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# Managing innovation successfully: The value of contextual fit (Doctoral Dissertation)

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# Managing Innovation Successfully: The Value of Contextual Fit

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# Abstract

Innovation - the development and implementation of novel and useful ideas - lies at the heart of human adaptation. Individuals are creative in solving novel problems and exploiting opportunities. Work teams and organizations develop and implement new products and processes. This dissertation examines the mental processes, individual behaviors, and coordinated actions in social systems from which innovation emerges in real-world settings. The author develops a dialectic perspective which views innovation as the result of a dynamic interplay between contradictory forces. Based on this theoretical perspective, three empirical studies are conducted towards the goal of an improved understanding of innovation. First, the author shows that creativity requires an integration of different affective and cognitive functions. Personality differences play an important role in determining in which work situation this integration occurs. Second, the author specifies conditions under which active performance is mostly likely in research and development teams. Active performance is characterized by high motivational intensity and proactivity. It occurs if there is congruence between a person's orientation and the work context. Third, the author examines effective modes of managing innovation implementation. The distribution of roles between a leader and team members is found to be critical for implementation success. The findings of the three empirical studies are integrated by applying the concept of contextual fit. It is argued that innovation is most likely to succeed under conditions of contextual fit, because contextual fit leads to optimal functioning. Practical recommendations that can help to achieve contextual fit and hence optimal functioning are expressed in terms of if-then statements.

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# General Introduction

The goal of this dissertation is to contribute to the theoretical understanding of innovation and to inform innovation management by deriving practical implications that are based on a dialectic theory perspective and that are grounded in empirical research. In the first chapter a dialectic perspective of innovation is developed that aims at integrating past research on innovation and that provides a theoretical framework for research and practice. The three empirical chapters address specific research questions within the dialectic perspective on conditions that are supportive of different aspects of the innovation process. Creativity, active performance, and innovation implementation are the three aspects of the innovation process that are examined as outcome criteria in the empirical studies.

A core idea of the dialectic perspective developed in the *first chapter* is that innovation is the result of successfully managing and integrating conflicting activities that are referred to by conceptual dichotomies such as exploration-exploitation, convergence-divergence, autonomy-control. According to the dialectic perspective, individuals, teams, and organizations need to self-regulate and manage conflicting demands by shifting between different activities in the course of innovation. I criticize past research on innovation for neglecting dynamics, for overemphasizing dichotomous reasoning, and for a lack of contextualization.

According to the dialectic perspective, simplistic one-best-way approaches to innovation management are neither theoretically nor empirically justified. The starting points of innovation can be different, contingency conditions can change during the course of a project, and there are multiple pathways that can lead to success. Therefore, rather than proposing one-best-way approaches to innovation management, I argue that success is a function of contextual fit of innovation management practices.

By the term “contextual fit” I refer to the broad theoretical notion that congruence between the environment and a certain management approach, characteristics of a person, or characteristics of a social system leads to desired outcomes. Contextual fit comprises the idea of person-environment fit but extends it as it is not limited to stable characteristics of environment and person such as values, interests or personality, which are the focus of the person-environment fit literature (Schneider, 2001). Contextual fit also addresses whether specific actions are aligned with situations and whether individuals adapt their actions to changing task demands.

For the practice of innovation management and the question how it can be informed by innovation research, contextual fit implies that advocating simplistic one-best-way practices is of limited value. Even if a certain practice is found to be generally related to innovation success, this does not imply that for any given organization, team or individual, adopting the practice is in fact beneficial. Building on the notion of contextual fit, I argue that practical recommendation should be stated as if-then statements. They specify the condition under which a certain practice yields particular outcomes. That is, rather than stating, for instance, that a certain leadership style leads to innovation success, I propose both the contingency condition and the outcome need specification: the effectiveness of directive leadership behaviors may depend on the level of initiative in a team and can have differential effects on performance or satisfaction outcomes (Morgeson, 2005).

In each of the three empirical chapters of this dissertation the notion of contextual fit is applied to a different aspect of the innovation process. In the *second chapter*, I investigate the research question "When are people creative at work?" through the theoretical lens of contextual fit. I argue and demonstrate that individuals are characterized by distinct signatures of creativity. If there is congruence between characteristics of work situations and people's disposition towards action or state orientation, creativity emerges. Creativity requires analytic and intuitive mental functions which are closely connected to positive and negative affect (Schwarz & Bless, 1991). Individual differences in action versus state orientation describe individual differences in the regulation of positive and negative affect (Kuhl, 1994a). These individual differences determine the conditions under which people can perform the mental functions required for creativity. Practical implications on how to select and shape work situations in accordance with employee personality are discussed.

In the *third chapter*, I address the research question "When do team members of research and development projects show active performance?" within the contextual fit perspective. Building on the literature on exploration versus exploitation (March, 1991), I propose that individuals differ in their motivational orientation towards either exploration or exploitation. This motivational orientation holds important implications for when employees, who work on innovative projects, show active rather than passive performance. Based on regulatory fit theory (Higgins, 2005), I propose that active performance occurs if an individual's motivational orientation is consistent with project management style (Lewis, Welsh, Dehler, & Green, 2002), because the latter influences the means of goal pursuit. This hypothesis is confirmed in a multilevel study of R&D teams. I discuss practical implications for matching people to management style and management style to people.

In the *fourth chapter*, I focus on the research question: "What are effective modes of managing innovation implementation in leader-team systems?" I argue that implementation success in leader-team systems depends on the configuration of roles among leaders and team members (Katz & Kahn, 1978). An effective mode of management integrates an active role of the leader and autonomy of the team. Furthermore, the success of different modes of management depends on contextual fit. If leader-team systems are characterized by leaders who initiate structure concerning the tasks of the team (Keller, 2006), there is a dependency on the leader such that leaders need to engage in and direct innovation implementation. In contrast, teams that operate by team member initiative are less dependent on the leader and can self-regulate innovation implementation (Baer & Frese, 2003). Results of an in-depth study on innovation implementation provided support for the hypothesis on effective modes of management and the notion of contextual fit.

In the *general conclusion*, I summarize the findings of this dissertation in relation to contextual fit by using if-then statements to express when innovation relevant outcomes are likely to be achieved. I argue that contextual fit leads to optimal functioning of a system (cf. Fredrickson, 2001). I derive the practical implication that individuals, teams, and organizations are successful at innovating if they capitalize on their functional strengths. An understanding of how a system functions and its respective strengths is a precondition for successful innovation management. Adopting off-the-shelf practices that are not compatible with a how a given system functions are proposed to be at best ineffective.

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# Chapter 1

## A Dialectic Perspective on Innovation: Conflicting Demands, Multiple Pathways, and Ambidexterity


### Abstract

Innovation, the development and intentional introduction of new and useful ideas by individuals, teams, and organizations, lies at the heart of human adaptation. Decades of research in different disciplines and at different organizational levels have produced a wealth of knowledge about how innovation emerges and the factors that facilitate and inhibit innovation. We propose that this knowledge needs integration. In an initial step toward this goal, we apply a dialectic perspective on innovation to overcome limitations of dichotomous reasoning and to gain a more valid account of innovation. We point out that individuals, teams, and organizations need to self-regulate and manage conflicting demands of innovation and that multiple pathways can lead to idea generation and innovation. By scrutinizing the current use of the concept of organizational ambidexterity and extending it to individuals and teams, we develop a framework to help guide and facilitate future research and practice. Readers expecting specific and universal prescriptions of how to innovate will be disappointed as current research does not allow such inferences. Rather, we think innovation research should focus on developing and testing principles of innovation management in addition to developing decision aids for organizational practice. To this end, we put forward key propositions and action principles of innovation management.

## 1.1. Introduction

Throughout this article, we[1] use the term *creativity* for the generation of new and useful ideas and that of *innovation* to include both creative ideas and their implementation. Innovation can take different forms, including technological innovation, product and service innovation, and process innovation. The importance of innovation is widely acknowledged by organizational scholars, practitioners, and the wider society in an economic environment characterized by fierce competition, rapid change, and the global challenges of climate change and economic booms and busts. Decades of research have produced a wealth of knowledge about the characteristics of individuals, teams, and organizations that are related to outcomes of innovation (e.g., Anderson, De Dreu, & Nijstad, 2004; Damanpour, 1991). Some of these findings converge around factors that have been reliably found to influence innovation, such as a shared vision, innovative organizational culture (Miron, Erez, & Naveh, 2004; Naveh & Erez, 2004), emphasis on exploration rather than exploitation, and investment in R&D (Cohen & Levinthal, 1990; Zahra & George, 2002). Findings with respect to other factors such as team diversity (Gibson & Gibbs, 2006), task-related conflict, and monetary rewards (Amabile, 2000; Eisenberger & Rhoades, 2001) remain contradictory. Although we think that the scientific understanding of innovation is an important endeavor in its own right, we also suggest that the impact of scientific knowledge about innovation can be improved in organizational practice. Although many reasons may account for a lack of transfer of scientific knowledge to management practices, one reason may be that the scientific findings do not readily or easily produce actionable knowledge.

However, simplistically inferring practical implications or trying to be overly prescriptive can do harm, particularly if the context of an individual, team, or organization is not taken into account. We, therefore, chose to integrate empirical findings of the extant literature with an attempt to develop a set of broad principles of innovation management that can guide decision making and action in organizations. We base this integration on a perspective on innovation, which we term dialectic; we present and develop this perspective below. Toward this goal, we offer three contributions to the literature:

[1] This chapter was co-authored by Michael Frese (National University of Singapore), Neil Anderson (University of Amsterdam), Miriam Erez (Technion – Israel Institute of Technology), and James Farr (Pennsylvania State University). I also use the term “we” for the three empirical chapters, as several colleagues and students have contributed to each study.

- By developing and applying a dialectic perspective on innovation, we aim to gain a more valid account of innovation in organizations that can enrich research and practice.
- By reviewing core findings about innovation, we illustrate how multiple pathways can lead to idea generation and innovation.
- By redefining and extending the concept of ambidexterity, we propose a cross-level framework for the successful management of inherently conflicting demands of innovation.

## 1.2. Tensions of innovation: Theoretical perspectives

A pervasive theme in research on organizational innovation is that innovation is characterized by tensions (Lewis, Welsh, Dehler, & Green, 2002), paradoxes (Miron et al., 2004), contradictions (King, Anderson, & West, 1991), dilemmas (Benner & Tushman, 2003), and the so-called dark side of innovation processes (Anderson & Gasteiger, 2007). Table 1.1 presents a number of examples of tensions related to innovation that have been noted in the published literature. We organize Table 1.1 by the referent level of the tension (individual, team, or organizational) and by whether the tension is primarily focused on antecedents of innovation or on innovative processes and outcomes. The fact that tensions have been described frequently at all levels of analysis and with regard to antecedents, processes, and consequences of innovation provides what we think is compelling evidence for their pervasiveness within organizations attempting to innovate.

We propose with others that understanding and managing these tensions is central to successful innovation and use the terms conflicting demands and conflicting activities to refer to the origins of tensions, paradoxes, contradictions, and dilemmas. In the following, we contrast two theoretical perspectives and the strategies they imply for dealing with these tensions. One strategy deals with tensions by emphasizing the separation of conflicting activities to different suborganizations or even different organizations altogether (O'Reilly & Tushman, 2004). The top management of the organization is responsible for the necessary integration of activities that produce the tensions. In a way, this strategy deals with tensions by reducing them as much as possible. This strategy derives from a dichotomous theory perspective (March, Sproull, & Tamuz, 1991). We contrast the dichotomous approach with a

Table 1.1

*Tensions of innovation: Examples at individual, team, and organizational levels*

| | Antecedents of innovation | Innovation processes and outcomes |
|---|---|---|
| Organization | Cultural values and practices for innovation, efficiency and quality (Miron et al., 2004)<br>Autonomy and control (Gebert, Boerner, Lanwehr, 2003)<br>Organizational routines and dynamic capabilities (Zahra & George, 2002)<br>Core competencies and core rigidities (Leonard-Barton, 1992)<br>Prospectors and reactors (Miles & Snow, 1978)<br>Inertia and change based momentum (Jansen, 2004) | Exploration and exploitation (March, 1991)<br>The productivity dilemma (Abernathy, 1978)<br>Incremental and radical innovation (Chandy, Chandy, & Tellis, 1998)<br>Discontinuous innovation (Christensen, 1997)<br>Inventing the future vs. fitting strategy to competence (Hamel & Prahalad, 1994)<br>Dysfunctional consequences of innovation: e.g. lowered short-term profits (Anderson & Gasteiger, 2007) |
| Team | Transformational leadership and initiating structure (Keller, 2006)<br>Creativity and standardization (Gilson, Mathieu, Shalley, & Ruddy 2005)<br>Team diversity (e.g. Hulsheger, Anderson, & Salgado, 2008)<br>Divergent team processes: e.g. minority dissent (De Dreu, 2002)<br>Convergent team processes: e.g. shared vision (Hulsheger et al., 2008) | Exploration and exploitation in teams (Taylor & Greve, 2006)<br>Alignment and adaptability (Gibson & Birkinshaw, 2004)<br>Team creativity (Pirola-Merlo & Mann, 2004) and idea evaluation, selection, and implementation in teams (Farr, Sin, & Tesluk, 2003)<br>Radicalness of work group innovation (West & Anderson, 1996)<br>Dysfunctional consequences of innovation: e.g. interpersonal conflict in teams (Anderson & Gasteiger, 2007) |
| Individual | Openness to experience and conscientiousness (George & Zhou, 2001)<br>Artistic/investigative and conventional interests (Holland & Gottfredson, 1992)<br>Divergent and convergent thinking (Guilford, 1967)<br>Adaptors and innovators (Kirton, 1976)<br>Positive and negative mood (George & Zhou, 2007)<br>Promotion and prevention focus (Forster et al., 2003)<br>Learning and performance goal orientations (Yeo & Neal, 2004)<br>External rewards and intrinsic motivation (Collins & Amabile, 1999) | Explorative and exploitative activities of individuals (Mom, Van Den Bosch, & Volberda, 2007)<br>Ideation-implementation dilemma (Kimberly & Evanisko, 1981)<br>Opportunistic action regulation (Hacker, 2003)<br>Dysfunctional consequences of innovation: e.g. increased stress levels (Anderson & Gasteiger, 2007) |

second theoretical perspective that argues that a strict separation of conflicting activities to suborganizations leads to disadvantages. Given that a system has sufficient levels of internal complexity (Brown & Eisenhardt, 1997), the tensions should be kept within the system to be managed rather than organized "out" of the system.

Both the dichotomous (keep separate) and dialectic (integrate and manage) perspectives concur that the innovation process poses potentially conflicting task demands on individuals, teams, and organizations. By task demands, we refer to the patterns of requisite activity an individual, team, or organization must engage in to achieve an outcome. Innovation confronts individuals, teams, and organizations with fundamentally different demands in several important and unavoidable ways.

First, the demands of innovation differ from the demands of routine performance. Whereas routine performance is based on the exploitation of knowledge, skills, and abilities that emphasize quality and efficiency criteria, innovation requires exploratory action and creative thinking. People and teams who need to be creative and innovative must crave newness and be curious, whereas people and teams who are supposed to produce efficiently must be able to close their minds to new ideas that just interrupt the clear pattern of existing routines and hinder the further development of those routines into ever more efficient production.

Second, the innovation process itself encompasses different sets of activities, such as those related to idea generation and innovation implementation: These sets of activities are linked to different or conflicting antecedents. For instance, granting autonomy is linked to the generation of new ideas (Shalley, Zhou, & Oldham, 2004), whereas initiating structure is related to the success of implementing incremental innovation (Keller, 2006). Maximizing the conditions fostering creativity is unlikely to translate directly into innovation because innovation encompasses much more than idea generation. Indeed, the maximization of factors that facilitate the development of new ideas is likely to simultaneously cause conditions that may inhibit idea implementation and thus innovation overall. For example, Xerox Parc developed many innovations in software design, PC hardware, and PC connectivity. The creativity of this group was enormous. In addition, these innovations were often implemented in products. However, Xerox made little economic use of these enormously creative new products that were essentially fed into innovations marketed by Apple and Microsoft (Bergin, 2006; Miller & Steinberg, 2006).

Third, there are different types of innovation: An innovation is incremental when it builds on and exploits existing products and processes; an innovation is radical or disruptive if it departs strongly from the status quo (Benner & Tushman, 2003). Incremental innovation leads to expected increases in mean levels of performance, whereas radical innovation creates variability in performance (potential for high losses or high returns). The expected level of returns is lower for radical than for incremental innovation (Taylor & Greve, 2006). We assume with others that for radical innovation the problem of conflicting task demands of innovation is more pronounced than for incremental innovation, and the management of tensions is particularly challenging (Hoegl, Parboteeah, & Gemuenden, 2003; Christensen, 1997). However, even incremental innovation requires different performance activities, and the emergent logic of incremental innovation can challenge the established logic and climate for working practices (Bouwen & Fry, 1991). After all, an innovation means by definition that something new is done, produced, or serviced—new to the context in which the organization has operated up to that point.

### 1.2.1. Dichotomous perspective on innovation: Creation–implementation and exploration– exploitation

> *Proposition 1.* Creation–implementation and exploration–exploitation are conceptual dichotomies that refer to potentially conflicting activities. However, both seemingly contradictory activities are intertwined and mutually dependent.

We label one approach to understanding the tensions of innovation a dichotomous theory perspective because it emphasizes the fundamental dichotomies of organizational innovation and their respective inconsistencies: creation–implementation and exploration–exploitation. The dichotomous theory perspective regards idea generation and implementation as two distinct activities that should be separated in terms of time and often even with regard to people. The separation of people is based on the fact that some people are more creative than others, whereas others may be better at implementation and the maintenance of newly implemented ideas. Once an idea has been developed in the creative phase, the implementation is conceptualized to be the execution of an idea that is largely fixed. Particularly, when different people are involved or if tasks are rigidly structured into phases, the differentiation of creation and implementation is emphasized. However, as we will elaborate later, creation and implementation are intertwined and mutually dependent

activities, and difficulties are likely to result if a strategy of clearly separating the two sets of activities is pursued.

The second basic dichotomy is the distinction between exploration and exploitation. "Exploration includes things captured by terms such as search, variation, risk taking, experimentation, play, flexibility, discovery, innovation. Exploitation includes such things as refinement, choice, production, efficiency, selection, implementation, execution" (March, 1991; p. 71). Thus, both dichotomies are directly related as exploration encompasses creative idea generation, whereas implementation is a subset of exploitation. Extending the work by March (1991), Benner and Tushman (2003) used the term "productivity dilemma" to refer to the difficulties organizations face as they are supposed to be both exploring and exploiting technologies and markets. An organization aiming at sustainable performance needs to exploit and adapt current products and processes and explore new products and processes. However, exploration and exploitation activities compete for scarce resources (March, 1991) and pursuing both activities has been proposed to pose inconsistent psychological demands on individuals, teams, and organizations (Smith & Tushman, 2005). Therefore, the standard suggestion is to make it possible for organizations to be both exploitative and explorative; however, because of the inherent tensions, these two functions of the organization need to be separated—often in different locations with different personnel and even in suborganizations that are distinct from the mother firm. This type of organization is known as the ambidextrous organization (Benner & Tushman, 2003; Gibson & Birkinshaw, 2004). One example is IBM, which developed its personal computers with a completely different set of employees than its standard mainframes (Hamel & Prahalad, 1994). Although research about exploration–exploitation has primarily focused on the organizational level of analysis, the logic underlying the dichotomous strategy can be extended to lower levels in an organization. For example, within a team the tensions between activities can be reduced by creating fixed roles around either more explorative or more exploitative tasks.

Although there is empirical support for the theoretical proposition that performing both activities leads to better organizational results (He & Wong, 2004), the assumption that exploration and exploitation need to be separated has, to our knowledge, not been empirically tested. Not denying the trade offs and inconsistencies that can arise, we doubt that this is a law of nature. For example, Gilson, Mathieu, Shalley, and Ruddy (2005) have demonstrated that creativity and standardization—creativity being explorative and standardization

exploitative—can not only co-occur within work teams but actually interact to bring about superior performance in terms of customer satisfaction.

Although exploration and exploitation may lead to tensions and trade-offs, they can co-occur and be as much functionally interdependent as they are in conflict. For instance, the separation of exploratory from exploitative units may reduce inconsistencies, such that R&D departments can more easily explore without being constrained by a current way of doing things or by a production-focused time horizon for goal accomplishment; this approach may, however, also create new problems and loss of synergies with other departments that are responsible for the implementation and marketing of new products (Westerman, McFarlan, & Iansiti, 2006). Companies have anecdotally reported unforeseen difficulties when they have kept research and development in their headquarters but moved production to low-cost countries. As the production base is no longer easily available, R&D departments face problems because production units frequently serve as a source of ideas and as an opportunity to test the feasibility of ideas and their implementation.

The problems of the dichotomous perspective that we note with this brief discussion lead us to propose an alternative approach that we label a dialectic perspective on innovation.

