ideology on creativity, and the changing nature of business and entrepreneurship under democratized financial markets.

## CHAPTER 5. GENERAL CONCLUSIONS

In this dissertation I set out to understand creativity in administrative organizations. I did this through three independent but related studies: The first study explored how strategic contradictions affect creative processes and products, this resulted in the theory of *paradoxical creativity*. Paradoxical creativity predicts that strategic contradiction affinity and efficacy determine creative output. The second study explored how incremental creativity can result in breakthrough innovations and developed the *power of incremental creativity* theory. Power of incremental creativity predicts that incremental search will produce small and actionable ideas that will drive action on breakthrough innovations. The third essay empirically challenged the notion that socially orientated new ventures, compared to profit-seeking or commercial only ventures, face difficulties in resource mobilization and developed a theory of why this notion may not be true in the crowdfunding space: social orientation increases creativity which results in more desirable products. The topics covered by the three preceding studies change how we think about what it takes and what it means to be creative in organizations.

### **5.1 What have we learned?**

Paradox theory makes a clear prediction: embracing paradoxical tensions induces creativity (Lewis, 2000; Smith and Lewis, 2011). In their 2011 foundational study, Smith and Lewis argue that paradox enables sustainable competitive

advantage by “(1) enabling learning and creativity, (2) fostering flexibility and resilience, and (3) unleashing human potential” (Smith and Lewis, 2011: 393). The argument that (on average) paradox enables creativity is empirically supported by another 2011 study by Miron-Spektor, Gino, and Argote. These arguments have been used to support an overly optimistic view about the effects of contradictions on the behavior of decision-makers and as a consequence on organizational performance (Smith and Tushman, 2005). My first essay is a caution against this optimism.

Strategic contradictions do have positive effects on creativity. They increase openness to new approaches and signal that something new must be done. My essay says the same. However, it adds that strategic contradictions must not result in better creative performance – even if they increase intellectual risk-taking and search breadth. This is because creative products will only result under a specific combination of these two cognitive factors and it is unlikely that all (or many) strategic contradictions will be perceived in such a way as to result in such a combination. Moreover, strategic contradictions may be noticed but not induce creative cognition. The underlying message of the first essay is that *how* (not just *if*) the decision-maker perceives the contradiction matters for creative performance.

As long ago as 1981 (Kimberly, 1981) scholars coined the term *proinnovation bias*. Proinnovation bias presumes that innovation is always good and that any factors that result in innovation must necessarily be desirable (Anderson *et al.*, 2014). This fallacy remains implicit and rarely addressed by the current literature (Anderson *et al.*, 2014). My second essay redresses the creativity maximization fallacy. I propose that more creativity is not necessarily better. I argue that creativity presents a fundamental problem

for strategic leaders – blindness. Blindness into future consequences increase with creativity and as such precludes efficacious decision-making. The outcome is that radical, highly creative ideas may either produce unpredictable outcomes, as demonstrated by accidental successes of Post-It Notes, or no economically positive outcomes at all, as demonstrated by a number of Xerox Parc inventions or by Eastman Kodak’s failure to act on an important invention by one of their own employees: the digital camera.

In this essay, I caution against the maximization of creativity in administrative organizations. In organizations, much stands to be lost from a misallocation of resources and poor strategic decisions. Radical ideas present such a risk. I demonstrate, through a simulation model and a number of real-world examples, that action on breakthrough ideas is most likely to be achieved if decision-makers engage in incremental cognitive search. Incrementally searching for ideas decreases blindness and increases opportunities for elaboration. Elaboration feeds the earlier stages of idea generation and can result in new generation, more incubation, and further elaboration. As a result, elaboration creates a virtuous cycle of creativity and action.

The third essay addresses the new institutional role of crowdfunding and how it has changed the capacity of socially responsible new ventures to mobilize resources. While entrepreneurial funding by a loose collection of individuals is not new, on-line crowdfunding platforms introduce an institutional setting that differs from that of traditional funding sources. Some platforms, such as Kickstarter, are reward-based and, as a result, move away from the traditional model of investors either acquiring equity in, or making a loan to, a new venture. For reward-based crowdfunding, backers’ motivations shift from pecuniary returns to other types of benefits. The shift in

motivation from economic rents to novelty of products has created an opportunity for creativity to play a much more important role in the ultimate success of new ventures.

