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Understanding acts of creativity

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Chapter 1. General introduction

“I’ve spent my entire life in devotion to creativity, and along the way I’ve developed a set of beliefs about how it works – and how to work with it – that is entirely and unapologetically based upon magical thinking. And when I refer to magic here, I mean it literally. Like, in the Hogwarts sense. I am referring to the supernatural, the mystical, the inexplicable, the surreal, the divine, the transcendent, the otherworldly. Because the truth is, I believe that creativity is a force of enchantment, not entirely human in its origins.

I am aware this is not an especially modern or rational way of seeing things. It is decidedly unscientific. Just the other day, I heard a respected neurologist say in an interview, “The creative process may seem magical, but it is not magic.”

With all due respect, I disagree.”

– Elizabeth Gilbert (author)

Creativity, defined as the development of ideas, processes, products, and problem solutions that are both novel and useful (Amabile, 1983), has captured the interest and imagination of laymen as well as scientists for as long as we can remember. The interest in creativity is eloquently reflected in the quote above made by the famous novelist Elizabeth Gilbert. Whether it’s the Mona Lisa painting, the invention of the lightbulb, the first landing on the Moon, or potentially the development of AI in the future, all these achievements required and require (groups of) individuals to deviate from normal ways of doing things, being playful with ideas, and taking new approaches to viewing and resolving problems. For the non-scientific audience, creativity is often seen as something magical or mystical, and like magic, it captures peoples’ interest because we want to better understand it. However,

one of the great inventors of our time, Thomas Edison, proposes that creativity requires a lot of hard work. Edison, holder of an astonishing 1093 patents, and famous for inventing the lightbulb, the phonograph, the motion picture, as well as improving the telegraph and the telephone, was quoted saying that “genius is one percent inspiration and ninety-nine percent perspiration” and "I never did anything by accident, nor did any of my inventions come by accident; they came by work." Thus, being creative according to Edison requires hard work. And it is the task for scientists to develop a better understanding of the nature of this hard work that leads to creativity or successful inventions.

As such, our main focus for this dissertation is not on creativity as an outcome, but our aim is to develop a better understanding of the behavioral patterns that lead to creative outcomes in the workplace, by focusing on the creative process. To generate creative ideas, employees must engage in creative processes or creative acts, which involve those (cognitive) activities related to creative outcomes, regardless of whether the resulting products of these activities can indeed be considered creative (e.g. Drazin et al., 1999; Lubart, 2001; Reiter-Palmon & Illies, 2004). Engagement in creative processes as opposed to engagement in habitual processes is considered an intentional choice (Ford, 1996), and is a necessary but insufficient prerequisite for generating creative outcomes (Shalley & Gilson, 2004). It is also necessary for an individual to engage in these creative processes in an effective way (i.e., in a way that leads to creative outcomes). This includes managing the allocation of cognitive resources across different processes (such as problem construction, information search, and idea generation), deciding on which processes to put more relative weight when pursuing specific creative outcomes (e.g., radical vs. incremental creativity), and deciding on how to structure the sequence of various creative processes over time. Given that creativity is very important for organizational survival and competitiveness (Anderson et al., 2014) we propose

that developing a better understanding of how the nature and unfolding of the creative process affect creative outcomes is a necessary step that we should take as researchers.

Research to date on the creative process can be roughly divided into three streams. Firstly, following the assumption that creative thought differs from non-creative thought, a stream of theoretical research has developed over the years that aims to identify the key elements of the creative process that people must engage in to produce creative outcomes (Finke et al., 1992; Illies & Reiter-Palmon, 2004; Mumford et al., 1991, 2012; Sternberg, 1988). Although these efforts have resulted in several different process models, most scholars agree that the central processes required for the generation of creative outcomes are problem construction, information search and encoding, and idea generation (Finke et al., 1992; Mumford et al., 1991; Reiter-Palmon & Illies, 2004). Problem construction constitutes the identification of the goals, procedures, and information required to solve the problem. Information search is defined as the processes of connecting, integrating, and encoding information, whereas idea generation is defined as the production of alternative solutions or outcomes (Mumford et al., 1991; Reiter-Palmon & Illies, 2004).