### 1.2.2. A dialectic perspective on innovation

> *"The thread of common meaning which runs through . . . four conceptions of dialectic [i.e., those of Plato, Aristotle, Kant, and Hegel] is to be found in the principle of opposition. In each of them dialectic either begins or ends with some sort of intellectual conflict, or develops and then resolves such oppositions" (Adler, 1952, p. 350).*

To advance our understanding of innovation, we propose dialectic reasoning as a useful framework. The common thread underlying the use of the term dialectic in Western philosophy is a focus on contradictions and the attempt to overcome contradictions in favor of higher order integration. For other dialectic approaches, in particular eastern philosophies and "eastern ways of thinking" more generally, the emphasis is more on acceptance and tolerance of contradictions rather than active change toward a synthesis (Nisbett, Peng, Choi, & Norenzayan, 2001). In accordance with our cultural background and the phenomenon we study—the intentional introduction of new ideas that brings about innovation—we follow a dialectic approach in the tradition of Western philosophy. Dialectic thinking emphasizes that reality is in a constant state of flux and that conflicting forces underlie the dynamic nature of

both reality and human thinking (e.g., Engels, 1940). Dialectic thinking stresses the mutual dependence of concepts and phenomena and their interrelationships. For instance, from a dialectic point of view, the meaning of a construct such as promotion focus is partly derived from implicitly contrasting it with its counterpart of prevention focus (Forster, Higgins, & Taylor-Bianco, 2003; Higgins, 1997).

From a dialectic perspective, we argue that the tensions between the above dichotomies, between creativity and implementation, and between exploration and exploitation should be kept within the same organizational system because they are interdependent. For example, it is precisely the ability to discuss conflicting ideas within a cross-functional team that leads to innovation (Lovelace, Shapiro, & Weingart, 2001).

Dialectic reasoning is inherently motivated as its goal is to overcome a dualism, a higher order integration of conflicting parts in the form of a new synthesis. Toward the goal of advancing our understanding of innovation, we apply dialectic reasoning to overcome the static and dichotomous way of thinking that prevails in much of the extant innovation research. We discuss how conflicting forces can be managed to achieve a synthesis in the form of successful innovation and propose that dialectic thinking can spur innovation. Indeed, Riegel (1973) argued that innovative activities "are dominated by playful manipulations of contradictions and by conceiving issues integratively which have been torn apart by formal operational thinking" (p. 363; see also Peng & Nisbett, 1999), thus, by thinking in a dialectic manner.

At the most abstract level, the well-known formula of thesis, antithesis, and synthesis describes the process of ongoing negation central to dialectic reasoning. The synthesis that resolves the opposition of thesis and antithesis already contains a new dialectic process: It becomes the next thesis that results in another antithesis, which can again be developed into a higher form of synthesis. This is a powerful description of change processes in general (Weick & Quinn, 1999): From a specific situation with its routines, norms, and beliefs (the thesis) emerges some dissatisfaction with the status quo, motivating a change process (the antithesis). The synthesis is an outcome from the change process, which carries the old and embraces the new at the same time. However, because the new synthesis produces new problems, it also produces new antitheses (Festinger [1983] has pointed this out as the dynamics of human cultural development).

*Proposition 2.* Every state of an organization leads to its contradiction and negation at some point. Thus, there is a never-ending cycle of continuing innovations that is based on recurring antitheses and syntheses.

We suggest that this abstract formula of thesis, antithesis, and synthesis describes the innovation process quite well, because innovation usually implies that one negates something that currently exists. At the same time, however, innovation cannot be completely "free" from the influence of what previously existed. A popular example is the fact that the first cars were essentially "horse carriages without a horse." The dialectic process of antithesis and synthesizing led to a series of innovative developments that integrated better aerodynamics, progress of engine technology, and so forth.

Another example is the innovation of lean production by Toyota (Womack, Jones, & Roos, 1990), which first started with the thesis of traditional Japanese production of cars by craftsmanship. An antithesis based on the use of modern production technology was developed, but this antithesis was constrained by postwar Japanese poverty; therefore, production could not mimic the American antithesis of Fordian assembly lines with its vast superiority in terms of standardization and routinization. Thus, a different antithesis had to be used, which led to a synthesis that allowed old craftsmanship to be lifted up into a new synthesis called lean production (or, more accurately, the inclusion of certain facets of craftsmanship, such as lifelong employment, consistent development of employee skills, and frequent performance improvement suggestions by blue collar workers). Again, lean production underwent a number of innovative revisions once the basic idea was developed. This led to the most powerful production machine in the world of automobiles (Womack et al., 1990). Once lean production was tried outside the Japanese context, this led again to a set of new theses, new antitheses, and new syntheses (Young, 1992).

In the tradition of dialectic thinking, organizational innovation can be conceptualized as a dialectic process, the resulting innovation being a specific instance of a synthesis. An initial idea of a new product or organizational process and the status quo are the contradictory forces at the beginning of the process. The successful transformation of the status quo to incorporate a new idea can be regarded as the synthesis in this dialectic process. The result of

innovation is not identical to the initial idea but "resolves"[2] the opposition of that idea and the former state. The synthesis carries elements of both parts of the system—the thesis and the antithesis—but integrates and supplements them.

Analytical separation of the status quo that is to be changed and the new idea, as contradictory categories, can obscure that both are interdependent. New ideas originate from and are embedded in the status quo, and the status quo is itself the result of prior ideas. Fundamental creativity can lead to new ideas, but we argue that those ideas are also subject to incremental improvements, new ideas that emerge because details do not work well (i.e., detail orientation) and because errors may appear unexpectedly even in routinized work and lead to new thinking. Thus, there are several avenues in which an antithesis can be developed to stimulate innovation. An example in psychological science for these different avenues is the approaches of Piaget and Tolman in their critique of behaviorism. Piaget (1947) made an all-out attack on behaviorism whereas Tolman (1932) started from an empirical critique of behaviorism that was still wedded to behaviorist principles. Nevertheless, both came to similar scientific ideas that emphasized cognitive concepts. Extending the focus from innovation processes to the antecedent conditions of innovation, dialectic reasoning requires scrutinizing the relationship between antecedent conditions and outcomes.

> *Proposition 3*. Antecedent conditions have inconsistent consequences for the different requisite activities of innovation. Both sides of many conceptual dichotomies have functional value for some of the activities underlying innovation.

An example for inconsistent consequences of antecedent conditions on innovation is diversity. Diversity of individuals in teams and organizations holds the promise of spurring innovation as different perspectives are available. However, diversity can lead to information elaboration, thereby fostering innovation, but can also lead to social categorization processes that hinder innovation (we later elaborate on findings about team diversity; Van Knippenberg, De Dreu, & Homan, 2004). The hypothesized role of individuals' regulatory focus for innovation can serve as an example for the functional value of both sides of a conceptual dichotomy. Although a high promotion focus aimed at moving an idea forward even in the face of uncertainty and potential failure can have high functional value for innovation success,

[2] The German term for resolve "Aufheben" is useful here because it denotes a double meaning: First, the synthesis does away (aufheben) with the contradiction of the thesis and the antithesis, but at the same time it lifts up (aufheben) the level of knowledge (in the synthesis).

the same is true for a prevention focus. Detailed elaboration of information and suspension of early decision making and commitment to a first idea can be as valuable (Forster et al., 2003).

The dialectic approach leads one to think differently about paradoxes. Originally, a paradox "denotes contradictory, mutually exclusive elements that exist simultaneously and for which no synthesis or choice is possible or necessarily desirable" (Cameron & Quinn, 1988, p. 2). A dialectic approach suggests that the paradoxes discussed in the innovation literature can be resolved by taking the complexity of innovation processes and the multiple pathways to innovation into account.

Let us contrast the dialectic theory perspective with the dichotomous theory perspective described above. The dichotomous perspective regards idea generation and implementation models of innovation as two separate activities that need to be separated in terms of time and often with regard to personnel. Once the creativity phase is completed, the implementation phase is conceptualized to be the execution of the novel idea that is fixed once and for all. In contrast, a dialectic perspective emphasizes that creative processes and implementation are intertwined and mutually dependent activities. Creative activity does not only serve as input to idea implementation but is required throughout the process as unforeseen problems and opportunities arise and subtasks such as product components, production processes, and marketing strategies are addressed (Mumford, Scott, Gaddis, & Strange, 2002). The same idea will lead to different outcomes depending on the specific circumstances of an organization as ideas interact with the environment in which they are implemented and transformed. Many stakeholders are involved in any organizational innovation, which should be regarded as the result of collective action. Thus, innovation at the team or organizational level emerges through processes in which the contributions of different actors are integrated, and the final result is different from what the actors initially intended (Hargrave & Van De Ven, 2006).

## 1.3. A dialectic review of research on innovation at multiple organizational levels

The steps commonly assumed to describe the path from ideas to their implementation consist of idea generation, idea evaluation and selection, idea mobilization, building a prototype, implementing the prototype into a final product, and marketing the product toward its successful penetration to the market (Amabile, 1988; Farr, Sin, & Tesluk, 2003; West, 2002b). Along this process, different factors can either facilitate or inhibit the innovation

process. In the following sections, we review the research literature on the steps from idea generation to its implementation, moving from the individual to the organizational level, to discuss some propositions that follow from a dialectic approach. We are not advocating a phase model of innovation but are using these familiar terms heuristically as convenient parcels of an outline of the innovation process. We demonstrate that the duality of competing processes exists not only between these steps but also within each step.

### 1.3.1. Step 1: The generation of new and useful ideas by individuals

> *Proposition 4*. There are multiple pathways to developing creative ideas, such as necessity, slack resources, or errors. Activities commonly considered as "uncreative", such as attention to detail, can lead to a point at which useful new ideas can first be initiated.

One focus of psychological research has been on creative idea generation. Creativity is often defined as the generation of new ideas that are useful and appropriate (Amabile, 2000; West, 2002b). Research has found that different and even conflicting factors can stimulate idea generation, and we infer there are multiple "entry points" and pathways to the generation of new and potentially useful ideas: Two competing forces—necessity and limited resources, but also slack and "garbage cans" (see below)—stimulate creativity. New ideas can arise in the face of opportunities, such as technological developments, or can be stimulated by pressing problems, necessities, and distress with the status quo. These different entry points of idea generation are reflected in conflicting theoretical propositions and empirical findings about the importance of slack resources for creativity. Slack resources can enable individuals and organizations to develop and explore ideas even if they do not lead to tangible results in the short term (Damanpour, 1991; Voss, Sirdeshmukh, & Voss, 2008). Cohen, March, and Olsen (1972) coined the term "garbage can", which refers to a form of organized anarchies, consisting of solutions looking for issues to which there might be an answer. However, not only the saying "necessity is the mother of invention" questions whether slack resources are a prerequisite for innovation. Environmental threat (Voss et al., 2008), time pressure (Baer & Oldham, 2006; Ohly, Sonnentag, & Pluntke, 2006), and sheer necessity (Gasper, 2003) can also be drivers of idea generation. These are opposing ideas. A dialectic viewpoint would suggest that a synthesis is possible: Threat, time pressure, and necessity can influence an active approach to dealing with problems, and such an active approach may lead to higher creativity that includes developing creative ideas with a goal-oriented approach. In our

thinking, personal initiative is influenced by these threats and necessities (Binnewies, Ohly, & Sonnentag, 2007; Fay & Sonnentag, 2002), and personal initiative implies creativity (Frese, Teng, & Wijnen, 1999). However, the complete lack of slack resources may lead to the expectation that nothing works well in the organization, and, therefore, there is little outcome control and action control—this leads to a lower degree of personal initiative, which includes lower creativity (Frese, Garst, & Fay, 2007).

> *Proposition 5*. Providing an environment that allows for ideas to emerge is useful, but rewarding creativity and structuring creativity are advisable when goals can be specified.

Another area in which contradictory propositions exist is the influence of organizational practices on individuals' motivation to engage in creative activities. Leaders can choose to increase employee creativity by setting goals for creativity and rewarding creative behavior (Eisenberger, Pierce, & Cameron, 1999; Shalley, 1991). Extrinsic motivators, such as money, can enhance creativity because individuals are motivated to focus on the generation of new and original ideas (Eisenberger & Rhoades, 2001; Livne-Tarandach, Erez, & Erev, 2004). A leader may specify what kind of creative ideas he or she is seeking. A project manager of a marketing campaign may ask for new ideas related to how new customers can be addressed and further constrain the options he or she considers feasible. This aligns individuals with the leaders' concept of what kind of new ideas add value. Setting goals and rewarding creativity is contradicted by the idea that intrinsic motivation is the main motivational driver of creativity (Collins & Amabile, 1999). The recommendation that follows from intrinsic motivation is to create a work environment that facilitates creativity rather than directly rewarding creativity. This perspective questions the usefulness of goal setting and rewarding creativity because it may undermine intrinsic motivation (Amabile, 2000).

A synthesis is possible between these contradictory ideas. Creativity goals and extrinsic motivators increase creativity whenever the goal to be creative clearly refers to a specific task (Shalley, 1991); this is often the case when creative ideas are implemented. More likely than not, creative ideas are very important in the implementation "phase" (Mumford et al., 2002). Whenever a goal cannot yet be specified for a task, it pays to provide environments in which there is unconditional acceptance and intrinsic motivation (Collins & Amabile, 1999; West, 2002b). A dialectic viewpoint suggests that one approach, namely freedom that

provides unconditional support for creativity, may produce the success of its opposite, namely goal-oriented creativity and extrinsic motivators, once the novel idea is deemed to be successful by an organization. In other words, the thesis freedom leads to its antithesis whenever creative ideas are translated into concrete products—in this later "phase", goal-oriented creativity is probably successful. Although this resembles the implementation "phase", we maintain that creativity is still needed; therefore, it is not a purely new phase even if the motivation for this creativity may be externally developed. Just so that we are not misunderstood that we want to introduce a phase model again, we hasten to add that even at that point of the innovation process, it may be useful to have undirected, non-goal-oriented sessions of creativity.

> *Proposition 6*. Fostering positive moods facilitates creativity. However, the functional value of negative moods, such as distress of the status quo and effortful persistence, need to be acknowledged as part of goal-directed innovation.

Evidence for our general claim that highly different circumstances and processes can lead to idea generation also comes from the literature investigating the mood-creativity link. There is consistent evidence on the creativity enhancing impact of positive moods (e.g., Amabile, Barsade, Mueller, & Staw, 2005; Isen, Daubman, & Nowicki, 1987). At the same time, negative mood can also foster creative thinking under certain conditions. George and Zhou (2002, 2007) have pointed out that both negative as well as positive moods may have a useful function: Negative mood promotes creativity when support for creativity and positive moods are present because negative mood signals a problematic state of affairs, leading individuals to systematically address the problem at hand. Fong (2006) found that experiencing the state of emotional ambivalence— the simultaneous presence of positive and negative emotions—leads to a state of higher creativity. De Dreu, Baas, and Nijstad (2008) suggested a dual pathway to creativity model in which creativity can be achieved through effortful persistence or a state of positive mood. Thus, the emotional underpinnings of creativity can vary, and creativity can emerge from a complex interaction of seemingly contradictory emotional tendencies.

> *Proposition 7*. Innovation requires the regulation of exploration and exploitation and their antecedents (e.g., divergent and convergent thinking, learning and performance orientation). Exploitative activities and expertise provide the foundation for useful new ideas but need to be challenged by explorative activities for new ideas to emerge.

New ideas that emerge, in turn, require exploitative activities to be successfully implemented.

Creative idea generation is subsumed under exploration within the conceptual dichotomy of exploration and exploitation activities in organizations. However, conceptually isolating creative idea generation from exploitative activities and empirically investigating it as an isolated phenomenon obscures that creative idea generation is embedded in and influenced by actions at work, be they exploratory or exploitative. Paying high attention to detail, developing routines, refining and exploiting skills—that is, engaging in activities that appear antithetical to creativity—can actually provide a basis for new ideas. Detailed expertise in a domain enables individuals to come up with ideas that are both new and useful (e.g., Conti, Coon, & Amabile, 1996; Taylor & Greve, 2006). Routinization and standardization can free up the cognitive resources required for creative thought (Ohly, Sonnentag, & Pluntke, 2006). Engaging and excelling in exploitative activities are essential in leading to a point at which it first becomes clear that an established way of doing things has its limits and that the incremental value of a current product or service for meeting customer needs is limited. Although essential preconditions for creative ideas, current skills and expertise are double-edged swords: Core competencies can become core rigidities (LeonardBarton, 1992), individuals may continue to use available problem-solving solutions and routines even when more effective ways of doing things are available (Luchins, 1942), and adherence to existing rules and guidelines can keep people from experimenting and inventing new procedures (George & Zhou, 2001). How do we resolve conflicting propositions on the role of expertise and routinization for innovation? Based on deep and broad expertise and well-developed routines, innovation can be spurred by engaging in the process of negation, that is, questioning the current way of doing things and combining available knowledge in new ways.

Given the different pathways to creativity and the fact that creativity can be based on activities that appear antithetical to creativity, simplistic recommendations based on isolated relationships between determinants and creativity seem misguided, even if those relationships are well established. If innovation is the desired outcome, making recommendations is even more challenging because creativity is only one element of successful innovation. Implementation, the transformation of ideas to new products and processes, is arguably a greater challenge than idea generation and is paradoxically the area with less research attention (West, 2002a).

### 1.3.2. Step 2: The implementation of new and useful ideas

Organizational scholars have long argued that idea generation and idea implementation are fundamentally different activities and that independent or even conflicting determinants, such as personality or goal orientations, influence performance of the respective activities (e.g., Farr et al., 2003; Farr & Ford, 1990; Kimberly & Evanisko, 1981). As both are necessary and potentially conflicting, innovation poses fundamental problems for self-regulation of individuals aiming to bring about innovation and management of innovation in organizational settings. The creation of new ideas is an exploratory activity that is based on divergent processes and leads to increases in variability. In contrast, implementation activities are based on convergent processes aimed at exploiting the potential value of new ideas and leading to a reduction of variability. When committed to a new idea, activities need to converge around the implementation of that idea. Persistence is required to overcome barriers and resistance (Frese & Fay, 2001; Hauschildt & Gemuenden, 1999). Individuals also need to resist engaging in divergent activities that do not serve the implementation of the chosen idea. Farr et al. (2003) have suggested that learning orientation is related to explorative idea generation, whereas performance orientation contributes to exploitative idea implementation. Learning orientation is reflected in a desire to explore, seek challenging situations, and engage in deep processing (Yeo & Neal, 2004). Performance orientation focuses on demonstrating one's ability, avoiding mistakes, and adhering to normative performance standards. Both orientations being required for innovating speaks for rejecting the tyranny of the "or" and embracing an emphatic "and" approach (Cameron & Quinn, 1988; Lewis, 2000) in contrast to emphasizing the one or the other. At the same time, however, individuals can be required to be either strongly performance or learning oriented at any given point in time if this is demanded by the task. The challenge for individuals is thus to be aware of the dynamic nature of the task demands and to switch between different mind and action sets.

> *Proposition 8.* Openness to Experience and Conscientiousness facilitate different requisite activities of innovation. Individuals disposed toward either high Openness to Experience or high Conscientiousness need to invest regulatory effort to meet all requisite demands of innovation.

As far as personality is concerned, research largely confirms the intuitively appealing proposition that psychological characteristics that are conceptually linked to creativity are consistently related to innovative behavior. More creative individuals are open to experience

(George & Zhou, 2001), demonstrate divergent thinking styles (Kirton, 1976), and are unconventional (Frese et al., 1999). However, these are hardly characteristics that go hand in hand with persistence, attention to detail, and the rigorous implementation of others' ideas—the latter are all necessary aspects of innovation implementation (Miron et al., 2004). Conscientiousness is a trait that should only be related to implementation and should inhibit creativity, particularly its subfactor of dependability. Thus, placing a strong emphasis on either Openness to Experience or on Conscientiousness in selection and placement decisions for R&D teams may be problematic (Hulsheger, Anderson, & Salgado, 2009a).

From a dialectic perspective, the crucial issue is to synthesize the qualities of both Openness to Experience and Conscientiousness for innovation. On the individual level, we expect this to be less difficult for individuals high on both dimensions compared with individuals disposed toward either high Conscientiousness or high Openness to Experience. Individuals need to invest high regulatory effort to meet the demands of innovation that are inconsistent with their dispositions. Individuals highly open to experience need to invest regulatory effort to conform to agreed courses of action, "close" their minds at times, and focus on implementation whenever this is required. In contrast, individuals who are highly conscientious without simultaneously being open to experience need to invest effort to challenge outdated ways of doing things, break rules hindering innovation, and take the risk of sometimes not being dependable concerning routine tasks for the sake of innovating. This would be an aspect of managing or regulating one's personality (Rauch & Frese, 2007). As most individuals are not disposed to easily perform all requisite activities of innovation, investing high degrees of regulatory effort is necessary. This points toward the importance of an active approach toward work, such as being proactive (Griffin, Neal, & Parker, 2007), demonstrating personal initiative (Frese & Fay, 2001), and being highly engaged (Macey & Schneider, 2008). On the level of the individual, we thus propose an active approach toward work as a crucial precondition for synthesizing conflicting but necessary activities.

Shifting our focus from individuals to teams, a complementary opportunity of synthesizing conflicting activities becomes feasible. Teams provide the opportunity to bring together requisite psychological qualities that may infrequently co-occur within individual persons.

### 1.3.3. Idea generation and implementation in teams

*Proposition 9*. Given frequent occurrence of convergent team processes, such as conformity and consensus seeking, divergent activities need to be encouraged, for instance, by appreciating minority dissent and challenging the content of the vision the team is pursuing. However, outcomes from such divergent team processes also need to be reintegrated, for instance, by clearly communicating a new vision.