In the last study of the dissertation we learn that not only are socially oriented new ventures more successful in reaching their funding goals than are commercial only ventures, but that they are receiving more overall pledges. This is contrary to the notion that socially oriented entrepreneurs are less likely to raise capital (Austin *et al.*, 2006). Moreover, creativity appears to be an important mechanism of this effect. That is, although I find a direct effect between social orientation and funding success, some of this effect (about 10%) is because social orientation increases the creativity of the new ventures' final products. I find that this is true in two important categories of crowdfunded projects: technology and film and video.

## **5.2 What's Next?**

While these studies answered important questions, they generated new ones and demonstrated that despite a great deal of interest in the topics of creativity and innovation, work remains to be done. I will focus the remainder of this section on a limited number of topics that follow most directly from the current work and are related to my fundamental interest in understanding how creativity can be useful to administrative organizations, and the individuals that make up these organizations.

The first study demonstrated the boundary conditions of the relationship between strategic contradictions and creativity. Future work should closely explore these boundary conditions. If there are differences in perceptions of strategic contradictions, what are the origins of these differences? Which individual, team, organizational, or social factors condition these differences? The ultimate objective of this stream of



research is accurate (context specific) prescriptions. While we cannot expect to map the creative consequences of all strategic contradictions, a more nuanced perspective could be an aid to managerial rationality.

The natural next step to the second study is the verification of the decision to act-innovation relationship. While the second study posits that incremental search will increase the decision to act, it assumes that more acting will result in more innovation. Future research should explore the limitations of this assumption. Another limitation of the second study is the innovation maximization bias. While this study explored the limits of maximizing creativity, it does not do the same for innovation. Future research should explore whether breakthroughs resulting from incremental search have positive organizational consequences. Although the elaborative, step-wise nature of incremental search should improve foresight and as such increase the propensity to act, it could have negative organizational and individual consequences. For instance, follow-up studies should explore how incremental search interacts with cognitive biases, such as the confirmation bias. One can imagine that managers using incremental search may more easily build confidence in what are ultimately bad ideas. One could also argue that, for similar reasons, incremental search is more susceptible to nefarious applications. Incremental search could be more successfully used to construct convincing stories for bad ideas (e.g., innovation as counterproductive behavior, “dark side” studies, innovation as legal violation).

The third study explored creativity as a mediator of an organizational performance antecedent. In her 2014 address to the Academy of Management, Teresa Amabile stressed the lack of management studies exploring creativity as an antecedent

condition. While my third study answers this call directly, it also demonstrated one potential method for future studies to do the same: by exploring creativity as a mediator between an antecedent condition and an organizational outcome. Such studies should not be limited to positive outcomes, but also explore the dark-side of creativity. More generally, this study demonstrated that creativity may have a specific role to play in some contexts. Creativity was important to the success of crowdfunding projects, but it remains unclear whether creativity could play a similar role in the success of traditional funding methods, such as venture capital or angel funding.

### **5.3 Practical Implications and Managerial Recommendations**

Paradoxical creativity provides important practical implications for managers. The first is that strategic contradictions, while they may appear desirable from the perspective of simultaneously accomplishing multiple goals, may in fact not just drive decision-makers to maximize one goal at the expense of minimizing a second, but may also preclude creativity. In the very general sense, managers should be aware of the potentially negative consequence competing strategies can have on creativity. The second practical implication is that strategic contradictions and their effects on creativity can be managed. Management requires measurability. Paradoxical creativity provides a framework necessary for managers to measure strategic contradictions. I describe this in the following paragraph.