Secondly, a stream of experimental research has focused on examining the predictive power of the effective execution of these elements of the creative process on creative task performance (Friedrich & Mumford, 2009; Illies & Reiter-Palmon, 2004; Mumford, Baughman, Supinski, et al., 1996; Mumford, Baughman, Threlfall, et al., 1996; Reiter-Palmon et al., 1997). For example, a study by Mumford et al. (1996) revealed that the type of information that individuals process during information search and encoding affect the extent to which novel solutions are generated. More specifically, results showed that individuals who spent more time on reading factual information and inconsistent information generated solutions that were more original. In another study, Reiter-Palmon et al. (1997) showed that individuals that performed better on a problem restatement task also performed better on an

unrelated idea generation task. Therefore, they concluded that problem-construction ability is positively related to creativity.

Thirdly, a stream of cross-sectional research has recently emerged that focuses on developing instruments that are able to capture the effects of engaging in creative processes in real-life settings. Drawing on the theoretical work on creative processes (e.g. Mumford et al., 1991; Reiter-Palmon & Illies, 2004; Zhang & Bartol, 2010), Zhang and Bartol (2010) defined the construct of creative process engagement and subsequently developed a measure for this construct. Creative process engagement is defined as involvement in creativity-relevant methods or processes, including problem identification, information search and encoding, and idea generation (Zhang & Bartol, 2010). Studies have shown that creative process engagement is positively related to contextual antecedents such as empowering leadership (Zhang & Bartol, 2010) and transformational leadership (Henker et al., 2015; Zhou & Pan, 2015) and also that creative process engagement is positively related to creativity as an outcome (Henker et al., 2015; Zhang & Bartol, 2010a; Zhang & Bartol, 2010b; Zhou & Pan, 2015).

Although these three streams of literature have significantly furthered our understanding of the activities required to achieve creative outcomes, many of the central propositions of the theoretical models on creative process engagement remain untested today. We propose that in order to develop a better understanding of the creative process, it is important to acknowledge that the creative process can – and should – be studied used different lenses that vary in detail. Specifically, we propose that the creative process can be conceptualized as:

- (1) creative action as a set of behaviors that differs from habitual action;
- (2) a set of conceptually distinct behaviors that have their own antecedents, and that have differential effects of different types of creative outcomes;

(3) a sequence of interacting behaviors that unfolds over time.

In what follows, we will expand on these conceptualizations and present an overview of how we examine these conceptualizations in this dissertation.

CURRENT APPROACH: THREE UNDEREXAMINED PROPOSITIONS ABOUT THE NATURE OF THE CREATIVE PROCESS

Prior work on the creative process has led to three clear theoretical propositions about the nature of the creative process that have largely remained untested. Firstly, at a most rudimentary level, scholars have suggested that the creative process consists of various creativity-relevant activities (i.e., problem construction, information search and encoding, idea generation, and idea selection and evaluation), and that these activities differ from activities related to habitual action processes (e.g. Mumford et al., 1991; Reiter-Palmon & Illies, 2004) and are cognitively demanding (Ford, 1996; Reiter-Palmon & Illies, 2004). The decision to engage in creative processes as opposed to habitual processes is considered intentional (Shalley & Gilson, 2004), with the default choice being habitual behavior because this is less risky and requires a smaller investment of cognitive resources (Ford, 1996). This brings about the first question: What are the drivers that make individuals decide to engage in creative action as opposed to habitual action?

So far, empirical research suggests that the decision for creative action occurs only when individuals are sufficiently motivated or when they experience activating affectional states that predispose them towards creative tasks (To et al., 2012; Zhang & Bartol, 2010). However, the assumption that creative process engagement is cognitively demanding has not been properly empirically scrutinized. It is important to examine this assumption, because when cognitive resources are indeed required for the decision to engage in creative action, the availability of these resources may be a crucial predictor for creative process engagement, above and beyond the effects of activating moods and motivation.