Corresponding to the research focus on creativity and divergent thinking at the individual level, researchers have put forward the thesis that team member diversity and divergent processes in teams, such as minority dissent and task-related conflict, fuel innovation (e.g., De Dreu, 2002; Shin & Zhou, 2007). Indeed, meta-analytic evidence at the team level (Hulsheger, Anderson & Salgado, 2008) supports the value of team member diversity for innovation. Diversity of team members in terms of educational background, knowledge, and demographics can be supportive of innovation (Shin & Zhou, 2007). However, cultural diversity was found to have a negative impact on team innovation (Gibson & Gibbs, 2006). Minority dissent has been found to be a facilitator of innovation, but only if overt task reflexivity about the team's objectives and processes was high (De Dreu, 2002). Further research by De Dreu and West (2001) showed that only if team members could participate in decision-making was minority dissent supportive of innovation. For task conflict, meta-analytic findings suggest neither a generally positive nor a negative effect on innovation (Hulsheger et al., 2008). There is, however, some support for a curvilinear relationship of task conflict with innovation, such that moderate levels of task conflict are optimal (De Dreu, 2006). Furthermore, as task conflict is unrelated to team innovation across studies, it does not seem to be detrimental, per se, to team innovation. This is different for team performance as an outcome where there is a clear negative relationship (De Dreu & Weingart, 2003). Thus, some teams with task conflict may actually be capable of leveraging the conflict for the enhancement of innovation, even though this is not generally the case and task conflict impedes overall team performance.

Teams aiming to innovate are required not only to develop and explore new ideas, but also to align team members toward the common goal of innovation and to achieve other performance criteria, such as quality and efficiency demands (Miron et al., 2004). Thus, an antithetical proposition to the emphasis of diversity and divergent processes stresses the importance of convergence in teams (Pearce & Ensley, 2004; Hoegl & Gemuenden, 2001).

Indeed, meta-analytic evidence on shared vision and task orientation as two factors supporting convergence and integration of team members' activities toward common goals corroborates this proposition (Hulsheger et al., 2008). Shared vision and task orientation are more closely related to successful innovation than the variability-enhancing factors of diversity and task conflict, and are among the strongest determinants of successful team innovation. Visions can lead to either incremental or transformational goals. Thus, visions can help with incremental and with radical innovation. Visions may lead to incremental innovation, driven by the attempt to implement the vision as fast as possible and be the first mover in the market. However, transformational visions exist, for example, in politics, Martin Luther King's dream about equal opportunities for African Americans, or the vision to reach the moon, which led to dramatic technological innovations.

In line with the dialectic approach, we suggest that as effective as a shared vision is for innovation, it can have undesired consequences if it comes at the expense of not exploring new possibilities for radical innovations that lie outside of the realm of the present vision. The vision of producing more powerful and faster cars within a certain technological paradigm has stimulated innovation in automotive industries. These innovations have served their purpose and may even prove useful for radical future innovations. However, there have been ample suggestions in the popular press that the vision of producing more powerful and faster cars has been detrimental to divergent thought and subsequent innovations related to fuel-efficient cars, new drive technologies, and low-cost individual mobility. Thus, through the commonality of purpose and perspective that a strong vision promotes, the development of new and divergent visions may be hindered.

We think the findings on convergent and divergent processes in teams are not contradictory but can be resolved. On the basis of strong convergent and integrative processes (e.g., participation in decision making, shared vision, team reflexivity, and task orientation), divergent processes can fuel innovation, whereas convergent processes alone can lead teams to become locked into the path they are currently pursuing. Tensions between convergent and divergent processes need to be actively managed within a system toward the right balance, with the empirical evidence speaking for a predominance of convergent and integrative processes (Hulsheger et al., 2008). Detailed plans on implementing ideas need to co-occur with the readiness to flexibly change and possibly alter a course of action as unforeseen events occur.

Frequently, stage models are used to outline the pathway from the generation of a new idea to its implementation and routinization (Zaltman, Duncan, & Holbek, 1973). However, stage models can be misleading if they are interpreted as describing the actual succession of different activities or if they are even taken as normative guides to how individuals and teams should proceed when innovating. At each point in time of the innovation process, individuals and teams can shift from exploring new possibilities to exploiting what they have already accomplished and back to exploratory activity. King (1992) and Cheng and Van de Ven (1996) found that linear models do not adequately represent the innovation process. Innovation, in particular radical innovation, unfolds in a cyclical and nonlinear fashion rather than as a sequence of phases (Anderson et al., 2004; Farr et al., 2003). Performance episodes of explorative idea generation and exploitative implementation activities alternate with limited predictability. The relative weight of different processes shifts over time. In general, idea creation processes tend to be emphasized in the beginning, whereas implementation processes are more prevalent in the final stages of an innovation project (West, 2002b). However, even when a project is close to completion, additional creative activity can be necessary to deal with unforeseen disturbances (Mumford et al., 2002), and new ideas may unintentionally emerge that stimulate further innovation. In a particularly informative study, Cheng and Van de Ven showed that within a single project the pattern of events and activities can frequently be chaotic—that is, not random but unpredictable—whereas at other (later) times follow a periodic, orderly pattern.

We expect individuals and teams can follow multiple pathways to innovation, some emphasizing clearly planned approaches, whereas for others "order emerges more from chaos" (Cheng & Van de Ven, 1996). However, neither a rigid approach that tries to follow a static stage-by-stage model while ignoring the uncertainty attached to innovation nor an approach where order does not emerge out of chaos is likely to succeed. Thus, as important as the development of detailed implementation plans for innovation is (Frese et al., 2007), equally important is the flexibility to be responsive to unforeseen events, give up previous plans, and to make fundamental changes to the course of action.

## 1.3.4. Organizational level antecedents of innovation

*Proposition 11*. As innovation has emerged from contradictory organizational structures and cultures, "one-best-way" recommendations for organizational

innovation that do not take into account the particularities of a given organization are misguided and may even do more harm than add value.

If we extend our focus from individuals and teams to organizations by asking what kind of organizations have been able to successfully innovate, we come to the conclusion that the principle of multiple pathways also applies for organizational innovation: Innovation has many different entry points and can be achieved via multiple pathways, meaning that the structures and cultures from which innovation arises can be different or even oppositional.

At the organizational level of analysis, we know from meta-analytic evidence (Camison-Zornoza, Lapiedra-Alcami, Segarra-Cipres, & Montserrat Boronat-Navarro, 2001; Damanpour, 1991) that larger, specialized, and functionally diversified organizations that possess high degrees of technical knowledge resources produce more innovations. In contrast, centralization of organizations is negatively related to innovation. Although these findings are somewhat dated, we think they are still informative about the general factors facilitating innovation. It may seem paradoxical, but the mechanisms operating at the level of a specific company may be quite opposite to the relationships that emerge across companies and studies. Large companies may fail to innovate, and small companies that are new to a market and lack a well developed technical knowledge base may have a competitive advantage for producing new products and services in comparison with large companies.

For example, Christensen's (1997) work on disruptive innovation demonstrates that small companies in the hard-disk industry have repeatedly entered the market with radical innovations leading to the failure of large, established companies, which have not been able to innovate successfully because they focused too strongly on their main customers. In light of the above cited meta-analytical findings, this does not seem to be a very frequent phenomenon. Our main point is, again, that caution is necessary in directly deriving implications for any particular firm from our knowledge about general determinants of innovation because the entry points and pathways to successful innovation are manifold.

The idea of different entry points and pathways to innovation can be illustrated by describing a group of German companies that do not fit well our innovative stereotype but that has been extremely successful in the recent decades at innovating and extending its markets (Venohr & Meyer, 2007). These companies are located in rural areas in the mostly conservative southwestern part of Germany far away from any government-funded technology center and are among the market leaders in their closely defined technological niche. The companies are family-owned and run by professional management. Size and

industry vary highly, including trading companies with 10,000 employees and mechanical systems engineering companies with a few hundred employees. The most successful of these companies have been termed “hidden champions” (Simon, 1996). Their workforce is to a large part rooted in the region. The dominant cultural focus is on quality, efficiency, and process effectiveness. Labor relations are described as consensus oriented, fluctuation and turnover among employees is low, and the basic organizational values are described as authoritarian. These companies have been reported to focus all their resources on solving a burning problem for a well-defined customer group, using their customers as a main source of innovation, while developing and extending their core competencies rather than diversifying widely. They use a highly integrated business model and have stayed successful at innovating and growing with this strategy for several decades. They seem to do most things different from the norm suggested by popular management books (Simon, 1996).

This group of companies highlights that a strategy quite opposite to many recommendations can be highly successful at continuous innovation. Thus, in the absence of rigorous empirical evidence and validated contingency models, prescriptive recommendations on how organizations should innovate seem misguided (Hamel & Prahalad, 1994).

Although we have emphasized throughout this article the pervasive existence of conflicting demands of innovation for individuals, teams, and organizations, there is little empirical research that has directly examined how conflicting demands might be effectively managed and self-regulated. In the absence of strong empirical research on management and self-regulation of conflicting demands, we draw on recent theoretical developments. Current organizational theory offers at least one concept that seems to be useful for understanding how conflicting demands might be managed in the context of innovation in organizations. This concept is ambidexterity. By redefining ambidexterity within our dialectic perspective and applying it across levels of analysis, we aim at taking the first step toward a framework that may prove useful for future research and the practice of innovation.

## 1.4. Ambidexterity: Managing conflicting demands at multiple organizational levels

From the proposition that innovation poses a variety of different demands, it follows that individuals and social systems need to be capable of performing fundamentally different activities and need to be able to integrate these activities to successfully innovate (Smith & Tushman, 2005). Literally referring to the rare characteristic of some people to be equally

adept in using their left and right hands, the term ambidexterity has been used in organizational science to describe the ability of organizations to engage in both explorative and exploitative activities (e.g., O'Reilly & Tushman, 2004; Raisch & Birkinshaw, 2008). Although previous research has primarily used the term to describe organizations, we provide a generalized functional definition of ambidexterity and extend the concept to individuals, teams, and leaders.

We define ambidexterity as the ability of a complex and adaptive system to manage and meet conflicting demands by engaging in fundamentally different activities. On the most general level, ambidexterity implies successfully managing the dichotomy of explorative variability creation and exploitative variability reduction. Systems can develop a variety of different internal structures and processes to perform fundamentally different activities. Thus, ambidexterity can take different shapes. How ambidexterity is achieved can be differentiated along the lines of integration and separation of activities. Activities can be structurally or temporally separated to different subsystems or across time (Gupta, Smith, & Shalley, 2006). For instance, in a team responsible for the development of a new product, some members may concentrate on coming up with radically new ideas, whereas others focus on scrutinizing the feasibility and usefulness of ideas. The same activities can be performed by an individual alone switching back and forth between engaging in unconstrained creativity and evaluating and selecting ideas. Management activities and self-regulatory processes are necessary to integrate different activities performed by subsystems or at different points in time.

Regulating the conflicting demands of innovation is not only a challenge for the upper echelon of an organization but a phenomenon that spans all levels of an organization. Individual employees, collectives of employees such as work teams, and the organization as a whole have to find strategies to deal with conflicting demands to successfully innovate and adapt to changing markets. Within an organization, department, or team, activities can be more or less separated and distributed to different individuals. How conflicting demands are regulated at one level affects the regulation at other levels of an organization (MahmoudJouini, Charue-Duboc, & Fourcade, 2007). For instance, if individual employees are capable of self-regulating conflicting activities, the requirement of leaders to be directive about what activities need to be performed is reduced.

Integration of different activities can occur at a hierarchically higher level, such as the leader, or by individuals themselves, for instance, by proactively attending to different and conflicting task demands and being flexible enough to switch between requisite activities or

roles in a team. We expect that strong separation of activities to different subsystems will create dysfunctional consequences because synergies that reside in pursuing both interdependent activities are lost. As we have previously noted, exploitative activities can be the foundation from which useful new ideas emerge. In addition, the separation of activities creates new tensions and conflicts that must be managed. This may occur, for instance, when a new product developed in an isolated explorative business unit enters the production routines of exploitative business units (Westerman et al., 2006). We assert that dealing with conflicting demands by high degrees of separation of activities to subsystems is a second best strategy that may become necessary if a system does not have the requisite complexity to manage internally the conflicting demands.

Although in all organizations there are those individuals, teams, and business units that focus more on exploring new possibilities, while others focus more on adapting and exploiting, research has not yet provided decision aids (Highhouse, 2008) to indicate the appropriate level and degree of separation for a given system. Exploration and exploitation activities and tensions between these activities co-occur at all levels of an organization. Even in an organization with high exploitative orientation, explorative task demands exist and vice versa. For example, when implementing process innovations such as just-intime-production to streamline a business, employees' initiative (which includes creativity) was important because it allowed them to explore how to adopt the process innovation in their particular jobs (Baer & Frese, 2003). That is, even if the productivity dilemma between exploration and exploitation is solved by some type of structural separation, at all levels of the organization there remain exploration and exploitation demands that need to be managed because human thought and action are never solely explorative or exploitative.

Several authors have emphasized the need to balance rather than separate exploration and exploitation. Although we agree with the notion that both activities are necessary and organizations should not focus on one to the expense of the other, the idea of a "balance" can be misleading if it implies that a moderate and equal amount of exploration and exploitation is always superior. Over time and depending on external circumstance such as the dynamics of the market, the relative importance of different activities can shift (Burgelman, 2002; Jansen, Van Den Bosch, & Volberda, 2006). Optimal antecedent conditions of organizational structures, management practices, and individual dispositions may be quite different depending on the relative importance of exploratory and exploitative activities, although they should always enable both kinds of activities.

Table 1.2

*Ambidexterity: The regulation of explorative and exploitative action at multiple organizational levels*

| | Separation | Integration by active management | Integration by self-regulation |
|---|---|---|---|
| Organization | Specialization of an organization either on exploration or exploitation<br>Separating explorative units form exploitative units (e.g. research and development) with distinct cultures, incentive systems and leadership styles<br>Time-based separation into phases of exploration and exploitation according to the punctuated equilibrium model | Providing leadership that embraces competing values and practices<br>Supporting creativity and initiative in all sections and on all hierarchical levels of an organization.<br>Transformational leadership at the top echelon of the organization<br>Providing resources for innovation to all rather than just to specialized departments | Intra-organizational market of ideas and emergence of innovation champions<br>Integration of conflicting activities in the top management team through dialectic processes of power and negotiation |
| Team | Segmentation of the innovation process into stages of idea generation, evaluation, selection and implementation<br>Reducing task and sequential interdependence in a team<br>Selecting people into a team with diverse KSAO's to increase diversity<br>Creating fixed and specialized roles in a team | Engaging in complementary leadership behaviors such as structuring activity, control and empowering employees to explore autonomously<br>A transformational leader who provides a common vision for a team that integrates diversity<br>Adapting to situational task demands and switching between leadership activities<br>Providing external help to switch between mindsets and activities<br>Encouraging internal and external communication and facilitating skunk teams. | Breadth of cognitive and behavioral complexity of team members and development of transactive memory systems and team reflexitivity<br>Emergence of shared leadership and team roles according to capabilities and task demands<br>Political processes of selling new ideas and negotiating for resources<br>Minority dissent as a regulating process in teams<br>Development of skunk teams in addition to formal teams. |
| Individual | Distributing tasks according to individual KSAO's relevant for idea generation, idea implementation, attention-to detail.<br>Setting goals and providing rewards for creativity.<br>Assigning individual rather than team accountability<br>Separating individual from highly interactive performance episodes to enable divergent processes | Acknowledging the nature of the creative process (e.g. incubation, unpredictability) in setting deadlines and providing feedback.<br>Empowering all employees to perform exploratory activities to some extent<br>Restraining from providing controlling rewards that impede creativity<br>Adapting leadership to strength and weaknesses of individual employees<br>Allowing time for individual projects that are not regulated by management<br>Questioning false beliefs about allegedly mutually exclusive activities | Breadth of behavioral repertoire and the flexibility to act according to situational demands<br>Individual reflexivity and meta cognition about different mindsets and activities<br>Development of idiosyncratic strategies to deal with conflicting demands<br>Effort and emotion regulation to deal with different task demands<br>Self-starting, proactive actions to improve external circumstances. |

Table 1.2 presents examples of ambidextrous strategies and tactics that could be implemented at three different levels of analysis—the individual, team, and organizational—to deal with the conflict posed by the need to both explore and exploit. Examples are presented that follow a separation strategy (in the separation column) or an integration strategy (in the active management and self-regulation columns) for dealing with conflicting demands and activities. None of these examples is empirically based; rather, we have derived them primarily from conceptual developments by organizational theorists and our own dialectic perspective. We organize our discussion of these examples by level of analysis.

### 1.4.1. Ambidexterity at the individual level

> *Proposition 12*. At the level of the individual, we use the term ambidextrous to describe the capability of individuals to perform contradictory activities and switch between different mindsets and action sets (e.g., switching from unconstrained creativity to scrutinizing the usefulness of ideas). For innovation to succeed, these general capabilities need to be based on domain-relevant expertise.

In keeping with the terminology derived from the organizational level, we propose that ambidexterity at the individual level refers to an individual's ability to perform explorative and exploitative activities and integrate both kinds of activities toward successful innovation through self-regulation. Ambidexterity is not another psychological trait. Rather, it refers to the regulated coexistence of characteristics that may seem incompatible from a dichotomous perspective but that hold a functional value for innovation. Examples of such dichotomies include attention to detail and innovativeness (Miron et al., 2004), prevention and promotion focus (Forster et al., 2003; Higgins 1997), and Conscientiousness and Openness to Experience (George & Zhou, 2001) as well as systematic versus intuitive problem-solving style (Scott & Bruce, 1994). Rather than overemphasizing any one of these characteristics, we propose that the contradictory qualities need to be regulated to successfully innovate.

Because seemingly contradictory qualities such as attention to detail and innovativeness are distinct empirical dimensions rather than opposite poles of one continuum, there are individuals who are high on both dimensions. Miron et al. (2004) found 7.4% of the engineers and technicians of a large sample of R&D employees to meet the criteria of high attention to detail and high creativity breakthrough. Thus, individual ambidexterity in this area appears to be a rare phenomenon. However, just looking at individual differences in

stable characteristics obscures that the cognitive and behavioral complexity described by ambidexterity can also appear over time. Individuals can switch between different mind and action sets in accordance with situational demands. For instance, individuals can carefully elaborate and weigh advantages and disadvantages of different courses of action, and once a decision is made, switch to a mode of information processing that is focused on acting to achieve a specific goal (Gollwitzer, Heckhausen, & Steller, 1990).

Research has demonstrated that managers of product-development teams were able to switch their management style from an emergent style in uncertain periods that required exploration to a planned style in more certain periods that required implementation, and that teams led by managers with fluctuating styles were more innovative than others (Lewis et al., 2002). Furthermore, individuals who were asked to generate original words and also keep the error rate low managed to do so by dividing their work into two sequential periods, first, generating original words and then checking for errors (Livne-Tarandach, Erez, & Erev, 2004).

Action theory (Frese & Zapf, 1994) provides concepts helpful to understanding how conflicting demands are self-regulated and how individuals switch between different modes of acting. In particular, the idea of opportunistic action regulation captures the integration of different modes of action (Hacker, 2003; Visser, 1994). From an action theory point of view, regulating actions that bring about innovation differ from regulating repetitive actions. The latter follows a hierarchical-sequential, topdown pattern. Consciously accessible goals represent future states that the acting person attempts to achieve. Goals are decomposed into subgoals, which are achieved sequentially. In contrast, the goal of innovative acting is not clearly defined in detail before action. The goal coevolves and changes as action proceeds. Hacker (2003) suggested calling this opportunistic action regulation, which is characterized by systematic episodes interspersed by more chaotic episodes triggered by unforeseen opportunities that change the course of action. To meet the demands of innovation, both modes of action regulation are necessary, and the challenge is to switch between and integrate both modes. We argue here that this captures quite well the idea of two fundamentally different capabilities that need to be integrated.

A factor that is supportive of both successfully performing exploratory and exploitative activities is domain-relevant expertise, both in terms of breadth and depth of expertise. In a study on innovation and performance in the comic book industry, Taylor and Greve (2006) found “the role of expertise in jointly spurring creativity and raising average

performance is so strong that it overwhelms the theorized tradeoff between exploration and exploitation" (p. 734). A similar positive effect on both successfully exploring and exploiting was also found for past innovation success. Thus, gaining profound and diverse domain expertise enables individuals to become ambidextrous in meeting both exploratory and exploitative task demands.

### 1.4.2. Ambidexterity at the team level

> *Proposition 13*. Ambidextrous teams are composed of team members with the requisite variety of characteristics (e.g., cognitive style, expertise) for a given task and are able to integrate performance episodes in which individual team members work alone with performance episodes in which team members work together.

Innovation often emerges from individuals working in team settings. The central feature of ambidextrous teams is that they are able to maintain and capitalize on the variability of what individuals bring to a team in terms of ideas, expertise, and individual differences, while at the same time integrating this variability toward common goals. Our conception of ambidexterity at the team level can be related to team composition, the dichotomy of individual and teamwork, contextual ambidexterity, and ambidextrous leadership.