One can observe and record the existence of strategic contradictions in an organization by surveying decision-makers from that organization. Decision makers that possess multiple or high affinity paradoxical frames will recognize strategic contradictions before the rest of the organizations does. These decision-makers are the organization's

metaphorical seismometers. Seismometers can measure otherwise unobservable seismic waves generated by fractures in the Earth's tectonic plates, before these schisms turn into full-blown earthquakes. Seismometers can therefore be used to predict the origin and intensity of future earthquakes and thus potentially save lives and resources. Similarly, individuals that are especially sensitive to organizational tensions may predict the origin and efficacy of strategic contradictions. Because, according to paradox theory, changes in the environment (e.g., resource constraints, introduction of new perspectives) can alter the affinity and efficacy of strategic contradictions, awareness of potential sources of strategic contradictions will result in better management.

An important practical implication of the third chapter is its emphasis on the decision to act for innovation. Perhaps most important is the *relative* emphasis on action over creativity. The practical implication of this view is straightforward: increase innovation by increasing action. This prescription is by no means obvious, especially when the reader notices that increasing creativity, the apparently most obvious and common sense way to increase innovation, may be counterproductive! I demonstrate that this effect is not constrained to small, large, new, or old organizations, but is a function of how individuals think. As such, this perspective applies broadly, to all organizations or situations where there is something at stake – there is something to lose by choosing an inferior alternative.

The practical implications of the fourth chapter are equally relevant for management. In this chapter, I demonstrate that acquiring resources online is importantly different from acquiring resources from more traditional sources (i.e., angels, banks, venture capitalists). Specifically, a disadvantage in the traditional sense of resource

acquisition may be an advantage in online crowdfunding. This implication is important because the online crowdfunding sector is poised to overtake traditional sources of funding as early as 2025. According to a number of reports (Harris, 2014; infoDev, 2013; Montini, 2014), by 2025 crowdfunding will raise over \$300 Billion for new ventures. This is six times the 2014 global venture capital market. This prediction is conservative, given that these reports only accounted for financial capital (not other forms of resources, such as volunteerism) and only capital from individual investors (not institutions). Understanding why crowdfunding backers invest in projects can have important implications on new ventures looking for capital.

Another practical implication of the fourth chapter is the moderating role creativity plays between organizational outcomes and its antecedents. Creativity maximizing antecedents must not always also result in better organizational performance. Anderson and colleagues (2014: 1319) call this “the creativity and innovation maximization fallacy”. For example, while task conflict may increase creativity, it may also reduce team cohesion. Both team cohesion and creativity are important for organizational performance. The organizational performance implications from such creativity maximization antecedents are often ambivalent. The fourth chapter explains that a sustainability orientation, a creativity maximization antecedent, may have positive organizational performance implications, particularly with respect to online resource mobilization. While the results of this particular study offer no direct proof that this is the case outside online crowdfunding, there is some indication (Gonin *et al.*, 2013; Hahn *et al.*, 2014; Jay, 2013) that my results may have broad applicability.

In sum, findings presented in this dissertation have not only advanced our understanding of creativity in organizations but also how these advances affect management in and of organizations. This dissertation extends current literature in creativity, paradoxes, entrepreneurship, innovation, and strategic management. It does so by building new theory and testing existing assumptions.

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## APPENDICES



## Appendix A Mathematical Exposition of EII

The general structure of the model resulting from Explicit Implicit Theory (EII) (implemented in the Non-Action-Centered Subsystem of CLARION (Sun, 2002)) is shown in Figure A1. The model is composed of two major modules, representing explicit and implicit knowledge respectively. These two modules are connected through bidirectional associative memories (i.e., the E and F weight matrices; Kosko, 1988). In each trial, the task is simultaneously processed in both modules, and their outputs, or response activations, are integrated in order to determine a response distribution. Once this distribution is specified, a response is stochastically chosen and the statistical mode of the distribution is used to estimate the internal confidence level (ICL). If this measure is higher than a predefined threshold, the chosen response is output; otherwise, another iteration of processing is done in both modules, using the chosen response as the input.