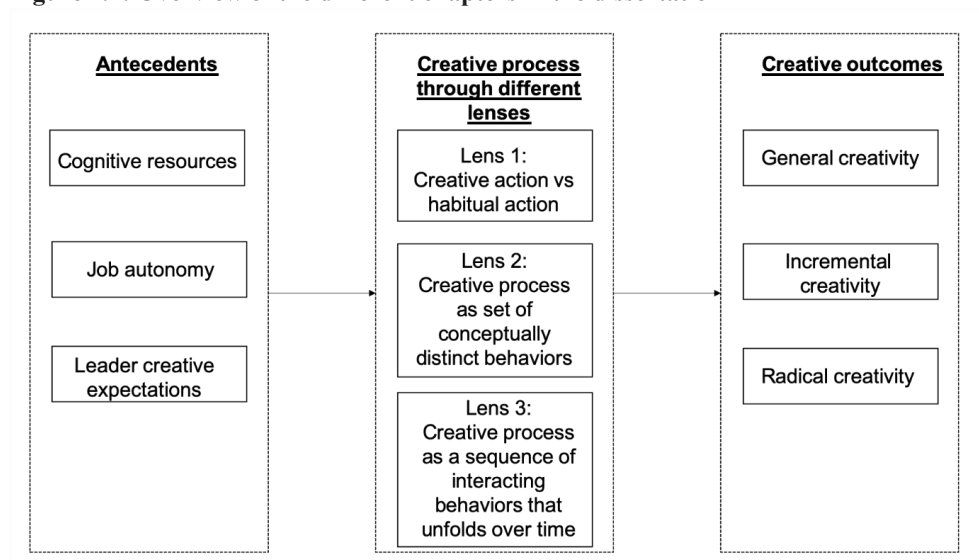
Secondly, and zooming in on specific creative activities, scholars have proposed that different creativity-relevant activities (i.e., problem construction, information search and encoding and idea generation), are conceptually distinct from each other, meaning that engagement in each of these activities might be triggered by different antecedents, and that these activities in turn, may be more important for some types of creativity than others (Mumford et al., 1991; Mumford & Gustafson, 1988; Unsworth, 2001). This brings about the second question: what are the drivers of specific creative actions, and how do specific creative actions relate to different types of creative outcomes?

To date however, theory is lacking on how these distinct creative activities may be promoted by differential antecedents, and how they may relate to different types of creative outcomes. Developing a theoretical framework linking different types of antecedents to specific processes, and these processes to creative outcomes, is important because it will enable practitioners to align the promotion of specific creative process activities with the types of creative outcomes they desire.

Thirdly, and zooming in even further, scholars have suggested that these different creativity-relevant activities (i.e., problem construction, information search and encoding, idea generation, and idea selection and evaluation) are not only distinct, but they also work in concert to produce creative outcomes. That is, different activities are considered interdependent, which means that the outcomes of one activity serve as input for other activities (Bink & Marsh, 2000; Reiter-Palmon & Illies, 2004). According to this view, the creative process can be conceptualized as individuals' engagement in a sequence of creativity-relevant activities, unfolding over time (Lubart, 2001). Given this conceptualization, it is important to know whether specific patterns in individuals' creative process are predictive of creative outcomes, because it would enable practitioners to guide the creative process in a way that more likely leads to actual creative outcomes.

Taken together, this dissertation aims to further our understanding of the creative process by studying and developing theory around three existing and understudied ideas about the nature of the creative process, namely: (1) creative process engagement is cognitively demanding; (2) engagement in specific activities within the creative process may be caused by differential antecedents and may have differential effects on various types of creative outcomes; and (3) the differential activities within the creative process interact with one another over time to produce creative outcomes. In what follows, we will introduce the three empirical Chapters that follow and that further examine these questions.