Not only do team members bring variability to a team in terms of different ideas and expertise, there is also variability among team members in terms of personality and cognitive styles. Ambidexterity can be achieved by composing a team of members that bring the different qualities rarely combined within one person. For instance, Miron-Spector, Erez, and Naveh (2006) found that the most innovative teams were composed of a majority of highly creative people, a moderate number of conformists who knew how to fit the product to the context, and a small number of members who were highly attentive to detail; teams with this composition were more innovative than homogenous teams composed of only creative people. Such a mix ensures that different task demands of idea generation and implementation are met. West and Anderson (1996) have demonstrated that the proportion of highly innovative team members has an impact on the radicalness of innovation generated by the team. Furthermore, newcomers increase heterogeneity of teams and affect innovativeness (Perretti & Negro, 2006). We expect team diversity to be particularly effective if team members value this diversity (Homan, van Knippenberg, Van Kleef, & De Dreu, 2007) and understand the functional and dysfunctional consequences that different cognitive styles can

have. For instance, Kearney, Gebert, and Voelpel (2009) found that teams composed of team members high in need for cognition were better able to integrate diversity with respect to age and educational specialization to achieve superior performance.

Team members tend to share their common rather than their unique knowledge and can overlook their diverse, unique capabilities (Stasser, Vaughan, & Stewart, 2000). To overcome this tendency, Arbel and Erez (2008) developed a methodology that assesses the team members' diverse cognitive style, provides individual feedback to the team members, and asks them to share their strengths with each other and use them as needed while they design an innovative product. Teams that used this methodology designed more innovative products than teams that did not share their unique task-related characteristics with each other. Thus, by carefully composing teams in accordance with the desired innovativeness of the outcome and actively managing team diversity in terms of expertise and cognitive style, the likelihood of team success can be improved.

Many arguments can be made for teamwork (Hoegl & Gemuenden, 2001), for example, the magnitude of a task may make it impossible for a single individual to perform it successfully. Furthermore, teams can counterbalance characteristics that rarely occur within one person. However, it is clear that teamwork is not always more effective than individual task performance. Not only do we know about process loss in teams (Steiner, 1972) and production blocking in brainstorming groups (Diehl & Stroebe, 1991), there is evidence that individual creators can outperform teams at integrating the depths and breadth of their expertise toward new syntheses (Taylor & Greve, 2006). Based on this evidence, it can be advisable to assign parts of a project to individuals. For teamwork, we hypothesize a temporal separation strategy to be more effective than constant collaborative work in teams. That is, interspersing performance episodes in which team members work closely together with individual performance episodes in which individuals can develop and pursue ideas independently, unconstrained from the activities and influence of other team members.

Individual self-regulation in terms of switching between different activities over time and team self-regulation in terms of changing leadership roles based on team members' strengths and weaknesses require an environment that supports and allows for self-regulation. An important environmental characteristic that allows for good self-regulation at work is freedom or autonomy, which has been shown to be related to innovation behavior (Amabile, Conti, Coon, Lazenby, & Herron, 1996; Hoegl & Parboteeah, 2006). Gibson and Birkinshaw (2004) use the term contextual ambidexterity to describe an environment that allows

individuals to decide for themselves when to closely align their activities with the standards and routines of an organization and when to depart and create value through innovative behavior. We concur with the idea of contextual ambidexterity, as the dynamics and unpredictability of the innovation process make it difficult for leaders to constantly specify instructions about when to focus on what kind of activity (Raisch & Birkinshaw, 2008). The necessity to shape an environment supportive of exploration and exploitation points to the importance of leadership for innovation (Mumford et al., 2002).

> *Proposition 14*. Ambidextrous leaders are characterized by cognitive as well as behavioral complexity and are able to dynamically adapt their tactics (such as being directive or providing autonomy) to contextual demands. We propose that transformational leadership is supportive of both exploratory and exploitative activity of followers and their integration and is thus a central component of ambidextrous leadership.

We extend the concept of ambidexterity to leadership and define ambidextrous leadership as the ability of leaders to manage tensions between variety creation and variety reduction toward successful innovation. On a general level, we characterize ambidextrous leadership as the ability of leaders to perform a broad range of seemingly conflicting behaviors (Denison, Hooijberg & Quinn, 1995) that are supportive of both explorative idea generation and exploitative idea implementation among their employees. Furthermore, leaders need to adapt these different behaviors according to contextual demands, the progress of the project, and the needs of individual employees. Effective ambidextrous leadership thus demands cognitive, emotional, and behavioral complexity and flexibility (Buijs, 2007; Denison et al., 1995; Mumford et al., 2002).

In a meta-analysis on leadership and innovation, Hulsheger, Anderson, and Salgado (2009b) found that all investigated leadership styles—supportive leadership, initiating structure, leader–member exchange, participative leadership, and transformational leadership—displayed substantial, positive mean corrected correlations with innovation. The fact that very different leadership behaviors are related to innovation supports the assertion that different or even contradictory leader behaviors hold functional value for innovation. The familiar argument that there are different pathways to innovation again emerges. Although the relative contribution of different leadership styles depends on contingency conditions, such as the research or development focus of a department (Keller, 2006), we stress that one needs to

take different, seemingly contradictory leadership behaviors into account simultaneously, rather than focusing on the impact of single leadership constructs.

A particularly important tension exists around the degree of structuring and controlling activities by the leaders versus the degree of autonomy provided for employees (increasing their chances to explore). A controlling leadership tactic, for example, close monitoring, may help avoid inefficiencies to ensure the alignment of followers' activities. However, several studies have reported detrimental effects of controlling leadership on creativity (Stahl & Koser, 1978; Zhou, 2003). In contrast, the leadership tactic of providing autonomy and situational control may also "run into trouble". Gebert, Boerner, and Lanwehr (2003) found support for a curvilinear relationship between autonomy and innovation with moderate levels of autonomy being optimal for innovativeness of organizations. Alternatively, we derive from our dialectic perspective that the simultaneous presence of integrative mechanisms, such as a shared vision, can help align the activities of different employees and buffer negative effects of high autonomy. How different leadership tactics and combinations of leadership tactics relate to success needs to be researched in more detail.

If innovation is marked by periods of stability and clarity and by bursts of creativity and ambiguity, then a key issue is how managers respond to such fluctuations. They increase their structuring activities if required and focus on providing autonomy and intellectual stimulation if creation and exploration are central to the project. However, there is only limited empirical research about the necessary dynamics of leadership for innovation. Lewis et al. (2002) investigated different project management styles, which she categorized as either emergent or planned, and found evidence that different aggregates of action are required at different times. However, all project management activities decreased over time, and her results do not support the idea that more managerial control is supportive in later implementation stages of a project, as may be inferred from a stage model of innovation.

We propose transformational leadership to serve an important role in managing conflicting demands between variability creation and integration of variability as it is supportive of different activities required for innovation. Providing intellectual stimulation and individual consideration stimulate followers' creativity and explorative activity. At the same time, transformational leaders provide direction by formulating a vision and inspirationally motivating their followers, resulting in greater alignment of their followers' activities (Kearney & Gebert, 2009). Recent empirical studies confirm that transformational leadership is not only correlated with innovation success but also interacts with diversity,

which support the hypothesis that transformational leaders can capitalize on the potential of diversity for innovation (Jansen, George, Van den Bosch, & Volberda, 2008; Kearney & Gebert, 2009; Shin & Zhou, 2007). However, as with our concern regarding unambiguously positive consequences of a shared vision, followers of transformational leaders may be influenced by the leader to such an extent that it becomes dysfunctional for innovation because they do not develop ideas outside of the realm of the charismatically communicated vision.

### 1.4.3. Ambidextrous organizations

> *Proposition 15.* Ambidextrous organizations can not only be achieved through separating explorative from exploitative activities and integrating activities at the level of the top management team but also by creating organizational values and practices that enable the management of conflicting demands within one system.

Ambidextrous organizations, as defined by O'Reilly and Tushman (2004), solve the conflict and tradeoffs between improving and exploiting existing products and developing new, potentially disruptive products by structurally separating explorative from exploitative business units. If organizations pursue a strategy that separates explorative activities from exploitative activities, they need to implement different practices, such as reward systems and criteria for personnel selection, and foster different cultures that are consistent with the respective units' goals. In this organizational design model, it is the responsibility of the top management team to integrate and balance conflicting activities (O'Reilly & Tushman, 2004).

Although the empirical evidence is still scarce, it supports the central assertion of ambidexterity that organizations perform at a superior level if they both explore and exploit (e.g., Katila & Ahuja, 2002). He and Wong (2004) found a positive interaction of exploration and exploitation, such that companies that balanced and engaged in both activities simultaneously performed best in terms of sales performance. On closer examination, however, the findings by He and Wong pose fundamental problems for a dichotomous theory perspective and its one-sided focus on the conflict between exploration and exploitation. He and Wong found that an exploitative strategy not only predicted sales performance via the mediator of process innovation intensity, an exploitative strategy positively and incrementally predicted product innovation intensity together with the presence of an explorative strategy

(both strategies are independent dimensions). This supports the argument based on our dialectic perspective that exploitative activities can lead to product innovation.

In contrast to evidence that both exploration and exploitation are required for sustainable performance, the ambidextrous organizational design proposition of high degrees of structural separation of explorative from exploitative activities is supported to our knowledge by case studies only. For instance, O'Reilly and Tushman (2004) describe how creating structurally separated business units has enabled Ciba Vison (now Novartis) to successfully develop fundamentally new products and manufacturing processes in the area of contact lenses and related products. In contrast, Westerman et al. (2006) report how Walgreens successfully used a more integrated approach in developing and implementing its online business, capitalizing on synergies with the exploitative activities of its stores. Westerman et al. noted that structural separation of explorative business units can have advantages at the beginning of an innovation life cycle, whereas it creates difficulties at later stages of an innovation life cycle. Given its prominence in the current literature, we think it is remarkable that the recommendation to strongly separate explorative from exploitative business units has not been clearly supported by empirical evidence. Contingency models specifying the conditions under which structural separation is advisable and recommended degrees of separation are not available.

In contrast to the hypothesis on structural separation, the need for integration of different activities in the top management team has been empirically supported by different groups of researchers. Top management teams need to see "the unity and conflict of opposites" (Engels, 1940), and transformational leadership can support this process (Jansen et al., 2008; Lubatkin, Simsek, Yan, & Veiga, 2006).

In one sense, O'Reilly and Tushman's (2004) proposition of an ambidextrous organization also is to a certain extent dialectic, as they emphasize the need for simultaneous presence of explorative and exploitative activities in an organization, although they emphasize separation (at lower levels of an organization) and integration (in the top management) of these activities. An approach that is even more dichotomous suggests that organizations can only focus on either exploration or exploitation at any given point in time (Abernathy & Utterback, 1978). Even from our dialectic approach, an argument can be made to create new business units, potentially with newly hired employees, that are unconstrained by more exploitative activities of the organization: As we stated, innovation cannot be completely "free" from what existed previously, and new business units with newly hired employees will

be more likely to develop innovations that are not related to what the organization has been producing. The question is to what extent this is desirable, given the problems we have outlined with structural separation, such as producing these innovations in the established exploitative business units, loss of synergies, and limited resources. Setting up new business units is likely to come at the expense of explorative activities within the system of an organization. Given the lack of empirical evidence and our theoretical propositions, we assert that the traditional notion of the ambidextrous organizations is not the only or even the one best strategy to meet conflicting demands.

The less an organization has structurally separated its differing activities, the more conflicting demands are imposed on subunits of the organization and the more important it is that these subunits themselves become ambidextrous. However, given that exploration and exploitation is an abstract dichotomy, we expect exploration and exploitation to always be necessary at every level and in every unit of the organization. Although the relative importance of each activity can vary, values and practices that support and integrate both activities are necessary throughout the organization.

Where organizational values and practices that support either exploration or exploitation are in conflict, a strategy of balancing competing values and practices is necessary. However, we believe that, more often than not, different cultural values and practices are not incompatible. Miron et al. (2004) and Naveh and Erez (2004) found cultural values for innovation, quality, and efficiency to be distinct but not necessarily incompatible. Organizations that find ways to integrate cultural values and practices that we generally conceive of as being important but incompatible will be most successful. The study by Gilson et al. (2005), which we have already mentioned, shows that creativity and standardization are not necessarily incompatible but can be complementary. Adler, Goldoftas, and Levine (1999) provide a case study concerning a Toyota subsidiary that succeeded in overcoming tradeoffs between flexibility and efficiency by developing new organizational mechanisms, such as metaroutines (routines for changing other routines) and the temporal separation of routine and nonroutine tasks. Concerning organizational practices of knowledge flows across hierarchical levels, Mom, Van Den Bosch, and Volberda (2007) have shown that the direction of knowledge flow is differentially related to explorative and exploitative activities by managers. A predominance of topdown knowledge flow is related to a focus on exploitative activities, whereas hierarchically bottom-up and horizontal knowledge flows facilitate managers'

exploratory activities. We infer that knowledge flows need to be in a balance that is contingent on the strategic focus of a business unit.

Error management culture is an example of a cultural approach for dealing with the dialectics of errors as having positive and negative consequences for innovation (Frese et al., 2009; van Dyck, Frese, Baer, & Sonnentag, 2005). Although aiming at avoiding negative consequences of errors and the reoccurrence of errors, error management culture aims at simultaneously capitalizing on positive consequences of errors. A cultural characteristic of organizations that can serve both exploratory and exploitative goals is climate for initiative, describing an active approach toward work throughout an organization. Individual initiatives can create variability and be the origin of innovation that unfolds upward across organizational levels. At the same time, climate for initiative has been found to facilitate the implementation of process innovation because an active work culture ensures that employees self start to deal with unforeseen problems during the implementation of innovation (Baer & Frese, 2003).

## 1.5. A dialectic perspective on the science and practice of innovation management

Our conceptual approach that contrasts dichotomous and dialectic thinking also applies to the science–practice relation in innovation management. Research on innovation and practical efforts to promote and manage innovation in organizations are separate activities geared toward different goals. Whereas science explores the unknowns of innovation, practice aims at exploiting knowledge for innovation endeavors to succeed. Both activities face different demands, for instance, in the dichotomy of rigor being a primary demand for science and relevance being a primary demand for practice. There are good reasons why both activities—the science of innovation and the practice of innovation management—need to be separated. A "natural distance" between pure science and day-to-day practices is a positive and healthy feature of any science-based professional discipline. For instance, the science of innovation needs extensive timeframes to produce generalizable findings, whereas innovation management addresses unique challenges of specific organizations that need to be met in real (and usually short) time. However, the separation of science and practice has led to scientific findings with little impact on organizational practices of innovation and to organizational practices that lack empirical evidence and, we suspect, that often may appear effective rather

than actually being effective. Therefore, as important as some degree of separation between science and practice of innovation may be, also important are integration and exchange.

Despite the growing attention to science–practice relations in industrial–organizational (I–O) psychology in general, there is little discussion specifically related to creativity and innovation. Rather, research into innovation, and especially studies into individual creativity, seems to have continued unabated and in splendid isolation from any imperative to demonstrate applicability to the real-world concerns of personnel practitioners and line managers concerned with stimulating and harnessing innovation at different levels of analysis (West, 2002b). Rather ironically, innovation research has demonstrated all the ontologically deleterious hallmarks of "excessive conformity": "Continu[ing] to routinely investigate old chestnut phenomena using conventional methods and designs, at times . . . actively dissuaded from pursuing an innovative agenda or from trialing untested methods and approaches" (Anderson, 1998, p. 323).

The field of I–O psychology has paid scarce attention to developing practical tools, transferring tools from basic psychology to organizational practice, and evaluating tools used in practice. There has been little transfer from science to practice in the sense of what Highhouse (2008) terms "decision aids" based on robust scientific findings into pragmatic products and processes to assist practitioners in their tasks. This is remarkable and distressing as I–O psychology is arguably the psychological discipline that should provide such applications. Even more so with regard to our focal topics, the consultancy marketplace for tools supporting creativity and innovation interventions in the workplace appears to be notably preformative, in that such tools are apparently not based on solid research findings but exhibit elements of being invidiously popularist in appealing to the whims and wish lists of practitioners desiring quick-fix solutions toward the ill-informed maximization of innovation in organizations (see also King, 1992; West, 2001). Even in the area of testing for creativity and innovation potential in selection situations, several popular tests have been challenged over their questionable psychometric properties (e.g., Anderson & Sleap, 2004; Patterson, 2002).

At the individual level, methods should be developed to allow individuals to switch between divergent and convergent thinking modes. At the team level, methods should be developed for optimizing team composition, such that it is most supportive of innovation. In addition, methods for improving team processes, such as assuring team psychological safety and enabling team reflexivity, should be further developed and implemented. At the

organizational level, implementing organizational practices that are in support of both exploration and exploitation is necessary, enabling the coexistence of innovation, quality, and efficiency.

As important as the development of scientifically based products of innovation management is, an overreliance and unreasoned application of any specific practice or method, even if it is evidence-based, stands in contrast to our dialectic approach: The pathways and processes leading to innovation are manifold and different contexts call for different solutions. A practice that is right at one point in time can become maladaptive as an innovation project unfolds or environmental contingency conditions change. Providing employees with time to pursue projects that grow out of their personal interests can stimulate variability generation and innovation, as Google has demonstrated (Mayer, 2006). However, if cost competition and streamlining of a business becomes more important, companies need to change their once highly successful practices toward greater convergence of employees' activities. Thus, an understanding of the dialectic processes underlying innovation and the ability to read contextual demands is at the heart of successful innovation management and provides the basis for an appropriate application of specific methods.

The challenge for a science of organizational innovation is to develop dynamic contingency models of innovation management that inform practice on when different practices are recommendable. We concur with Locke (2004) that science should produce action principles to guide practice. For instance, brainstorming in teams is a widely adopted practice, but creativity researchers question its effectiveness (Diehl & Stroebe, 1991). Because of production blocking, individuals in teams actually produce fewer ideas than they would if each team member generated ideas individually. Does that imply that brainstorming is in general not advisable? We do not think so. If a limited set of convergent ideas is sufficient, or if there needs to be high agreement among the team members to act, traditional brainstorming can be a pragmatic solution (Sutton & Hargadon, 1996). However, if the goal of a team is to develop as many divergent ideas as possible, nominal brainstorming in which individuals first generate ideas individually is advisable, a process that can be extended by going through iterative cycles between individual idea generation and idea integration in teams. Our point is that personnel practitioners and line managers do not only need a fixed set of scientifically based products for managing innovation. Understanding the fundamental psychological and social principles involved in innovation and the ability to adapt methods to contextual demands is at least as important.

### 1.5.1. Action principles of innovation management

Principles of action have been suggested to follow from theory to make the theory practice oriented (Locke, 2004). Although we are aware that our dialectic perspective is in no way a formalized theory to produce tightly argued principles, we would like to suggest a few principles that follow from our thinking about innovation. We propose that these principles apply to a unit at all three levels:

- *Principle of conflicting demands*: Bringing about innovation poses conflicting demands on systems. To meet the demands of innovation, systems need to value and perform a variety of different and partially conflicting activities (e.g., creative idea generation and focused innovation implementation; exploration and exploitation).
- *Principle of antithesis*: Whenever a system moves to the extremes of one activity of a dichotomy, such as exploration–exploitation, over a longer period of time, an antithesis will occur requiring the system to change its course of action, incorporating the activity it has neglected (e.g., a strong focus on developing new products and reinventing processes will result in an antithetical call for stability).
- *Principle of integrating variability*: The more variability there is on a lower level of a system, the more important integrative mechanisms at a higher level become (e.g., variability: amount of new ideas, diversity of people, business units with different cultures and purposes; integration: shared vision in a team, a transformational leader).
- *Principle of overcoming dichotomous thinking*: Activities regarded as contradictory, paradoxical, or in conflict can often be reconciled within a dialectic approach toward innovation. Systems may benefit by moving from "either/or" thinking and acting with a "both/and" approach (e.g., encouraging explorative activity in predominantly exploitative organizations and organizational units).
- *Principle of separation*: Although we have been critical of the strong emphasis on separating explorative and exploitative activities in the current ambidexterity literature, this is a possible pathway to innovation as several case studies have demonstrated (e.g., launching explorative business units unconstrained by the current way of doing things). We suggest if this pathway is taken, good

mechanisms need to be in place to bring the separated activities together again, not only on the level of top management but also for the involved subsystems.

- *Principle of actively managing dialectic tensions*: If a system has the internal complexity to manage conflicting activities, it can capitalize on the interdependencies of conflicting activities other systems need to separate (e.g., a company vision that encompasses both creative experimentation and standardization of core processes).
- *Principle of proactivity*: A proactive orientation of a system facilitates the learning processes required to meet the conflicting demands of innovation (e.g., a system that is proactive in realizing changing demands and then self-starts in switching between different activities).
- *Principle of dialogue between research and practice*: A dialogue between researchers in academia and practitioners may lead to the discovery of new practical implementations to existing solutions. Furthermore, it may stimulate new theoretical developments and new solutions to practical problems.

### 1.5.2. Limitations to our approach and directions for relevant future research

We have emphasized that the propositions and action principles we have put forward cannot be considered examples of evidenced-based management (Rousseau, 2006); rather, we have derived these primarily from conceptual developments by organizational theorists, our own dialectic perspective, and from available empirical evidence to the best of our current knowledge. All the propositions, action principles, and the strategies of dealing with conflicting demands (Table 1.2) require specification and additional research at all level from the individual through the team level and up to the organizational level.