In the model, explicit processing is captured using a two-layer linear connectionist network while implicit processing is captured using a non-linear attractor neural network (NDRAM: Chartier and Proulx, 2005). The inaccessible nature of implicit knowledge may be captured by distributed representations in an attractor neural network, because units in a distributed representation are capable of accomplishing tasks but are less individually meaningful. This characteristic corresponds well with the relative inaccessibility of implicit knowledge. In contrast, explicit knowledge may be captured in computational modeling by localist representations, because each unit in a localist representation is more easily interpretable and has a clearer conceptual meaning. This characteristic captures the property of explicit knowledge being more accessible and

manipulable. This difference in the representation of the two types of knowledge leads to a dual-representation, dual-process model.

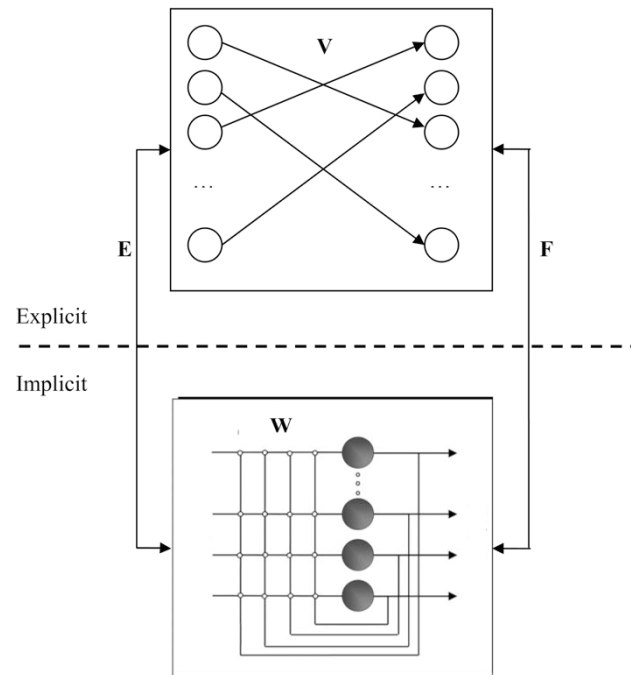


Figure 5-1 General architecture of the connectionist model. The model is implemented in the Non-Action-Centered Subsystem of CLARION (Sun, 2002). Figure retrieved from Hélié and Sun (2010). Copyright 2010 by American Psychological Association.

Specifically, explicit knowledge is localistically represented in the top level using binary activation. The left layer in Figure A1 (denoted  $\mathbf{x}$ ) is composed of  $n$  units while the right layer (denoted  $\mathbf{y}$ ) is composed of  $m$  units. These layers are connected using the binary weight matrix  $\mathbf{V}$ , and the information is transmitted using the standard weighted

sum (dot product, i.e.,  $\mathbf{y} = \mathbf{N}\mathbf{V}\mathbf{x}$ , where  $\mathbf{N}$  is a diagonal matrix normalizing the activation of  $\mathbf{y}$ ).<sup>1</sup>

In the bottom level, implicit knowledge is represented using  $r$  bipolar units (denoted  $\mathbf{z}$ ). Specifically,  $\mathbf{z} = \mathbf{t}_1 + \mathbf{t}_2$ , where  $\mathbf{t}_1$  represents the first  $s$  units in  $\mathbf{z}$ , which are connected to the left layer in the top level using the  $\mathbf{E}$  weight matrix. Meanwhile,  $\mathbf{t}_2$  represents the remaining  $r - s$  units in  $\mathbf{z}$ , which are connected to the right layer in the top level using weight matrix  $\mathbf{F}$ . In words, the  $\mathbf{E}$  and  $\mathbf{F}$  weight matrices are used to ‘translate’ explicit knowledge into implicit knowledge (i.e., ‘implication’) and vice-versa (i.e., ‘explicitation’).