Figure 1.1: Overview of the different chapters in the dissertation



CHAPTERS OVERVIEW

Chapters 2, 3, and 4 of the dissertation report three empirical studies in which we examined the nature of the creative process by examining predictors of (specific stages of) the creative process, their relationship with creative outcomes, and their interplay over time. Data for these Chapters were collected from various sources. To test our predictions, in Chapter 2, we use longitudinal field-data among employees, in Chapter 3, we use multisource

field-data among employees, and in Chapter 4 we use micro-longitudinal lab data among students. The Chapters were written as independent papers, and therefore all Chapters can be read independently from the rest of the dissertation. Given that all Chapters deal with the creative process, there is some overlap in the theoretical approaches. However, our methodological approaches vary per chapter, depending on the extent to which we zoom in on the creative process. Specifically, Chapter 2 is a diary study and focuses on the within-person level, Chapter 3 reports a cross-sectional survey and focuses on the between person-level, and in Chapter 4 we deployed a lab paradigm that enables us to track the creative process as it unfolds over time, as well as to make between person comparisons in terms of creative process patterns. Chapter 5 provides the general discussion in which we reflect on these studies and their individual and collective contributions. Overall, these Chapters therefore offer a coherent framework that furthers our understanding of the creative process by varying the level of detail at which we examine the creative process across the Chapters (see Figure 1.1).

Chapter 2: A Conservation of Resources perspective on creative process engagement

In Chapter 2, we look at creative action as a set of behaviors that differs from habitual action. In particular, we examine what causes individuals to decide to engage in creative processes, apart from the previously studied affectional states and specific motivations (Ford, 1996). Using Conservation of Resources theory (CoR; Hobfoll, 2002; Hobfoll et al., 2018), which states that employees deal with challenges in their work environment by expending (cognitive) resources in the form of work effort, we argue and show that daily creative process engagement requires the investment of daily work effort. Also drawing on CoR theory, we propose and find that prior-day work effort negatively relates to daily creative process engagement via two mechanisms. Firstly, expending work effort is cognitively depleting and as such, when individuals expend above-average levels of work effort, this

leads to lower resource availability and to less work effort the next day. Secondly, and more importantly, we propose a direct negative effect of lagged work effort, because individuals become more protective of their resources when these are depleted, and as such, they are less willing to use their remaining resources to engage in cognitively demanding creative processes.

The propositions were tested while controlling for activating moods, as well as intrinsic and extrinsic motivation. As such, in Chapter 2 we identify an important predictor of individuals decision to engage in creative action as opposed to habitual action on a certain day, namely the availability of cognitive resources. Thus, this chapter specifically deals with the implicit assumption that creative process engagement is cognitively depleting, and shows the implications of when cognitive resources are less available for an individual. We used a five-day within-person diary design among MTurk workers from various industries in America to examine our predictions.

Chapter 3: Disentangling the creative process: An examination of differential antecedents and outcomes for specific process-elements

In Chapter 3 we focus on the conceptualization of the creative process as a set of conceptually distinct behaviors that have their own antecedents, and that have differential effects of different types of creative outcomes. Although Chapter 2 mainly focuses on creative process engagement as a unitary construct, several scholars have proposed that the creative process consists out of conceptually distinct behaviors (i.e., problem construction, information search and encoding, and idea generation), each of them potentially elicited by a different set of antecedents, and each of them potentially relevant depending on which type of creativity is desired (e.g. Mumford et al., 1991; Unsworth, 2001). Developing a better understanding of which antecedents are related to which processes, and which processes to

which types of creativity is important because it enables practitioners to encourage certain types of creative actions, depending on the type of creativity that is desired.

In Chapter 3, we use a sensemaking perspective (Foldy et al., 2008; Ford, 1996; Weick, 1995) and assume that employees are engaged in an ongoing sensemaking process in which they try to answer the following two questions: (1) whether they are responsible for developing their own frameworks of meaning about the work situation in terms of what tasks are relevant for performance and what the problems are that deserve attention, or whether their leaders provide them with this framework of meaning; and (2) whether they are supposed to develop their own solutions to deal with tasks and problems or whether there is a prescribed way of acting for each specific task or situation. The first question refers to the extent to which individuals need to develop their own diagnostic frames (i.e., representation of the problems and searching for information to understand the environment), whereas the second question refers to the extent to which individuals need to develop their own prognostic frames (i.e., generate their own solutions or action strategies in situations).