From our proposition that multiple pathways can lead to idea generation and implementation, it should not be inferred that "everything and anything goes." Quite to the contrary, innovation is a high-risk endeavor that often fails. Thus, future research needs to point out how systems can meet conflicting demands of innovation to remain adaptive in the long term. The most important research questions that follow from our reasoning are: What are the cognitive, behavioral, cultural, and structural antecedents of ambidexterity? What are optimal levels of separation of conflicting activities at different organizational levels that

sufficiently reduce tensions without compromising their interdependence? What are the boundary conditions for the effectiveness of different strategies in dealing with conflicting demands of innovation? Finally, allowing for a two-way communication between academia and industry will facilitate the validation of existing theories of innovation, leading to new theoretical developments and practical implementation. We emphasize this endeavor should be based on Lewin's (1951) proposition that "there is nothing as practical as a good theory" (p. 169).

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# Chapter 2

## Signatures of Creativity: An Integration of Intraindividual Processes, Personality, and Work Situation


### Abstract

Building on personality systems interaction theory (PSI-Theory), the authors integrate intraindividual processes, personality characteristics, and features of work situations to predict when creativity occurs. The dynamics of positive and negative affect are proposed to play the key role in enabling individuals to perform the mental functions underlying creativity. Individual differences in affect regulation (action versus state orientation) are hypothesized to interact with situational characteristics, which leads to distinct patterns of creativity across different work situations. These patterns are termed signatures of creativity. Using an experience sampling study with 102 employees holding professional jobs, the authors find support for their hypotheses. The interplay of different functions underlying creativity was modulated by changes in affect. Action-oriented individuals were creative if self-efficacy was high and the work situation was characterized by high demands and low structure. In contrast, state-oriented individuals were creative if demands were low, the work situation was well structured, and they could shift out of negative affective states. The study holds implications for employees and supervisors on how to facilitate creativity.

## 2.1. Introduction

The demands of modern work places require employees to engage in creativity, the development of novel and useful ideas (Amabile, 1996). Whenever there is no readily available behavioral routine or problem solution, creativity is necessary. Emergent opportunities can only be capitalized on if people develop new ideas. Innovation – the development and implementation of new products or processes – requires creativity not only as an initial input but throughout the process (Bledow, Frese, Anderson, Erez, & Farr, 2009a). Given the importance of creativity at work, past research has addressed the relationship between creativity and intraindividual processes (Mumford, 2003), personality factors (Feist, 1999), as well as contextual characteristics (Shalley, Zhou, & Oldham, 2004). However, there are many apparent contradictions in the literature and our knowledge on how to promote work place creativity remains limited (Bledow, Frese et al., 2009a). For instance, although we know that positive affect is related to creativity, negative affect plays an important role as well (De Dreu, Baas, & Nijstad, 2008; George & Zhou, 2007). We therefore cannot infer that stimulating positive affect is always beneficial to a person's creativity.

The observation of contradictions has recently led us to propose a dialectic perspective on creativity and innovation (Bledow, Frese et al., 2009a). The goal of the dialectic perspective is to resolve contradictions, integrate the understanding that has emerged in different disciplines, and provide guidelines for practice. In the present article, we apply the dialectic perspective to creativity and aim towards a more integrative account of creativity in the work place. From our point of view, there are two main limitations on how creativity is commonly addressed, which have led to contradictory findings: First, we know that creativity is the result of a complex and dynamic interplay of different intraindividual processes (Mumford, 2003). However, creativity research in field settings is rarely based on a theory of mental functioning, and the research designs applied cannot adequately address processes. Second, although it is widely accepted that both personality and situations are essential in determining whether creativity occurs, the interplay between personality and work situations has rarely been the focus of research (for exceptions see George & Zhou, 2001; Miron, Erez, & Naveh, 2004). To overcome these limitations, we propose that intraindividual processes, personality, and work situations need to be integrated theoretically as well as empirically.

To do so, we begin by addressing how positive and negative affect are related to mental functions that allow people to generate novel and useful ideas. We then integrate our

reasoning into Personality-Systems-Interaction-Theory (PSI-Theory), which is a broad model of personality functioning (Kuhl, 2000a). From the theory, we derive specific hypotheses on how individual differences in affect-regulation interact with features of work situations in determining when a person is creative. We use the term signature of creativity to describe the pattern of situations in which a person's creativity is high or low.

## 2.2. Affect and creativity

Affect influences cognition (Schwarz & Bless, 1991), and research in experimental and field settings has shown that positive as well as negative affect have an impact on creativity (Baas, De Dreu, & Nijstad, 2008). To begin with a detailed examination of the role affect plays for creativity, we would like to ask you to think about a recent situation in which you developed a novel and useful work-related idea. Maybe you were very focused and engaged in solving a problem and at some point you found a solution. On the other hand, you may have been doing your daily business or taking a break, and suddenly a new idea emerged. In any case, you somehow formed a new association. "Things" that had been separated until then, suddenly fit together. Maybe you heard somebody talk or observed something in the environment you could connect to your knowledge. You could also have developed a new idea out of your own knowledge by combining content in a novel way. It is quite likely that you were in a positive rather than a negative mood when the new idea came to mind. Creativity most often occurs in situations in which people feel good (Amabile, Barsade, Mueller, & Staw, 2005; Baas et al., 2008). If you are in a positive state of mind, your focus is broad rather than narrow (Baumann & Kuhl, 2005). You can process vast amounts of information simultaneously in an intuitive and flexible manner (De Dreu et al., 2008; Isen, 1999). This allows you to make remote associations and thereby combine knowledge in new ways (Bolte, Goschke, & Kuhl, 2003).

Let us next think about what happened before you developed the new idea as something that may be an important part of the creative process. You could have been under time pressure and very persistent in following a plan of action (Markus Baer & Oldham, 2006). Maybe you were even frustrated, anxious or sad, ruminating about the details of a problem for which no solution seemed at reach (George & Zhou, 2002, 2007). The point we would like to emphasize is that what happened before you developed the idea is an important part of the creative process. Moreover, it is quite likely that the mental state you were in was different from what happened in the moment of idea generation. In order to generate useful

new ideas, mental processes are necessary which depart from what we associate with creativity.

In work settings novel ideas are useful if they are connected to the reality of a person. They are useful if they help individuals and organizations to reach goals. Creativity at work does not concern arbitrary associations. Ideas need to be embedded into a system of goals which a person is pursuing and need to be related to a detailed understanding of a situation at hand (Shalley, 1991). However, developing goals and intentions, persisting in goal-pursuit, and gaining a detailed understanding of a situation are mental processes quite different from what we associate with creativity (De Dreu et al., 2008; Schwarz, 1990; Schwarz & Bless, 1991). They are tied to an analytic, effortful, and controlled mode of information processing. This mode of information processing is supported by negative rather than positive affect (e.g., Clore, Schwarz, & Conway, 1994; Gray, 2001). Negative affect signals to a person "states of the world that have to be responded to" (Frijda, 1988, p. 354). It is important to note that negative affect does not only refer to "full-blown negative emotions" (Baumeister, Vohs, DeWall, & Zhang, 2007). It also refers to implicit negative affect, which occurs outside of a person's awareness (Quirin, Kazen, Rohrmann, & Kuhl, 2009).

The mode of information associated with negative affect may lay the foundation for creativity because a person develops a detailed understanding of a situation. As long as negative affect is present, however, a person's focus is narrow and rigid rather than broad and flexible (Baumann & Kuhl, 2005; Derryberry & Reed, 1998). Indeed, metaanalytic evidence suggests that people in fearful or anxious moods are less creative (Baas et al., 2008). Thus, although negative affect and its associated mode of information processing are antithetical to creativity, they may be an important part of the creative process.

By taking the dynamic interplay of positive and negative affect into account, the contradiction that negative affect is important for creativity but that it blocks creativity at any given moment, can be resolved. The dual-tuning model of affect by George and Zhou (2007) proposes that positive and negative affect are important components of the creative process that need to be "tuned". They found a positive relationship between supervisor ratings of creativity and employees' level of negative affect during a two-week period. However, the relationship was only positive if the level of positive affect was also high and the conditions were supportive (see also George & Zhou, 2002). In the same vein, Bledow, Schmitt, and Frese (2009) found that the interplay between positive and negative affect was related to work

engagement. A change from negative to positive affect led to higher work engagement beyond the immediate effect of positive and negative affect.

We integrate and specify these lines of research and argue that the value of negative affect for creativity can unfold if a change in affect from negative to positive occurs. We refer to this change as *affective shifting*. In an analytic mode of information processing that is induced by negative affect, people pay close attention to details of a situation. They engage in bottom-up information processing and do not rely on their preexisting knowledge (George & Zhou, 2007). Intensively reflecting on the problematic state of affairs can lead to a more objective understanding of the situation at hand (Schwarz & Bless, 1991). However, people cannot make use of this analytic understanding of a situation for creativity if they remain in a negative affective state. Only if they manage to shift to positive affect at some point, can the knowledge people have gained during analytic processing be integrated enabling creativity to occur. In contrast, creativity should be low if no change in affect takes place and a person remains in a negative affective state. Therefore, we predict that, in addition to the relationship between positive affect and creativity, shifting from negative to positive affect in a work situation is related to creativity.

*Hypothesis 1a:* Positive affect in a work situation is related to creativity.
*Hypothesis 1b:* Shifting from negative to positive affect in a work situation is related to creativity.

In search of a comprehensive theory that could integrate our reasoning and previous empirical findings on affective and cognitive processes relevant for creativity (Bledow, Kuehnel et al., 2009), we became aware of PSI-Theory. Kuhl's (2000) theoretical framework is not so much a new theory as it is the integration of currently available knowledge on mental functioning. After outlining the theory and integrating the above reasoning on affect and creativity into this framework, we use it to derive specific hypotheses on how creativity emerges from the interaction of personality and work situation.

## 2.3. Personality systems interaction theory and creativity

PSI-Theory is an integrative theory of the person that views mental functioning as the interplay of different psychological systems (for a detailed discussion see Kuhl, 2000). A simplified model is illustrated in Figure 2.1. Besides positive and negative affect as the dynamic "engine" of the model, the theory distinguishes two complex and two elementary

mental systems. Affective processes that mostly occur outside of a person's awareness modulate the access to the different mental systems (Quirin, Kazen, Rohrmann et al., 2009). That is, depending on one's level of positive and negative affect, the systems are accessible or inaccessible. The four systems are hypothetical constructs and should not be conceived as structural entities. Although there is some evidence linking these systems to regions of the brain, the systems are defined in terms of their mental functions (Baumann, Kuhl, & Kazen, 2005). We limit our discussion of the theory to what is of immediate relevance for creativity.

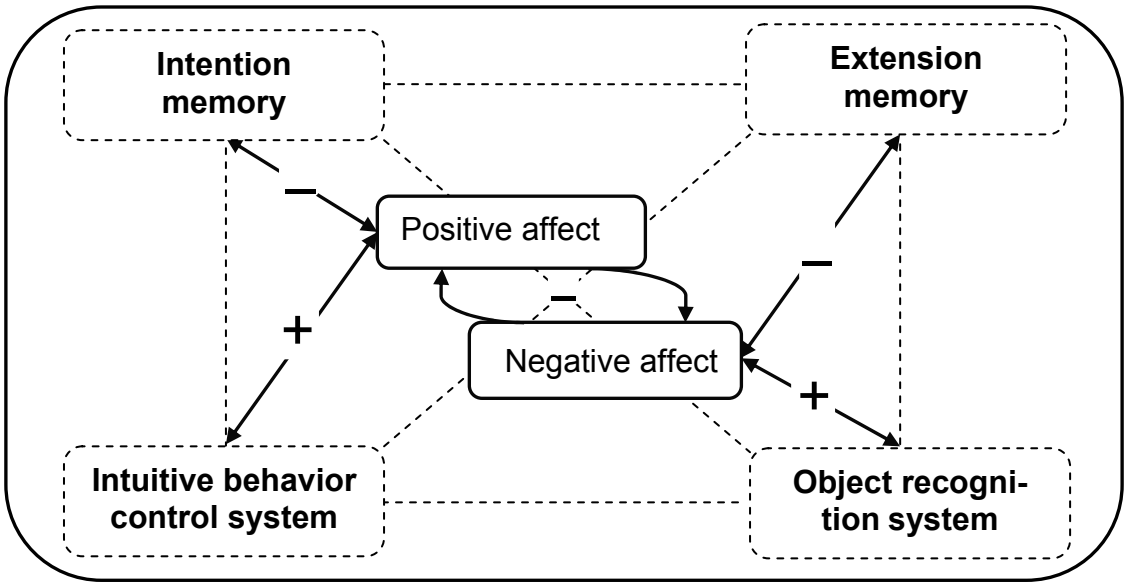


*Figure 2.1.* Simplified PSI-Theory model of mental functioning

First, creativity most directly depends on a system that provides the person with the extensive network of semantic representations from which creative associations can be formed, a system which is referred to as *extension memory*. "Extension memory is the repository for extended networks of remote semantic associations such as meaningful experiences, options for action, personal values, and many other aspects of the `integrated self´" (Kuhl, 2000b, p. 670). This system is active, for instance, if a person intuitively realizes that there is a connection between the three words *green, pass,* and *goat.* All three words are related to the common theme *mountain* and extension memory enables people to realize this connection (Baumann & Kuhl, 2002). Extension memory is characterized by a fast, holistic, and intuitive manner of processing. The presence of positive affect provides access to extension memory because positive affect reduces negative affect (see Figure 2.1).

However, extension memory alone does not suffice for real-world creativity. As ideas are only useful if they are connected to the goals a person pursues, a system is necessary which represents and stores goals, which develops plans of action, and which monitors goal progress. This system is referred to as *intention memory*. If intention memory is not active at some point, a person may "get lost" in the extensive network of extension memory and form associations that are irrelevant for a given situation. Intention memory is characterized by a slow, controlled, and effortful mode of processing. Information is processed in a sequential-analytic manner. A state of high positive affect, such as being enthusiastic about a new idea, is not compatible with intention memory. The system functions most effectively if positive affect is damped by the presence of negative affect.

There is increasing evidence for the notion that two families of cognitive processes with the characteristics of extension and intention memory can be differentiated. This notion is often referred to under the label of dual-process theories (Chaiken & Trope, 1999; Kahneman & Frederick, 2002). In the field of creativity research, De Dreu, Baas, and Nijstad (2008) have recently tested a dual-pathway to creativity model that distinguishes persistence and cognitive flexibility as two essential functions for creativity. These functions relate to the two systems of intention memory and extension memory.

Besides these complex cognitive systems, PSI-Theory distinguishes two elementary mental systems that interact with the complex systems and the environment of a person. For creativity, the perceptive *object recognition system* is important because it is sensitive to discrepancies and provides a person with novel information, for instance on details of a task which a person has not expected or so far overlooked (cf. George & Zhou, 2007). The object recognition system is active if negative affect is high. It is characterized by a similar mode of information processing as intention memory (i.e. slow and analytical). In such a mode, a person focuses on specific entities which are isolated from their context. Such entities or objects can refer to the external environment, for instance, a sentence a person is reading that does not make sense, as well as to internal events such as identifiable thoughts or emotions a person is focusing on (Kuhl, 2000b).

Creativity also depends on the second elementary system referred to as the *intuitive behavior control system*. Concerning its mode of information processing, the system is similar to extension memory (i.e. fast and parallel). The intuitive behavior control system is activated if positive affect is high. The system performs elementary intuitive operations that are important for creativity such as spontaneously exploring a new course of action the

environment offers. The system also frees up cognitive resources for complex cognitive operations. For instance, if one is able to perform routine processes such as typewriting automatically, cognitive resources are available that can be used for complex problem solving (Ohly, Sonnentag, & Pluntke, 2006).

We infer from this theory that creativity is one of the most complex mental functions, which requires, more than other performance relevant behaviors, an effective interplay of the different systems of the mind. According to the theory, the dynamics of positive and negative affect are essential for regulating a balanced and effective interplay (Kuhl, 2000a). Let us readdress Hypothesis 1a and 1b from the perspective of this theory: If positive affect turns from low to high, it allows the intuitive behavior control system to carry out a plan that was previously developed and temporarily stored in intention memory. In this intuitive mode of information processing, negative affect is reduced and individuals can access their large network of memories stored in extension memories, which enables new associations (Hypothesis 1a). If negative affect turns from low to high, for instance, because a person repeatedly fails to solve a problem, the object recognition system is activated. People become sensitive to discrepant information and start focusing on specific objects. Information processing focuses on details and proceeds in a sequential-analytical manner. Negative affect also reduces positive affect. In a state of reduced positive affect, a person can analyze problems and develop plans of action. If a shift in affect from negative to positive occurs (Hypothesis 1b), *extension memory* is activated again, the system which enables intuitive associations among the vast network of memories (Bolte et al., 2003; Kuhl, 2001). By integrating the detailed understanding of a situation which individuals have gained during a phase of negative affecte into *extension memory*, individuals can change their existing knowledge to incorporate novel information. Individuals can thereby achieve creative insights that would not occur, had they not experienced a phase of negative affect (cf., Kazen, Baumann, & Kuhl, 2003). Therefore, shifting to positive affect after a phase of negative affect should be associated with high creativity.

More specific hypotheses on when creativity occurs can be derived from PSI-Theory if individual differences in personality functioning are taken into account. According to the theory, individual differences in personality functioning relate to how people regulate positive and negative affect (e.g., Baumann & Kuhl, 2002; Bolte et al., 2003). As affect modulates access to the different systems, individual differences in affect regulation should relate to how

well and under which conditions people can access the different systems. The concept of action versus state orientation describes these individual differences.

## 2.4. Action versus state orientation and creativity

Individual differences in action versus state orientation describe how positive and negative affect are regulated in demanding and threatening situations. There is abundant empirical evidence on the validity of the concept and on how it is related to affect regulation (e.g., Baumann & Kuhl, 2002; Kuhl, 1994b). For instance, Koole and Joostman (2004) showed that action-oriented individuals can implicitly down-regulate tense feelings in demanding situations such as high performance pressure induced by contingent reward. In contrast, state oriented individuals experience persevering negative moods. In such a state, they show an impaired ability to make intuitive judgments (Baumann & Kuhl, 2002). The concept action versus state orientation distinguished two main dimensions, *hesitation* and *preoccupation* (Diefendorff, Hall, Lord, & Strean, 2000). Both dimensions are positively correlated. Thus, most people are either high in hesitation and preoccupation or low in hesitation as well as in preoccupation. Concerning the hesitation dimension, action-orientated individuals (*low hesitation*) implicitly generate positive affect under demanding conditions. This allows them to quickly decide on what to do and to initiate action by shifting from activity in *intention memory* to activity in the *intuitive behavior control system*. In contrast, state-oriented individuals (*high hesitation*) are indecisive and find it difficult to start acting when demands are high, due to their impaired ability to self-generate positive affect.

The *preoccupation dimension* of action versus state orientation refers to affect regulation in situations, in which negative affect is experienced, for instance after failure (Diefendorff et al., 2000). In situations in which individuals experience negative affect, action-oriented individuals (*low preoccupation*) can quickly down-regulate negatively toned thoughts and feelings and can then initiate action (Kuhl, 1994c). In contrast, state-oriented individuals (*high preoccupation*) are flooded by uncontrollable negative feelings. The object recognition system and its discrepancy sensitive mode of information processing are active for a prolonged period of time. State-oriented individuals ruminate on the sources of negative affect and show impaired self-regulation (Kuhl & Beckmann, 1994).

We argue that there is no straightforward relationship between the dimensions of action versus state orientation and creativity such that either action- or state-oriented individuals are more creative. The adaptiveness of action orientation for effective goal

pursuit, which has been the focus of many studies, does not generalize to creativity. Action and state orientation provide different advantages and disadvantages, which we outline below (Koole, Kuhl, Jostmann, & Vohs, 2005). Moreover, a person's action or state orientation is related to the situations in which creativity-relevant mental functions can be performed.

On the most general level, we argue that individuals are creative if there is congruence between personality and work situation. For action orientation, congruence is present if the person is in charge and can autonomously regulate ongoing experiences and behavior. For state orientation congruence is present if the environment is supportive such that it assists regulatory control because state orientation implies a deficit in self-regulation. An example of two software engineers illustrates that the situations and intraindividual processes that facilitate creativity differ between action- and state-oriented individuals.

For example, an action-oriented software engineer succeeds in solving a difficult problem for a client. She perceives the task as demanding and challenging. Although she does not have a readily available solution for the problem, she is confident. She has an initial idea and quickly comes up with a plan on what to do which is based on her past experiences. Without considering many alternative ways of addressing the problem, she starts acting with her mind focused on her plan of action. At some point she realizes that it leads to a dead end because she did not consider novel details of the problem. Without caring much about her initial failure, she persists on the task, tries out a different approach, and after several rounds of experimentation and failure finally comes up with a solution.

In contrast, an equally capable but state-oriented colleague solves a similar problem but proceeds in a different manner. She perceives the task as highly demanding and worries whether she will succeed. She cannot decide on what to do and intensively thinks about detailed features of the problem and potential actions she could take. After long hesitation, she decides on a course of action. Her initial attempt fails, which induces a preoccupied state of mind and rumination on why her carefully developed plan of action did not succeed. A colleague realizes her miserable state of mind and calms her down. Due to the support by her colleague, the affective state of the software engineer changes from negative to positive. In the positive state of mind, she turns back to the task. Her positive mood allows her to make remote associations and to integrate details of the novel problem, which she has analyzed thoroughly, into her memories of related problems. Without investing high self-regulatory effort she finds a solution she can now implement. In the following section, we systematically derive hypotheses on when action- or state-oriented individuals are creative.