Bottom-level activation ( $\mathbf{z}$ ) is modified through a settling process using the NDRAM transmission rule:

$$\mathbf{z}_{[t+1]} = f(\mathbf{W}\mathbf{z}_{[t]}), \quad f(z_i) = \begin{cases} +1 & , z_i > 1 \\ (\delta + 1)z_i - \delta z_i^3 & , -1 \leq z_i \leq 1 \\ -1 & , z_i < -1 \end{cases} \quad (\text{A1})$$

where  $\mathbf{z}_{[t]} = \{z_1, z_2, \dots, z_r\}$  is the bottom-level activation after  $t$  iterations in the network,  $\mathbf{W}$  is the bottom-level weight matrix, and  $0 < \delta < 0.5$  is the slope of the transmission function. This settling process amounts to a search through a soft constraint satisfaction process, where each connection represents a constraint and the weights represent the importance of the constraints. Note that it was estimated psychologically that each iteration in this network takes roughly 350 ms of psychological time.

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<sup>1</sup> In the model, all the weight matrices are learned using Hebbian learning. This type of learning has the advantage of psychological and biological realism. The  $\mathbf{V}$ ,  $\mathbf{E}$ , and  $\mathbf{F}$  weight matrices are learned using regular Hebbian learning (i.e., the outer matrix product). The bottom-level weight matrix ( $\mathbf{W}$ ) is learned using a contrastive Hebbian learning rule (Chartier and Proulx, 2005). More details can be found in the appendix of Hélie & Sun (2010).

Once the response activations have been computed in both levels, they are integrated using the *Max* function:

$$o_i = \text{Max} \left[ y_i, \lambda (k_i)^{-1.1} \sum_{j=1}^r f_{ji} z_j \right] \quad (\text{A2})$$

where  $\mathbf{o} = \{o_1, o_2, \dots, o_m\}$  is the integrated response activation,  $\mathbf{y} = \{y_1, y_2, \dots, y_m\}$  is the result of top-level processing,  $\lambda$  is a scaling parameter specifying the relative weight of bottom-level processing,  $k_i$  is the number of nodes in the bottom level (in  $\mathbf{z}$ ) that are connected to  $y_i$  ( $k_i \leq r - s$ ), and  $\mathbf{F} = [f_{ij}]$  is a weight matrix. The integrated response activation is then transformed into the Boltzmann response distribution:

$$P(o_i) = e^{o_i/\alpha} \left( \sum_j e^{o_j/\alpha} \right)^{-1} \quad (\text{A3})$$

where  $\alpha$  is a noise parameter (i.e., the temperature). Note that low noise levels tend to exaggerate the probability differences, which lead to a narrow search of possible responses and favors stereotypical responses. In contrast, high noise levels tend to minimize the probability differences, which leads to a more complete search of the response space.

A response is stochastically chosen based on the response distribution (A3) and the statistical mode of the distribution is computed to estimate the ICL. This measure represents the relative support for the most likely response (which may or may not be the stochastically selected response). In the current model, the chosen response is output if the ICL is higher than threshold  $\psi$ . However, if the ICL is smaller than  $\psi$ , the search process continues with a new iteration using the chosen response to activate the left layer

( $\mathbf{x} = \mathbf{V}^T \mathbf{o}$ ;  $\mathbf{z} = \mathbf{E}\mathbf{x}$ ). The algorithm specifying the complete process is summarized in Table A1.

Table 5-1 Algorithm of the Connectionist Model

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1. Observe the current state of the environment;
2. Compute the response activations in both levels;
3. Compute the integrated response activation and the resulting response distribution;
4. Stochastically choose a response and compute the statistical mode of the response distribution: a. If the mode is higher than $\psi$ , output the response;
5. Else, if there is time remaining, go back to step 2.

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## Appendix B Surveys

### Coding Instructions for Sustainability Orientation

**Rate each project as having a social or environmental orientation.**

**Environmental:** *Does the project in some way benefit the environment - nature and the Earth's life support systems (For example: saves trees, plants, bees, whales, the ecosystem, reduces pollution, makes recycling easier, etc.)?*

Score: 1 = Yes, 0 = No.

**Social:** *Does the project in some way benefit people (For example: improves education, fights discrimination, donates to the needy)?*

Score: 1 = Yes, 0 = No.

### Judging Instructions for Creativity and Creativity Controls

**Judge each project on each of the following 3 dimensions.**

Before beginning to judge each project, read the first 20 projects in the Excel file. You should have an idea of the quality of projects on the list before you judge any of them. When judging, judge projects relative to one another, and not to some absolute standard. For example, a rating of 5 should go to the best Kickstarter projects in the list, and not the best possible Kickstarter project that you can imagine.