We propose that job autonomy, as an important driver of internal regulation of behavior, signals to employees that they are responsible for developing their own diagnostic frames. As such, we expect a strong positive relationship of job autonomy with problem construction and information search and encoding, but not necessarily with idea generation. In contrast, we propose that leader creative expectations, as an external motivational driver, provide employees with the cue that they are required to generate novel ways of dealing with situations. As such, we expect a positive relation with idea generation, but not necessarily with problem construction and information search and encoding, because leaders might also specify very clearly for which problems they want creative solutions.

Additionally, we propose that radical creativity requires engagement in all creative processes, while incremental creativity only requires idea generation. Thus, in this chapter we

develop and test a theoretical framework that distinguishes sensemaking in prognostic framing and diagnostic framing, and show that this distinction enables us to explain why job autonomy and leader creative expectations are differentially related to creative process activities. Additionally, we show that these processes, in turn, impact radical and incremental creativity differentially. Thus, this chapter focuses on disentangling the creative process, and shows that different activities indeed are differentially related to both antecedents and consequences. To test these predictions, we gathered multi-source field data among employees and their direct supervisors in 25 companies in the Netherlands.

Chapter 4: Creativity as it unfolds: An examination of time in the creative process

In Chapter 4, we examine the conceptualization of creative process engagement as a sequence of interacting behaviors that unfolds over time. Thus, we zoom in even further on the creative process, by not only treating the specific activities in the creative process as distinct, but examining the idea that creativity arises from a process consisting of the interplay of activities that unfold over time (Lubart, 2001). In this Chapter we focus not only problem construction, information search and encoding, and idea generation, but also on idea selection and development.

The idea that creativity unfolds over time implies that time plays an important role in creativity. Unfortunately, the field lacks clear and explicit propositions about the temporal aspects of the creative process and lacks suitable methodology to examine this process in detail. In this Chapter, we firstly outline two broad perspectives on the creative process, the linear and iterative perspectives, and translate their implicit theories of time into temporal propositions regarding the duration, frequency, timing, and sequencing of creative process activities. In particular, the linear perspective assumes that creative activities should follow each other in an orderly and linear way. It predicts that early-stage activities (problem construction and information search) are more important than later activities (idea generation

and idea selection), that switching among activities is ineffective, and that late-stage activities should only be started when earlier activities have been completed. In contrast, the iterative perspective assumes that creativity involves a dynamic process of generation and selection activities through which an ill-defined problem is developed into a concrete and creative solution. This perspective predicts that idea selection and development is most important, that switching among activities is necessary and beneficial, and that idea evaluation processes should start early rather than late.

Secondly, we develop and use an lab paradigm that enables us to test these propositions, and offer some initial insights into how the creative process unfolds. This paradigm involves a computer environment, in which (student) participants are given the task to solve a real-world problem. During problem solving, they can freely navigate among different pages that can be used for problem construction, information search, idea generation, and idea selection and evaluation. During the process, it is unobtrusively monitored what participants actually do, allowing us to test the temporal propositions of the linear versus the iterative perspective.

Results of this study suggest (1) that some people followed a more linear approach to creativity, whereas others behaved more in line with the iterative approach; (2) that those who followed the iterative approach generated more original solutions; and (3) this difference mainly occurred because people who followed the iterative approach spent more time on idea selection and development. These results suggest that the creative process indeed is largely dynamic, and unfolds over time, and that the basic dynamic properties of this process can be fruitfully studied.

Chapter 5: General discussion

Finally, in Chapter 5, we summarize the findings of our three empirical Chapters. Following the findings of this thesis, we distill theoretical implications. Additionally, we

highlight the limitations of our research, and provide clear directions for future research regarding the creative process. Furthermore, we offer managers and practitioners advice on how they can implement the insights of this thesis in the workplace to improve the creative functioning of their workforce.