### 2.4.1. Preoccupation and creativity

The *preoccupation* dimension of action versus state orientation describes individual differences in how easily they can shift from negative to positive affect. It is therefore directly relevant for the hypothesis on the creativity enhancing effect of shifting from negative to positive affect (Hypothesis 1b). The defining feature of state orientation is the difficulty individuals have in shifting out of negative affect (Kuhl, 1994c). However, if they succeed in shifting, they can gain higher levels of creativity than action-oriented individuals. Whereas action-orientated individuals (*low preoccupation*) brush aside negative affective thoughts and feelings quickly, state orientation (*high preoccupation*) implies prolonged rumination if negative affect is experienced.

For creativity and deeper forms of learning, quick down-regulation of negative affect can be a disadvantage (Koole et al., 2005). State-oriented individuals experience prolonged phases of negative affect and its associated modes of information processing. They spend more time on deliberating during decision-making (Stiensmeier-Pelster, Schürmann, John, & Stulik, 1991) and on ruminating about features of uncompleted tasks (Baumann & Kuhl, 2003). Koole et al. (2005) suggested that "their willingness to keep an open mind about things can make state-oriented individuals more objective information processors than action-oriented individuals" (p. 22). Compared to action-oriented individuals, they are less biased towards their preference during and after decision-making (Beckmann & Kuhl, 1984). However, by itself, these processes should not be an advantage for creativity. Only if state-oriented people manage to shift to positive affect at some point, can the functional value of negative affect be capitalized on. Environmental conditions may change in a favorable manner or state-oriented people may eventually succeed in calming themselves down such that positive affect increases (Biebrich & Kuhl, 2002). Thus, in order to be creative, state-oriented individuals are most dependent on the process of shifting. Creativity should be highest when they succeed in shifting from negative to positive affect. It should be lowest when negative affect prevails and no shifting takes place. For action-oriented individuals, this process should be less pronounced. As they down-regulate negative affect quickly, they are less likely to make use of novel information elaborated during a phase of negative affect.

> *Hypothesis 2*: Action versus state orientation (*preoccupation dimension*) moderates the relationship between negative affect and creativity depending on the extent to which a shift to positive affect occurs. The relationship between negative affect and creativity

is more positive for state orientation than for action orientation if a shift to positive affect occurs.

As shifting out of negative affect is particularly difficult and important for state-oriented individuals, an important question is how they manage to do so. State-oriented individuals are particularly sensitive to their social environment and external cues may therefore assist them in affect regulation (Baumann & Kuhl, 2003). Social support is one well-known external mechanism that buffers against detrimental consequences of negative affect (Frese, 1999). Receiving social support may compensate for the reduced ability of state-oriented individual to autonomously generate positive affect and may assist them in overcoming a negative affective state (Kuhl, 2000b). As a consequence of the change in affect induced by social support, creativity should increase. We do not expect this effect of social support for action-oriented individuals. They rely on self-regulation rather than on external influences such as social support to regulate negative affect (Kuhl, 2001).

*Hypothesis 3*: Action versus state orientation (*preoccupation dimension*) moderates the relationship between negative affect and creativity depending on social support in a work situation. For state orientation, there is a positive relationship between negative affect and creativity if social support is high.

## 2.4.2. Signatures of creativity

Affective and cognitive mental functions relevant for creativity are not only influenced by personality but also by situational characteristics of the work setting (Shalley et al., 2004). To integrate situational characteristics into our reasoning on when creativity occurs, we adapt the concept of *behavioral signatures* and use the term *signatures of creativity*. The notion of *behavioral signatures* was coined by Walter Mischel. Mischel's (2004) work has demonstrated that individuals do not only differ in their average level of a certain behavioral trait such as conscientiousness (Mischel & Peake, 1982) or aggressiveness (Shoda, Mischel, & Wright, 1994). Individuals also differ with respect to the specific and stable pattern of behavior they perform across different situations (Mischel & Shoda, 1998). The term situation refers to what an individual encounters in the external environment as well as intrapsychic situational features such as mood states (Mischel & Shoda, 1995). Individuals are characterized by distinct *if...then* situation-behavior relationships, their behavioral signature. In situations that are functionally equivalent for a person, the person will show similar

behavior on different occasions. However, if situations differ in how they influence mental functioning, the behavior of a person will vary between situations. We apply this general notion to creativity at work and use the term *signatures of creativity* to connote the distinct pattern of situations in which people's creativity is high or low. Above, we have already developed hypotheses concerning the preoccupation dimension of action versus state orientation and signatures of creativity, for instance on differential effects of social support in a work situation. We now turn to the hesitation dimension of action versus state orientation.

Concerning the *hesitation* dimension of action versus state orientation, we derive the hypothesis that action-oriented individuals (*low hesitation*) can make better use of the creative potential inherent to high self-efficacy in a work situation than state oriented individuals. Self-efficacy beliefs are an important predictor of successful goal-pursuit and of creativity (Bandura, 1997). In work situations in which people trust their capability to perform well they exhibit more creativity (Frese, Teng, & Wijnen, 1999; Tierney & Farmer, 2002). In terms of PSI-Theory, high self-efficacy is related to activity of extension memory, which allows a person to have an overview over desired outcomes, possible associations, and courses of action. Extension memory thereby provides a person with a strong sense of self (Kuhl, 2000b). Although people in general are more creative in situations in which they perceive high rather than low self-efficacy, the strength of the relationship should depend on action versus state orientation. Action orientation is an orientation towards self-regulation and experiencing self-efficacy is consistent with this dispositional orientation. High self-efficacy allows action-oriented individuals to capitalize on their strength to initiate and persist in goal-directed action. Although we expect the relationship to also be positive for state-oriented individuals, it should be less pronounced. They are less oriented towards active self-regulation and should benefit less from high self-efficacy.

> *Hypothesis 4a*: Self efficacy in a work situation is positively related to creativity.
> *Hypothesis 4b:* Action versus state orientation (*hesitation dimension*) moderates the relationship between self-efficacy and creativity such that this relationship is more positive for action orientation than for state orientation.

Next, we consider situational features of the work context that lead to distinct signatures of creativity for action versus state orientation. *Hesitation* has also been referred to as demand-related action versus state orientation because the self-regulatory advantages of action orientation appear only in high demand situations (Kuhl, 1994c). In work settings, high

demands are present if individuals experience a discrepancy between the status quo and their goals. The perception of a discrepancy signals the necessity to act and activates the self (Baumeister, Bratslavsky, Muraven, & Tice, 1998; Lord & Levy, 1994). Action-oriented people (*low hesitation*) can effectively self-regulate in work situations with high demands because they can implicitly regulate affect such that it facilitates effective goal-pursuit (Kazen, Kaschel, & Kuhl, 2008). Koole and Jostmann (2004) provided support for the proposition of PSI-Theory that action-oriented people implicitly down-regulate negative affect if they are confronted with a demanding situation. Implicit down-regulation of negative affect facilitates mobilization of cognitive resources, effective self-regulation and thereby contributes to creativity. By means of affect regulation action-oriented individuals may appraise demands as challenges rather than hindrances (cf. Lazarus & Folkman, 1984; Lepine, Podsakoff, & Lepine, 2005). Perceiving demands as challenges is positively related to creativity in a work situation (Ohly & Fritz, in press).

However, these advantages of action orientation compared to state orientation are limited to situations of high demands. In situations of low demands PSI-theory argues that action-oriented people can be less effective (Koole et al., 2005). The perception of discrepancies is crucial in order for individuals to take goal-directed action (Lord & Levy, 1994). Action-oriented individuals may be particularly dependent on the perception that investing effort and actively generating new ideas is necessary. If they do not see the necessity of a challenging situation to intentionally focus on creativity, they are unlikely to develop and enact related intentions. Therefore, work demands should be positively related to creativity for action-oriented people.

In contrast, we expect a negative relationship between work demands and creativity for state-oriented individuals (*high hesitation*). Their ability to access the intuitive mental functions of *extension memory* and the *intuitive behavioral control system* is impaired by high demands (Kazen et al., 2003). They remain in an analytic mode of information processing focused on developing intentions and plans of action. However, they have difficulties in enacting their intentions if demands are high. Due to their limited ability to generate positive affect, state-oriented individuals are likely to perceive demanding situations as stressful rather than challenging. Such situations lead to high cognitive load and should reduce creativity of state-oriented individuals (Amabile, Hadley, & Kramer, 2002; Kazen et al., 2008). Under conditions of low demands, state-orientation does not pose a disadvantage for performing creativity relevant mental functions. The necessity to engage in effortful self-regulation is

low, and state-oriented individuals can access the intuitive mental functions that are important for creativity. In sum, we propose that the relationship between demands and creativity is moderated by action versus state orientation.

> *Hypothesis 5*: Action versus state orientation (*hesitation dimension*) moderates the relationship between demands of a work situation and creativity such that this relationship is positive for action orientation and negative for state orientation.

Next, we posit that signatures of creativity for action- and state-oriented individuals depart depending on the degree of structure in a work situation. Structure refers to the extent to which the work flow of a day is predetermined as to concerning the kind of tasks, their order, and the manner in which they need to be performed. A situation with high structure is consistent with state orientation, because it does not pose high demands on self-regulation. Structure provides external cues on the specific activities and the sequence of tasks employees need to perform. If structure is high, the limited capacity of state-oriented individuals to self-regulate affect and behavior is not overly strained (Kuhl, 1994c). There are reduced demands on enacting difficult goals and consciously controlling ongoing behavior. Action can be controlled by the intuitive *behavior control system* responsible for routinized behavior. This automatic mode of control frees up cognitive resources, which can be devoted to other activities (Kanfer & Ackerman, 1989). Ohly et al., (2006) argued that the availability of routines allows a person to reflect on tasks and to develop new ideas. They found support for the hypothesis of a positive relationship between routinization and creativity.

In work settings structure is often imposed by the external context of individuals, for instance, by their supervisor. One distinctive characteristic of state-oriented individuals is their ability and willingness to adhere to external directives, even if it comes at the expense to satisfying their own needs (Kazen et al., 2003; Kuhl & Kazén, 1994). Koole and Jostmann (2004) found state-oriented individuals to invest more effort and outperform action-oriented individuals on unpleasant tasks that were externally reinforced (cf. Koole et al., 2005). Situations with high structure, in which one can rely on one's routines, are supportive of state orientation. In contrast, situations with low task structure pose high demands on self-regulation and are inconsistent with state orientation. We therefore hypothesize a positive relationship between structure and creativity for state-orientation.

For action-oriented individuals, we posit a negative relationship between the structure of a work situation and creativity. The self-regulatory advantages of action orientation can be

capitalized on in situations of low rather than high structure. Situations of high structure constrain self-regulation and the range of behavior a person can perform (C. M. Ford & Gioia, 2000). The possibility to autonomously explore is limited by high structure. There is a misfit between an orientation towards self-regulation and a situation in which the person has to adhere to a detailed structure. A misfit can lead to lower motivation and enjoyment of a task and hence lower creativity (cf. Higgins, 2005). If structure is high, action-oriented individuals may also perceive a situation as unchallenging such that they do not actively pursue their tasks. A lack of challenge is detrimental to creativity (Ohly & Fritz, in press). Therefore, a negative relationship between structure and creativity can be expected for action-oriented individuals.

> *Hypothesis 6*: Action versus state orientation (*hesitation dimension*) moderates the relationship between structure of a work situation and creativity such that this relationship is negative for action orientation and positive for state orientation.

## 2.5. Method

We conducted an experience sampling study with full-time employees in professional jobs to test hypotheses on signatures of creativity at work. After responding to a survey in which we assessed personality variables, participants answered a short online-survey twice a day over the course of one working week. At the onset of each working day, participants reported on features of the work situation and their internal state. At the end of each working day, participants indicated their social and affective experiences and how creative they had been during the day. Multilevel modeling was used to test hypotheses.

### 2.5.1. Participants and procedure

In order to test our hypotheses in a sample that allows for generalization across jobs and industries, we used a heterogeneous convenience sample of full-time employees. One of the primary concerns of a diary study is that participants commit themselves to answer the surveys repeatedly (Alliger & Williams, 1993). To ensure participants' commitment, we directly contacted potential participants through private networks asking them to volunteer in the study, rather than asking supervisors to let their employees participate. We also asked participants if they could name friends or colleagues who might be willing to support a scientific study of employee creativity. As an incentive, participants were offered feedback about the results of the study. As potential participants we contacted only people who held

professional jobs in order to ensure that their job allowed for and demanded the development of new and useful ideas.

We contacted approximately 140 people in this way; 116 eventually participated in the study. As our main focus was to study within-person variability across situations, it was important that participants had completed the daily questionnaire for at least three days. 102 participants met this criterion and were included in the final sample. The 14 participants we dropped from the final sample because they had answered on less than three days did not significantly differ on the main variables of the study. Participants' ages ranged from 20 to 57 with an average of 34 years. 42% were women. 75% of participants held a university degree. The most frequent professions were: business (34%), psychology (18%), engineering (15%), IT-engineering (8%), teaching (6%). Participants worked for private as well as public organizations. 27% worked in small companies with less than 50 employees, 24% in companies with less than 500 employees, and 44% in organizations with more than 500 employees. Average tenure was 6.3 years.

Data collection was divided into two parts: First, participants filled out a questionnaire to measure personality variables and demographic control variables. Second, in the consecutive week participants filled out a short online survey in the morning after arriving in the office and in the evening before leaving the office. Each morning and evening participants received an email link to the online questionnaire. We were able to assess and control whether participants responded to the survey at the agreed times. We used two points of measurement each day to measure independent variables and the dependent variable separately. Each morning participants reported the level of positive affect, negative affect, self-efficacy, demands, and structure. Each evening we asked participants about their level of creativity during the day, their affective state during the day, and the extent to which they perceived social support. On average, participants completed both the morning and evening questionnaire on 4.6 days, leading to a total sample of 475 pairs of morning and evening observations of 102 participants.

### 2.5.2. Measures

*Control variables*. We included age and gender as demographic control variables. To ensure validity of the daily measure of creativity and to control for individual differences, we included a 10-item measure of the Big Five Inventory of personality (BFI-10). This inventory measures each personality dimension with two items (one item for each scale is reverse-

coded) and has been found to be both reliable and valid (Rammstedt & John, 2007). However, validity and reliability coefficients for the BFI-10 are lower than for more comprehensive measures of personality. Rammstedt & John (2007) report the following average coefficients for the five scales: part-whole correlation: .83, test-retest reliability: .75, self-peer convergent validity correlation: .44. As the five-factor model of personality was not the main focus of the study and efficiency was of primarily concern, we decided that a rough assessment of the five-factor model of personality was sufficient.

*Action versus state orientation.* We used the action-control scales to measure two dimensions of action versus state orientation (ACS; Kuhl, 1994a). The two dimensions hesitation and preoccupation were assessed with 8 items each. We used the items that were suggested by Diefendorff, Hall, Lord, and Strean (2000) for further use of the scale. Cronbach's alpha for hesitation was .70. An example item for the scale was: "When I am getting ready to tackle a difficult problem, (a) It feels like I am facing a big mountain that I don't think I can climb, (b) I look for a way that the problem can be approached in a suitable manner". Option (b) reflects lower hesitation, i.e. action-orientation. Respondents were requested to select between both options. Items were coded with 0 and 1 such that higher scores reflect action-orientation (*lower hesitation*). The mean score across the eight items was used for all analyses. For the eight items of the preoccupation scale, Cronbach's alpha was .68. An example item is: "If I've worked for weeks on one project and then everything goes completely wrong with the project, (a) it takes me a long time to adjust myself to it, (b) it bothers me for a while, but then I don't think about it anymore". In this example option (b) reflects low preoccupation, i.e. high action orientation. Items were also coded with 0 and 1 such that higher values reflect action orientation (*lower preoccupation*).

The relatively low internal consistency for both dimensions of action versus state orientation is due to situational variance and the short version of the scales we used. The format of the action versus state orientation items is similar to situational judgment test items in that they consist of situation descriptions as item-stems and different response options for each item (Motowidlo, Dunnette, & Carter, 1990). This format introduces situational variance which leads to lower levels of internal consistency as respondents take the situation into account and do not respond uniformly to items (Bledow & Frese, 2009). For reasons of validity such scales are not developed to maximize internal consistency, and high degrees of internal consistency are not to be expected if short versions of such scales are used (Kuhl, 1994a).

*Daily measures.* Hypotheses of this study concern antecedent conditions and creativity in specific work situations. Each work day of a participant is treated as a delimitable situation with distinct characteristics. We followed the strategy to use items of existing trait measures and adapted items to refer to specific days. If no measures were available, we formulated items to directly reflect the construct of interest and then refined items in discussions among the authors. All items were used in German and participants responded on a 5-point scale ranging from 1 = "strongly disagree" to 5 = "strongly agree*"*. We used confirmatory factor analysis to examine the latent factor structure of the situation specific measures.

*Creativity.* Each evening participants reported the level of creativity for a work day. We used five items by Tierney, Farmer, and Graen (1999) which were translated into German and adapted to the level of the work day by Ohly and Fritz (in press). Example items are: *"*Today, I generated novel, but operable work-related ideas" and "Today, I served as a good role model for creativity". Cronbach's alpha for the five-item creativity scales was .84.

*Self-Efficacy.* We adapted three items of the work-related self-efficacy scales by Speier and Frese (1997) to refer to the level of self-efficacy participants perceived for dealing with the tasks on each day. The three items were: "I judge my abilities to be high to deal with today's work task"; "If I am confronted with a new task today, I am confident I can handle it"; "If I want to achieve something today, I can overcome setbacks without giving up my goal". Cronbach's alpha for the scale was .78.

*Demands.* We referred to items of the job demands scale (Karasek et al., 1998) to measure the extent to which participants perceived high work demands in the morning before starting to work. However, as these items measure the objective task characteristics rather than an individual's daily appraisal of demands, we developed a set of items that more directly reflected the control theoretical concept of discrepancy perception (Lord & Levy, 1994). After discussions on the newly developed items among the authors, we decided to use the three items that best reflect the construct: "I have not advanced my work as far as I should have", "To reach my work goals, I have to work hard today". "In order to live up to my own expectations, I have to invest high effort today". Cronbach's alpha for the demand scale was .80.

*Structure.* As for the demand scale, no suitable items were available which measured how well structured and predictable a work day is. We therefore formulated a set of items to capture the construct: "I have a detailed picture of today's work agenda", "I know exactly which tasks I will work on today", "I know exactly which kind of situations, I will be facing

today", "The tasks I will work on today, are planned in great detail". Cronbach's alpha for the scales was .89.

We examined the latent factor structure of situational (i.e. daily) fluctuations on the measures for self-efficacy, work demands, work structure, and creativity using multilevel confirmatory factor analysis (MPlus, Muthen & Muthen, 2004). A four factor model showed a better fit to the data than models with fewer latent factors, indicating that the four constructs could be differentiated ($\chi^2 = 1107.4$, $df = 105$, $CFI = 0.98$, $RMSEA = 0.02$, $SRMR = 0.04$). All items loaded higher than .50 on their respective factor.

*Positive and negative affect* was measured with the PANAS inventory (Watson, Clark, & Tellegen, 1988) twice each day. Positive affect was measured with the six items: excited, interested, strong, active, inspired, alert. Negative affect was measured with the seven items: scared, guilty, distressed, afraid, nervous, hostile, upset, angry. In the morning survey, participants were asked to report their affective state for each item on a five-point Likert scale (1 = not at all, 5 = extremely). Cronbach's alpha was .87 for the positive affect scale and .83 for the negative affect scale. In the evening participants reported their affective state on the same positive and negative affect items (Cronbach's alpha: .86 /.82). Participants were instructed to indicate how they felt on average during that work day.

*Social Support.* Social support was measured by asking respondents to what extent they felt supported by their supervisor and their colleagues during the day (cf. Caplan, Cobb, French, van Harrison, & Pinneau, 1975). The two items were: "To what extent did you feel socially supported by your supervisor / your colleagues today". Participants responded on a five-point scale (1 = not at all, 5 = very much). We combined the two items to a composite scale. Cronbach's alpha for the scale was .63.

## 2.5.3. Analyses

For all analyses, we used random coefficient modeling to predict creativity by the situation specific variables (HLM 6, Raudenbush, Bryk, & Congdon, 2004). Repeated measures data from the daily surveys were nested within persons. This led to a two-level model with repeatedly measured predictors on the situation level (affect, self-efficacy, structure, demands, social support; N = 475 observations) and stable individual difference predictors on the person level (action-state orientation, personality, demographic controls; N = 102 participants). In statistical terms, the situation level refers to within-person variance and the person level refers to between-person variance. Predictors on the situation level were

centered around the mean of each person. This method of centering ensures that all relationships on the situation level are unconfounded by person level variance, which is essential for the correct interpretation of cross-level moderation (Enders & Tofighi, 2007; Hofmann, Griffin, & Gavin, 2000).