The dimensions are:

- 1) **Creativity:** using your own subjective definition of creativity, the degree to which the project is creative relative to other projects.
- 2) **Technical goodness:** the degree to which the work is good technically relative to other projects. *(only for technology subsample)*
- 3) **Aesthetic appeal:** in general, the degree to which the work is aesthetically pleasing relative to other projects. *(only for film and video subsample)*
- 4) **Complexity:** the level of complexity of the project relative to other projects.

Score each dimension on a **scale from 0 to 5**.

0 is always the lowest score for that characteristic

5 is always the highest possible score for that characteristic

The reference points (from 0 to 5) are equally spaced.

*It is vital that you maintain clarity in your subjective definitions of the different dimensions. That is, separate the dimensions (creativity, technical goodness, complexity) from one another as much as possible.*

VITA



## VITA

**Education**

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**PhD - Strategy**

Purdue University, USA 2016

**Master of Business Administration**

Purdue University, USA 2006 - 2007

**Honours Degree in Business Commerce**

University of Ottawa, Canada 2002 - 2006

University of Vienna, Austria 2004 - 2005

**Research** (entrepreneurship, strategic management, cognition, creativity, innovation)

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**Publications**

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Calic G., Mosakowski E. (2016) "Kicking off social entrepreneurship: how a sustainability orientation influences crowdfunding success" (*Journal of Management Studies*)

Mosakowski E., Calic G., Earley P.C. (2013) "Cultures as learning laboratories: What makes some more effective than others" (*Academy of Management Learning and Perspective*)

**Academic Awards**

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**TEACHING**

Spring 2014 Krannert Certification of Distinguished Teaching (MGMT 484)

Fall 2014 Krannert Certification of Distinguished Teaching (MGMT 451)

2015 Purdue Teaching Academy Graduate Teaching Award

**RESEARCH**

2015 Max Boisot Award

2015 EGOS Paradox Subtheme *That's Interesting Award* - European Group for Organizational Studies (EGOS); Athens, Greece2015 EGOS Conference *That's Interesting Award Nominee*; Athens, Greece

## Conference Presentations

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“Big ideas, one small idea at a time: the power of cognitively proximate search to drive action on breakthrough ideas”

- 2016 *European Group for Organizational Studies* (Naples, Italy)

“Global opening through cultural identity, mindset & leadership”

- 2015 *Academy of Management Meeting* (Vancouver, Canada)

“Cognition of contradiction: a non-monotonic model of paradoxical frames on creative responses”

- 2015 *European Group for Organizational Studies* (Athens, Greece)
- 2015 *Atlanta Competitive Advantage Conference* (Atlanta, Georgia)
- 2015 *Midwest Strategy Meeting* (St. Louis, Missouri)

“Something special, unique, and different than what they thought of: the effects of a sustainability orientation on resource mobilization of crowdfunded projects”

- 2015 *Sustainability, Ethics, and Entrepreneurship Conference* (Denver, Colorado)

“Do boards affect CEO creativity? A creative cognition analysis of different contexts”

- 2014 *Strategic Management Society Meeting* (Madrid, Spain)

“Cultures as learning laboratories: developing CQ through international service learning”

- 2014 *Academy of International Business* (Vancouver, Canada)

“Entrepreneurs as social others: how collective interests and selflessness affect funding success”

- 2013 *Sustainability, Ethics, and Entrepreneurship Conference* (Denver, Colorado)
- 2013 *Academy of Management Meeting* (Orlando, Florida)

“Plausible, yet unpredictable: the effects of comprehensibility on entrepreneurial success”

- 2013 *Strategic Management Society Meeting* (Atlanta, Georgia)

## Industry Experience

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**Georgsmarienhütte GmbH**

2007 - 2011

Lower Saxony, Germany

Marketing Project Manager

## LANGUAGES

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English (fluent), Croatian (fluent), German (fluent)