Cross-level moderation provides the test or the core proposition of signatures of creativity: Individual differences in *if...then* relationships that specify, in which situations a person is creative. We tested for cross-level moderation by predicting situation level relationships with person level differences in action versus state orientation (i.e. slope-as-outcome models). Hypotheses 1b, 2, and 3 pertain to dynamic phenomena, for which the sequence of different processes must be taken into account. Concerning the hypotheses on the consequence of shifting from negative affect in the morning to positive affect during the day, we used the interaction term of negative affect measured in the morning and the level of positive affect during the day which was reported in the evening (Bledow, Kuehnel et al., 2009). Shifting refers to the case, in which a person experienced high negative affect in the morning but reported high levels of positive affect for that work day in the evening. In this case, a shift from negative affect to positive has taken place. For these analyses, we controlled for the main effects of positive and negative affect in the morning as well as in the evening. We applied a similar method to test Hypothesis 3 on the consequences of receiving social support after the experience of negative affect. We used the interaction term between negative affect measured in the morning and social support for that day (measured in the evening) to predict creativity.

## 2.6. Results

Table 2.1 presents means, standard deviations, variance proportions and intercorrelations of all variables. Correlations above the diagonal are situation-level correlations. Correlations below the diagonal are person-level correlations. Variance proportions indicate the proportion of situation level and person level variance in the daily measures. For the dependent variable creativity, 55% of variance was on the level of situations and 45% was on the level of persons. Individual differences in creativity (i.e. average creativity across the five days) were unrelated to age and gender and significantly related to openness to experiences ($r = .26$, $p < .01$) and extraversion ($r = .26$, $p < .01$). These relationships are in line with past research on creativity and personality and provide support for the validity of the daily measure of creativity (Feist, 1999).

Table 2.1

*Means (M), variance proportions ($\sigma^2$), standard deviations (SD) and intercorrelations of all variables*

| | Variable | *M* | *SD* | $\sigma^2$ sit. (%)[b] | $\sigma^2$ per. (%)[b] | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Situation-level variables* | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Creativity | 2.26 | .84 | 55 | 45 | - | .11* | -.02 | .15** | -.02 | .04 | .17** | -.04 | .08 | | | | | | | | |
| | *Morning measurement* | | | | | | | | | | | | | | | | | | | | | |
| 2 | Pos. affect | 3.11 | 0.71 | 62 | 38 | .33** | - | -.15** | .35** | .10* | .12* | .32** | -.05 | .09 | | | | | | | | |
| 3 | Neg. affect | 1.26 | 0.42 | 67 | 33 | .00 | -.14 | - | -.25** | .15** | .02 | -.10* | .23** | -.02 | | | | | | | | |
| 4 | Self-efficacy | 3.83 | 0.62 | 55 | 45 | .39** | .42** | -.31 | - | -.09 | .13** | .11** | -.17** | .00 | | | | | | | | |
| 5 | Demands | 2.76 | 0.92 | 41 | 59 | .16 | .13 | .11 | .04 | - | .09 | .01 | .03 | -.02 | | | | | | | | |
| 6 | Structure | 3.08 | 0.88 | 38 | 62 | .08 | .13 | -.23* | .22 | .14 | - | .12* | -.06 | .09* | | | | | | | | |
| | *Evening measurement* | | | | | | | | | | | | | | | | | | | | | |
| 7 | Pos. Affect | 3.19 | 0.68 | 41 | 39 | .30** | .74** | -.15 | .41** | .15 | .08 | - | -.26** | .16** | | | | | | | | |
| 8 | Neg. affect | 1.38 | 0.48 | 70 | 30 | .11 | -.05 | -.69** | -.17 | .20* | -.19 | -.17 | - | -.21** | | | | | | | | |
| 9 | Social Support | 2.94 | 1.00 | 47 | 53 | .19 | .34** | -.21* | .24 | .15 | .15 | .34** | -.17 | - | | | | | | | | |
| *Person-level variables* | | | | | | | | | | | | | | | | | | | | | | |
| 10 | Hesitation[b] | .54 | .25 | - | 100 | .14 | .33** | -.24* | .19 | -.23* | .10 | .27** | -.20* | .24* | - | | | | | | | |
| 11 | Preoccupation[b] | .47 | .26 | - | 100 | .07 | .32** | -.24* | .16 | .04 | .02 | .27** | -.11 | .06 | .23* | - | | | | | | |
| 12 | Age | 34 | 9.52 | - | 100 | .18 | .10 | -.11 | .19 | .13 | .38** | .19 | -.16 | -.05 | -.07 | .11 | - | | | | | |
| 13 | Gender[c] | 1.60 | .50 | - | 100 | .16 | .06 | -.02 | .16 | .06 | .03 | .06 | -.13 | .02 | -.09 | .02 | .32** | - | | | | |
| 14 | Conscientious. | 3.58 | .62 | - | 100 | .16 | .26** | -.17 | .19 | -.02 | .16 | .33 | -.06 | .18 | .35** | .09 | .13 | -.13 | - | | | |
| 15 | Extraversion | 3.41 | .86 | - | 100 | .26** | .12 | .06 | .21** | .27** | -.03 | .12 | .18 | .10 | .09 | .03 | -.16 | -.03 | .11 | - | | |
| 16 | Openness | 3.48 | .85 | - | 100 | .26** | .13 | .06 | .13 | .12 | -.01 | .10 | .05 | .12 | .10 | .01 | .07 | .07 | .05 | .20 | - | |
| 17 | Neuroticism | 2.62 | .70 | - | 100 | -.01 | -.27** | .27** | -.39** | .06 | -.16 | -.20** | .31** | -.08 | -.26** | -.25* | -.04 | -.13 | -.15 | -.11 | -.13 | - |
| 18 | Agreeableness | 3.41 | .57 | - | 100 | .16 | .09 | .10 | -.11 | .11 | -.07 | .12 | .06 | -.00 | .09 | .14 | .09 | -.16 | -.04 | .05 | .10 | .06 |

*Note*. Correlations below the diagonal represent the person level (*N*= 102). In order to calculate person-level correlations for variables that were measured at the situation level, values were aggregated across days. Correlations above the diagonal represent the situation level (*N*= 475). In order to obtain standardized estimates for situation-level correlations, we standardized all variables prior to calculating the coefficients with HLM. $^{*}$ $p \leq .05$. $^{**}$ $p \leq .01$. (two-sided).

[a] $\sigma^2$ sit. refers to the proportion of the total variance of each variable that resides at the situation level; $\sigma^2$ per. refers to the proportion of the total variance of each variable that resides at the person level. [b] Variables are coded such that high values indicate action orientation and low values indicate state-orientation. [c] Gender was coded with "1" for female and "2" for male participants.

### 2.6.1. Test of hypotheses

Table 2.2 presents five hierarchical linear models with creativity as the dependent variable. In the first model, situation-level predictors were entered that were measured at the beginning of each working day. In the second model, situation-level predictors were entered that were measured at the end of each working day. In the third model, the person-level variable preoccupation was included. In the fourth model the person-level variable hesitation was added. In the final model all predictors were entered for a simultaneous test of all hypotheses. In all models we included the person-level control variables age, gender and the five factors of personality (the regression weights are not displayed in Table 2.2.). Individual differences in creativity were significantly predicted by extraversion ($\gamma = .16$, $p = .025$) and openness to experience ($\gamma = .14$, $p = .049$). All other control variables were unrelated to creativity.

Hypothesis 1a concerns the relationship between positive affect and creativity. Consistent with past research and hypothesis 1a, Models 1 through 5 show a positive relationship between positive affect and creativity. Positive affect measured at the beginning of each working day predicted creativity reported in the evening for that day ($\gamma = .12$, $p = .05$). If positive affect measured retrospectively for each day was added in Model 2, it was significantly related to creativity and rendered the effect of positive affect measured in the morning insignificant (Model 2 without the interaction term: $\gamma = .27$, $p < .001$, $\Delta R^2 = 3\%$).

*Affective Shifting.* Negative affect was unrelated to creativity in Models 1 through 5. Hypothesis 1b posits that shifting from negative affect to positive affect is related to creativity beyond the main effect of positive affect. The term shifting refers to the case in which individuals experienced negative affect at the beginning of a work day but reported high average levels of positive affect during the work day. The present study cannot address at which point during a day shifting took place or if repeated shifts in affect occurred. However, it can be inferred that overall a change in affect from negative to positive occurred if participants reported high negative affect in the morning but high average levels of positive affect for that day in the evening. Model 2 shows that the interaction term between negative affect in the morning and positive affect during the day was significant after controlling for the main effects of positive and negative affect ($\gamma = .39$, $p = .043$, $\Delta R^2 = 1\%$). Negative affect was positively related to creativity if positive affect during the day was high. In order to interpret and illustrate this effect results for Hypothesis 2 need to be taken into account.

Table 2.2

*Hierarchical linear models with creativity as dependent variable*

| Independent variables | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 |
|---|---|---|---|---|---|
| *Situation-level* | | | | | |
| Intercept | 1.62** (0.25) | 1.65** (0.25) | 1.65** (0.26) | 1.58** (0.26) | 1.61** (0.26) |
| *Morning* | | | | | |
| Positive affect | 0.12† (0.06) | 0.01 (0.06) | 0.02 (0.06) | 0.12* (0.06) | 0.03 (0.06) |
| Negative affect | 0.06 (0.09) | 0.11 (0.09) | 0.07 (0.11) | 0.10 (0.09) | 0.12 (0.11) |
| Self-efficacy | 0.27** (0.07) | 0.28** (0.07) | 0.26** (0.07) | 0.31** (0.08) | 0.29** (0.08) |
| Demands | -0.02 (0.05) | -0.03 (0.05) | -0.06 (0.05) | -0.03 (0.05) | -0.07 (0.05) |
| Structure | 0.02 (0.06) | 0.02 (0.06) | 0.02 (0.06) | 0.00 (0.06) | 0.00 (0.06) |
| *Evening* | | | | | |
| Positive affect | | 0.25** (0.06) | 0.26** (0.06) | | 0.25** (0.06) |
| Negative affect | | 0.06 (0.08) | 0.02 (0.08) | | 0.00 (0.08) |
| Social support | | 0.09* (0.05) | 0.09* (0.05) | | 0.09† (0.05) |
| Shifting: negative to positive affect [a] | | 0.39** (0.19) | 0.26** (0.06) | | 0.25* (0.20) |
| Social support after negative affect | | 0.12 (0.12) | | | -.10 (0.14) |
| *Person-level* | | | | | |
| Control variables | | | | | |
| Hesitation | | | | 0.26 (0.25) | 0.25 (0.26) |
| Preoccupation | | | 0.06 (0.24) | | 0.03 (0.25) |
| *Person X Situation (cross-level)* | | | | | |
| Hesitation * Self-efficacy | | | | 0.86* (0.30) | 0.64* (0.29) |
| Hesitation * Demands | | | | 0.47* (0.21) | 0.42* (0.21) |
| Hesitation * Structure | | | | -0.50* (0.22) | -0.50* (0.22) |
| Preoccupation * Shifting: negative to positive affect [a] | | | -1.58*(0.71) | | -1.58* (0.70) |
| Preoccupation * Social support after negative affect [a] | | | -1.14* (0.52) | | -1.09* (0.52) |
| Model $R^2$ | .05 | .09 | .12 | .08 | .15 |

*Note*. Creativity is the dependent variable. The values are unstandardized parameter estimates for regression weights (γ). Standard errors are indicated in parenthesis. *N* = 475 observations nested within 102 individuals. [a] Three-way interaction, $R^2$ = Within-person variance explained in creativity by the variables in the model. † *p* < *.10.* * *p* < *.05.* ** *p* < *.01. (two-sided test of significance)*

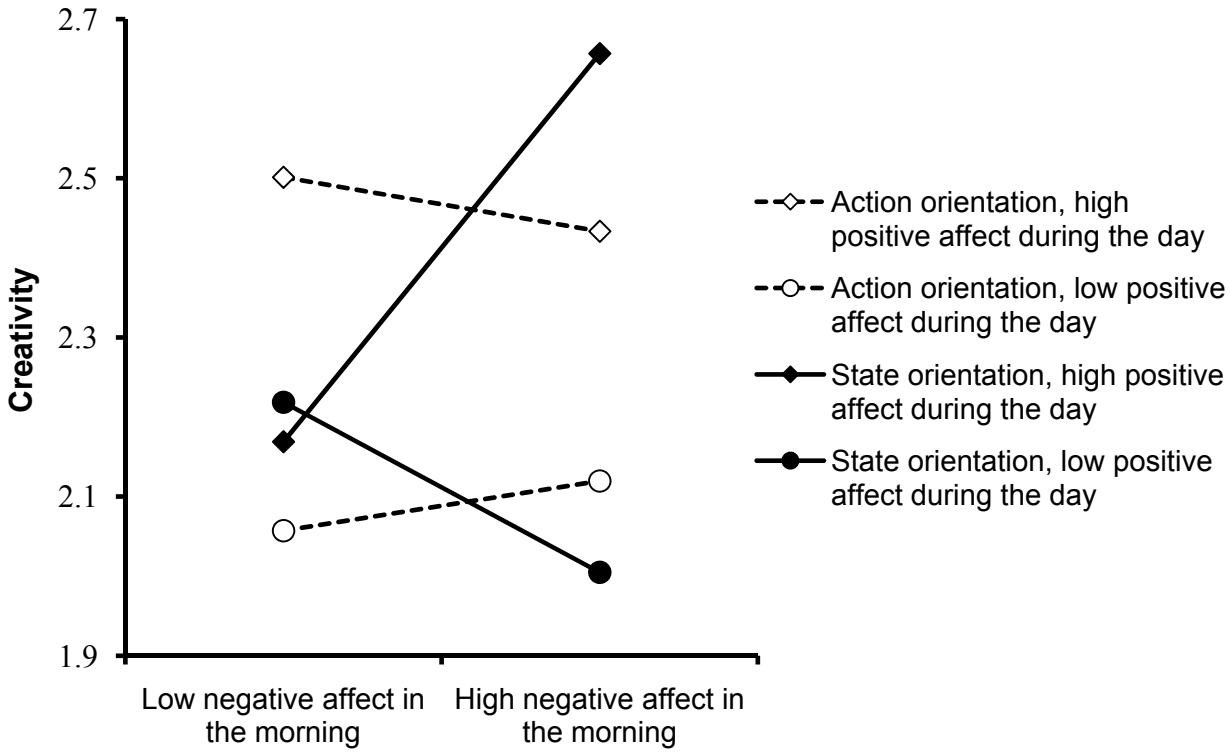


*Figure 2.2.* Preoccupation, affective shifting, and creativity

Hypothesis 2 extends the proposition on affective shifting and posits that the effect should be stronger for state orientation than for action orientation (*preoccupation dimension*). In support of Hypothesis 2, the cross-level moderation of action versus state orientation on shifting was significant (Model 3: $\gamma = -1.58$, $p = .025$, $\Delta R^2 = 2\%$). Figure 2.2 displays this three-way interaction. The solid lines refer to state orientation; the dotted lines refer to action orientation. For state orientation, the figure shows a positive relationship between negative affect reported in the morning and creativity if a high level of positive affect was experienced during the day. The relationship between negative affect reported in the morning and creativity was negative if a low level of positive affect was experienced during the day. For action orientation, there were no distinct relationships between negative affect and creativity depending on positive affect. There was only a main effect of positive affect on creativity. These results provide support for Hypothesis 1b and 2. In general, shifting from negative to positive affect is related to creativity. This effect is particularly pronounced for state orientation and insignificant for high action orientation.

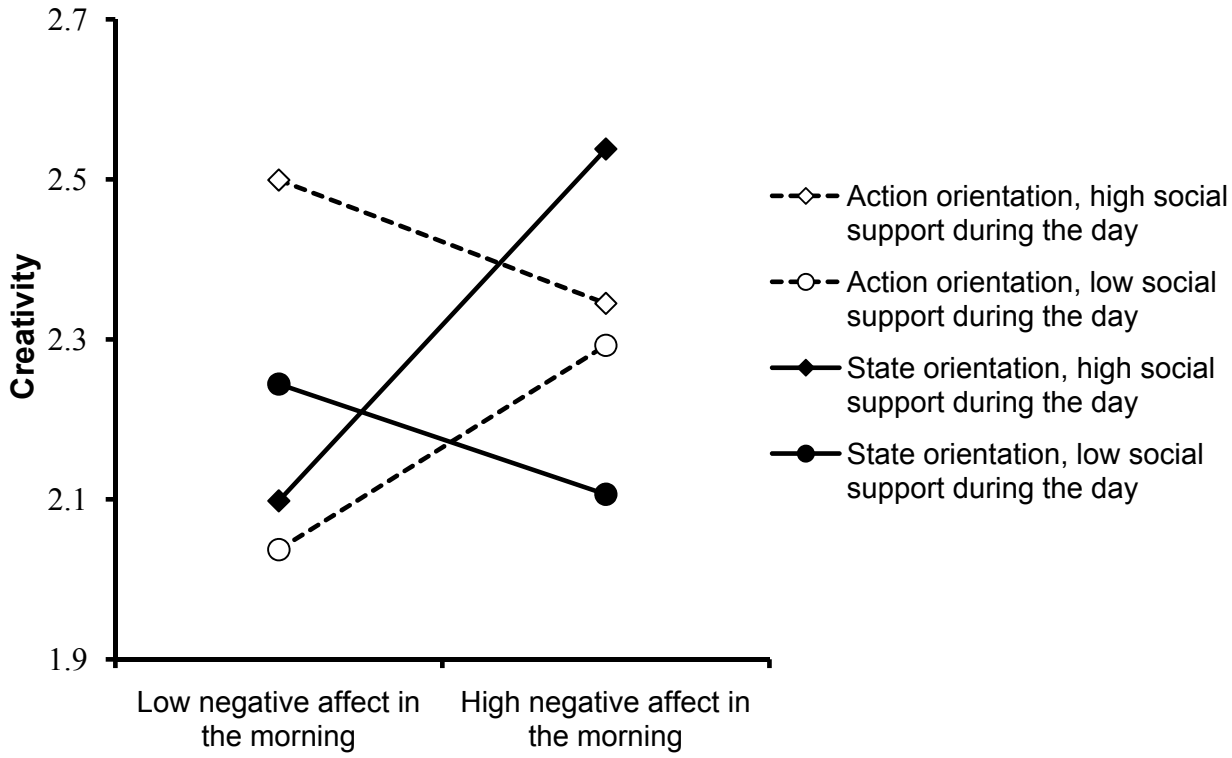


*Figure 2.3*. Preoccupation, social support, and creativity

*Social support*. According to Hypothesis 3, for state-oriented individuals (*preoccupation dimension*) negative affect is positively related to creativity in situations, in which social support is high. The interaction term of negative affect at the beginning of the work day and social support during the work day was used to test this hypothesis. Model 2 shows that there was a marginally significant main effect of social support on creativity (Model 2 without the interaction term: $\gamma = 0.09$, $p = .054$). The interaction term between negative affect and social support was not significant ($\gamma = 0.12$, $p = .317$). However, in support of Hypothesis 3, there was a significant three-way interaction in Model 3 ($\gamma = -1.14$, $p = .034$, $\Delta R^2 = 1\%$), which is displayed in Figure 2.3. For state orientation, there was a positive relationship between negative affect in the morning and creativity if social support during the day was high. The relationship between negative affect and creativity was negative if social support was low. Results for action orientation were unexpected: They showed a reverse pattern of relationships. If social support during a day was high, there was a negative relationship between negative affect in the morning and creativity. If social support during a day was low, there was a positive relationship between negative affect and creativity. Although the finding fits to the notion that social support has differential effects for action versus state orientation, this finding was not expected.

*Self-efficacy*. According to Hypothesis 4a situational variation in self-efficacy is related to creativity such that people are more creative if self-efficacy is high. In support of Hypothesis 4a, self-efficacy was significantly related to creativity in Models 1 through 5 (Model 1: $\gamma = .27$, $p < .001$, $\Delta R^2 = 3\%$). Hypothesis 4b posits that the relationship between self-efficacy and creativity is stronger for action orientation than for state orientation (*hesitation dimension*). Cross-level moderation of the relationship was significant providing support for Hypothesis 4b (Model 4: $\gamma = .86$, $p = .005$, $\Delta R^2 = 1\%$). The interaction is displayed in Figure 2.4. Investigation of the significance of simple slopes at different values of the moderator showed that the relationship was significantly positive for action orientation (i.e. one standard deviation above the mean: $\gamma = .53$, $p < .001$) and for people on the mean of action versus state orientation ($\gamma = .31$, $p < .001$; not displayed in Figure 2.4). For state orientation (one standard deviation below the mean) there was no significant relationship between self-efficacy and creativity ($\gamma = .10$, $p = .311$).

*Demands*. Hypothesis 5 states that action versus state orientation (*hesitation dimension*) moderates the relationship between demands and creativity. In support of Hypothesis 5, there was a significant cross-level moderation effect of hesitation on the relationship between demands and creativity (Model 5: $\gamma = .47$, $p = .028$, $\Delta R^2 = 1\%$). The shape of the interaction is displayed in Figure 2.4. The relationship between demands and creativity was positive for action orientation and negative for state orientation. Region-of-significance tests were performed to test for which values of the moderator simple slopes were significant (Preacher, Curran, & Bauer, 2006). Simple slopes were significantly positive for values higher than 1.8 standard deviations above the mean of action versus state orientation. Simple slopes were significant negative for values lower than 0.6 standard deviations below the mean of the moderator. Thus, there was a negative relationship of demands and creativity for state orientation. For very high values of action orientation (i.e. 1.8 *SD* above the mean), the relationship between demands and creativity was positive.

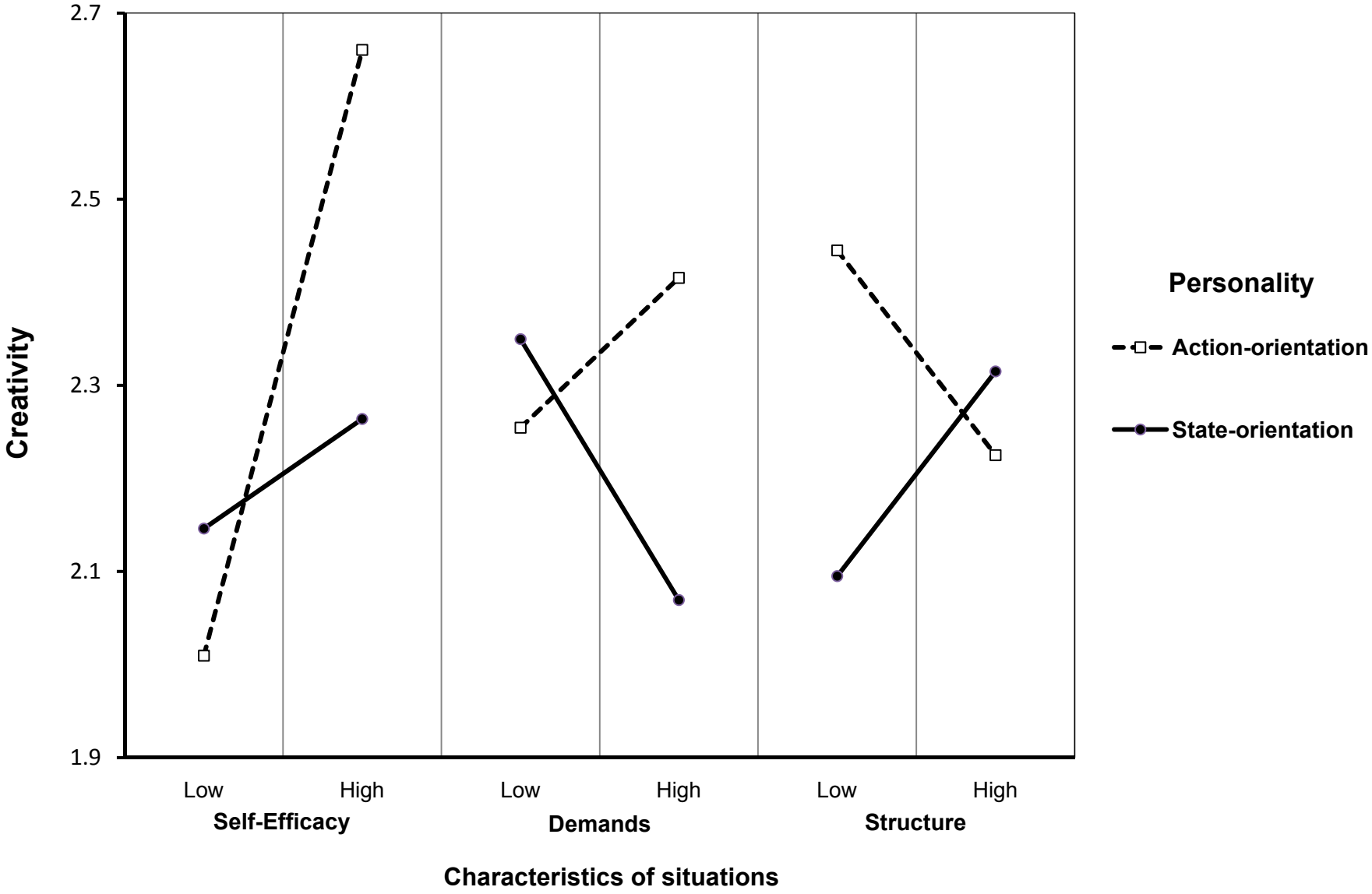


*Figure 4.* Signatures of creativity for the hesitation dimension of action versus state orientation

*Structure.* Hypothesis 6 posits that action versus state orientation (*hesitation dimension*) moderates the relationship between structure and creativity. The models in Table 2.2 show that there was no direct effect of structure on creativity. Cross-level moderation of the relationship between structure and creativity was significant (Model 4: $\gamma$ = -.50, $p$ = .025, $\Delta R^2$= 1%) providing support for Hypothesis 6. The interaction is displayed in Figure 2.4. The relationship between structure and creativity was negative for action orientation and positive for state orientation. Region-of-significance tests indicated that simple slopes were significantly negative for values higher than 1.2 standard deviations above the mean of the moderator. Simple slopes were significantly positive for values lower than 1.0 standard deviations below the mean of the moderator.

## 2.7. Discussion

We used Mischel's (2004) concept of behavioral signatures to capture the idea that creativity at work emerges from the interaction of personality and work situation. In departing from the original concept of behavioral signatures and its background in social-learning theory (Mischel & Shoda, 1995), we expected that such signatures are not entirely idiosyncratic for each person but that they are systematically related to individual differences in personality functioning. The experience sampling study supported this reasoning. PSI-Theory provided the basis for developing hypotheses on individual differences in personality functioning and the way different mental systems interact to produce novel and useful ideas. Although PSI-Theory is based on extensive research (Kuhl, 2001), it is a broad and highly inferential theory which concerns phenomena that are not directly observable. Moreover, to our knowledge the theory has not yet been applied to creativity in real-world settings. Therefore, the support we found for our specific hypotheses cannot be taken as direct evidence for the psychological mechanisms we claimed and these claims should be viewed as preliminary and subject to future research. We insist, however, that a lack of theorizing on the psychological mechanism underlying creativity and a narrow focus on isolated empirical relationships between antecedent conditions and creativity is misleading (Bledow, Frese et al., 2009a). In this vein, we integrate our findings, point out limitations and avenues for future research, and make tentative practical recommendations.

What counts for creativity, independent of action or state orientation, is the interplay of mental functions. However, the different mental functions underlying creativity are partly inhibitory because they are linked to positive or negative affect (Kuhl, 2001). The

simultaneous presence of positive and negative affect is rare (Fong, 2006). Intuitive and analytic modes of information processing thus rarely co-occur. An essential question then is how people manage to integrate these different mental functions to develop new ideas. We have argued elsewhere that repeatedly shifting between affective states and modes of information processing is likely to be more effective for creativity than a one-sided focus on any particular mental state (Bledow, Frese, Anderson, Erez, & Farr, 2009b). In this article, we derived from PSI-Theory that frequently shifting between an intuitive mode of information processing and an analytic mode of information processes ensures that mental functions work together to achieve optimal functioning (Kuhl, 2001). Such alternations are modulated by changes in affect (Koole & Jostmann, 2004; Quirin, Kazen, & Kuhl, 2009). We found support for the hypothesis that shifting from negative to positive affect is associated with creativity. However, this is only one aspect of the general notion that creativity requires alternations between different mental states. Moreover, we could only examine how people shifted between different modes of information processing by studying changes in affect. Future research may add value by studying such dynamic phenomena more directly and in more detail. The frequency and ease with which people can shift between mental states may prove an important predictor of individual differences in creativity. Training a person to shift between different mental states may be a way to enhance creativity. An attempt to enhance creativity needs to also take a person's action versus state orientation into account.

Action-oriented individuals are characterized by a strong sense of self and pronounced self-regulatory abilities (Kuhl & Beckmann, 1994). Action-oriented individuals are creative by making use of their self-regulatory abilities in situation that require these abilities, which leads to a distinctive signature of creativity. If demands in a situation are high, such that action-oriented individuals perceive a discrepancy between their current state and a goal state, they can mobilize their self-regulatory capabilities and engage in creativity. The empirical findings suggest that there is a positive relationship between demands and creativity only for individuals very high in action orientation. Further situational characteristics that were associated with creativity for action-oriented individuals were low structure in a work situation and high self-efficacy. According to our interpretation, low structure and high self-efficacy are consistent with action-orientated individuals' preference that the self is in charge of a situation. The pronounced self-regulatory abilities implied by action orientation contribute to creativity in situations of high demands, low structure and high self-efficacy.

What are the downsides of action orientation for creativity? In situations, in which self-regulation is not demanded or is even constrained by a situation, we found low levels of creativity among action-orientated individuals. Individuals are embedded in a social environment at work. If the environment constrains high-level self-regulatory processes such as autonomously initiating action, the dispositional orientation towards self-regulation leads to a misfit (cf., Higgins, 2005). In such situations, state-oriented individuals, who are disposed towards being regulated by environmental cues, were more creative. Moreover, action-oriented individuals may make premature decisions and do not take into account discrepant information which seems irrelevant for their current goals but may prove valuable for creativity (Beckmann & Kuhl, 1984). Although we did not directly observe these processes, indirect support stems from the advantages of state orientation for creativity.

State-oriented individuals are characterized by a different signature of creativity. State-orientation implies lower degrees of self-regulatory control in demanding and threatening situations. There is a misfit between situations that demand regulatory control and state orientation. For state orientation, demanding situations lead to high cognitive load, which is detrimental to creativity (Baumann & Kuhl, 2002). In contrast, situations that do not require the self to actively regulate thoughts and feeling are congruent with state-orientation. In line with this reasoning, we found situations, in which work demands were low and tasks were well-structured to be beneficial to state-oriented individuals' creativity. Moreover, their self-efficacy was unrelated to creativity, which is consistent with the notion that they achieve creativity by other means than acting on the basis of a strong sense of self. An important mechanism by which state-oriented individuals are creative is by shifting to positive affect after prolonged phases of negative affect (Koole et al., 2005). Ruminating on discrepant information provides the foundation for creativity. Creativity is realized by shifting to positive affect. This enables integration of discrepant information into one's wealth of experience. We found social support helped state-oriented individuals to shift out of negative affect. The more action-oriented individuals were, the less pronounced was the shifting effect. Action-oriented individuals down-regulate negative affect too quickly to leverage its potential (Kuhl, 1994c). The findings on affective shifting are consistent with and specify the dual-tuning model of creativity by George and Zhou (2007).

### 2.7.1. Limitations and future research

By nature of the real-world setting of the study, there is a general limitation concerning the precision, with which we could test the psychological mechanisms we have proposed. In addition, there are several specific limitations of our study that require further research. First, we did not assess content and characteristics of the new ideas developed by participants. Idea originality, fluency and usefulness are different aspects of creativity, which can have different antecedents (De Dreu et al., 2008). Future research can examine how personality, situational characteristics and their interaction influence different aspects of creativity. For instance, are creative ideas which state-oriented individuals generate after a prolonged phase of negative affect qualitatively different from ideas which action-oriented individuals produce in demanding situations? Second, we found an unexpected negative relationship of negative affect and creativity in situations with high social support for action-oriented individuals. A more detailed analysis on how social support influences creativity is indicated. For instance, emotional support and instrumental support may have a differential impact: Instrumental support may lead to reduced creativity if it decreases the demand to develop new ideas or if it is perceived as constraining. Such potential detrimental effects of social support are more likely to affect action-oriented individuals. Third, a limitation of this study concerns the measurement of situational characteristics. Perceptions of situational characteristics were measured at the beginning of each work day. However, situational characteristics of a particular day may have turned out to be quite different than participants expected. Although we cannot rule out that situational characteristics such as work demands changed during the day, such changes should have increased error variance and made it less likely to find support for our hypotheses. Fourth, we only measured explicit positive and negative affect that individuals consciously experience. According to the theory, many of the relationships we have proposed are influenced by implicit affect regulation (Koole & Jostmann, 2004). Advances in measurement may allow for measurement of implicit affect even in real-world settings (Quirin, Kazen, & Kuhl, 2009).

This study was based on self-report data, and common method variance may appear as a threat to validity (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Several reasons render it unlikely that this be the case. First, between-person differences in response tendencies such as social desirability can be a source of common method variance in cross-sectional research. However, they cannot directly account for within-person relationships because they do not vary within-persons. Second, affective states that vary within-persons could be a source of

common method variance and lead to spurious relationships. In the present study, we included positive and negative affect at all points of measurement as substantial and control variables to rule out this possibility. Furthermore, we have separated measurement of the independent and dependent variables each day according to points in time. According to Podsakoff et al. (2003), variables measured at different points in time are less likely to be affected by common method bias. Third, Podsakoff et al. (2003) state that common method variance cannot easily account for interaction effects. As the main hypotheses and findings of this study concern interaction effects, common method variance is unlikely to pose a threat to validity. Concerning the dependent variable of this study, we argue that self-report is probably the most valid means of measuring creativity of a person on a particular day. The development of new and useful ideas does not imply that people talk about these ideas or implement ideas right away and it can therefore hardly be observed by others or be reflected in objective outcomes.

An important avenue for future research is to examine whether stable and objective characteristics of work situations interact with action versus state orientation on between-person differences in creativity. To address this question, a different research design is required and it should include measures of individual differences in creativity other than self-report. Theoretically, we expect a similar pattern of relationship such that individuals are more creative if they work in an environment that is congruent with their action or state orientation. However, this needs to be tested empirically. Stable contextual factors such as human resource practices also need to be addressed. For instance, research on action versus state orientation suggests that individuals react differently to rewards (Koole et al., 2005). To resolve the ongoing dispute on the relationship between rewards and creativity, taking into account action versus state orientation may be necessary (e.g., Amabile, 2000; Eisenberger & Rhoades, 2001).

## 2.7.2. Practical implications

We suggest that supervisors and individual employees can promote creativity by increasing the congruence of personality and work situations. Effective leadership for creativity demands that supervisors are sensitive of individual differences and adapt their behavior to individual employees. To make best use of employees' creative potential, supervisors need to ensure that employees can work in situations that are congruent with their personality. Our results suggest that creativity of action-oriented employees increases if

supervisors are demanding, strengthen self-efficacy beliefs and provide employees with freedom to self-regulate. In contrast, the creativity of state-oriented employees can benefit if supervisors allow for non-demanding situations, provide a clear structure and are supportive. Thus, effective leadership requires an understanding of individual differences and of the mental mechanisms underlying creativity rather than the uniform application of any particular leadership style.

Individuals can increase their own creativity by selecting environments and shaping their daily work situations such that the mental processes underlying creativity are facilitated. Psychological assessment of individual differences in personality functioning can assist employees in understanding the situational characteristics that facilitate or inhibit their creativity. Based on this understanding, employees can seek out and shape work situations. For instance, state-oriented individuals can benefit from understanding their dependency on social support and by cultivating supportive relationships with their colleagues or by leaving environments that are unsupportive. Action-oriented individuals can benefit from understanding that they will be most creative in challenging situations, in which they can actively self-regulate.

In addition to selecting environments and shaping situations, creativity can be promoted through self-regulation. The theory and the findings suggest that creativity requires diversity in terms of affective and mental states and an integration of this diversity. A one-sided focus on an analytic or intuitive mode of mental functioning is detrimental to creativity. By shifting between different modes of mental functioning, these functions can be integrated. Affect regulation is a way to gain access to and to integrate different mental functions.

Action- and state-oriented individuals may be trained in affect-regulation for enhanced creative performance. Different affect-regulation skills are of relevance for action versus state orientation. State-oriented individuals can benefit from training in ways to deal with situations in which negative affect is high. By consciously focusing on positive aspects of the work situation, state-oriented individuals may be able to shift out of negative affective states. Examples of potentially effective strategies to regulate negative affect are: imagination of valued outcomes (Oettingen, Mayer, Thorpe, Janetzke, & Lorenz, 2005); positive reflections on the significance of work tasks for the larger social context (Grant, 2008); a phase of relaxation and techniques to calm oneself down (Amabile et al., 2002; Kuhl, 2001). The strategies may help state-oriented individuals to shift to an intuitive mode that helps them to integrate discrepant information and to be creative. However, such strategies will not promote

creativity if they are aimed at premature distraction from negative affect. Only after a prolonged phase of negative affect, in which a person ruminates on a problem, should strategies to generate positive affect be effective for creativity (Biebrich & Kuhl, 2002; Kuhl, 2000b). Most importantly, state-oriented individuals will benefit from understanding that high hesitation and preoccupation are not only a deficit, as they often perceive it (Koole et al., 2005). Phases of hesitation and preoccupation have function value for creativity which can be realized by a well-timed shift in affect.

In contrast, action-oriented individuals may gain something if they learn to be more tolerant of negative affect and refrain from brushing aside negative affect too quickly. They may benefit from learning to endure episodes of negative effect such that they can make use of a broader information base that they otherwise overlook. Strategies that may prove useful for action-oriented individuals concern a focus on discrepant information: Focusing on negative aspects of a task such as the discrepancy between goals and goal progress (Carver & Scheier, 1990); reflecting about potential barriers that could hinder goal pursuit (Oettingen et al., 2005); questioning current goals and manners of goal pursuit; considering alternatives in more detail without making premature decisions (Koole et al., 2005). Whether or not such strategies are effective for creativity in the work place needs to be empirically demonstrated.

### 2.7.3. Conclusion

The starting-point of this article was a discrepancy perception of how intraindividual processes, personality and contextual factors are separately studied in relation to creativity at work. We have attempted to take an integrative approach to improve our understanding of creativity. Our discrepancy perception on the separation of process, person and context is not limited to the domain of creativity. We think Mischel's (2004) notion of behavioral signatures may prove a useful means of integration for other phenomena relevant for individuals and organizations. However, it needs to be extended to incorporate individual differences in personality functioning, by which systematic individual differences in behavioral signatures can be explained. Although descriptive trait dimensions such as the five-factor model of personality are useful for many purposes, we believe they are of limited value for explaining behavioral signatures. They refer, by definition, to average levels in behavior (Mischel & Shoda, 1995). To explain behavioral signatures, constructs on the internal organization of personality appear more promising. Advances in implicit measurement on functional aspects of personality such as motives and affect appear to us as particularly useful for future research

on behavioral signatures (e.g., Brunstein & Maier, 2005; Kuhl & Kazen, 2008; Motowidlo, Hooper, & Jackson, 2006; Quirin, Kazen, & Kuhl, 2009).

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# Chapter 3

## Active Performance in Research and Development: The Value of Contextual Fit


### Abstract

The authors argue that employee's active performance is of key concern for research and development and that active performance emerges from contextual fit. They apply the concept of exploration versus exploitation on the individual level and propose that individuals differ in their relative orientation towards either exploration or exploitation. Contextual fit is present if project management style is consistent with an individual's orientation. Under conditions of contextual fit active performance is most likely. Hypotheses are tested in a multilevel study with 111 employees working on 49 research and development projects. Consistent with the hypothesis, supervisors assessed those employees as performing most actively for whom there was contextual fit between exploration or exploitation orientation and project management style. Practical implications for selecting the right individuals for projects and for adopting appropriate project management styles are discussed.

## 3.1. Introduction

Organizational scholars and practitioners alike pay increasing attention to the importance of active performance for modern work places (Griffin, Neal, & Parker, 2007; Macey & Schneider, 2008). Active performance refers to work behavior that is characterized by high motivational intensity and a proactive approach towards the tasks that need to be performed (Frese, 2008). The changing nature of work towards higher uncertainty and interdependence (Howard, 1995) increases the importance of active performance. In uncertain work contexts, tasks cannot be formalized in all detail and individuals need to self-start (Frese & Fay, 2001), take charge (Morrison & Phelps, 1999), and initiate and adapt to change in order to be effective (Griffin et al., 2007). In highly interdependent contexts such as project teams, effectiveness depends not only on performing individual work roles but also on proactive behavior directed at the social context an individual is embedded in (Griffin et al., 2007).

A highly uncertain and interdependent work context for which active performance is of key concern is research and development (Bledow, Frese et al., 2009a). Assigned with innovation projects, R&D teams face uncertainty with respect to the specific features of the product they develop and the sequence of activities they need to perform (Souder, Sherman, & Davies-Cooper, 1998). The work of R&D teams is interdependent as the final product emerges from the coordinated activities of multiple team members. Besides high uncertainty and interdependence, integration of the conflicting demands of exploration and exploitation is a further characteristic of work in R&D teams which necessitates active performance. Bledow and colleagues (2009a) argued that performing exploratory and exploitative activities and alternating between these activities requires high motivational intensity and a proactive approach.

Given the importance of active performance for modern work contexts and successful innovation in R&D teams, research needs to identify factors employees and managers can influence so as to increase active performance. Past research has mainly focused on individual differences in antecedents of active performance and on the relationship between active performance and outcomes (e.g., Parker, Williams, & Turner, 2006; Seibert, Crant, & Kraimer, 1999). However, to our knowledge, research has not yet addressed whether contextual conditions interact with individual differences such that active performance results from person-environment fit (e.g., Schneider, 2001). A person-environment fit perspective

can hold important implications for practice: If interacting characteristics of persons and environments can be identified, active performance may be increased by selecting the right person for a given environment and by modifying an environment such that it matches the person.

In this article, we address active performance in R&D teams as a function of person-environment fit. We argue that people differ along a dimension between exploration orientation and exploitation orientation. Whereas human action is never solely exploratory or exploitative, some individuals lean more towards exploration and others lean more towards exploitation (Bledow, Frese et al., 2009a; Kirton, 1976). Active performance results if the work context is consistent with an individual's orientation. In project-based R&D teams, project management style is an aspect of the work context which interacts with people's orientation. We examine emergent vs. planned project management style (Lewis et al., 2002) as the contextual condition that leads to contextual fit or misfit. If individuals lean towards exploration, an emergent project management style that provides freedom of action leads to contextual fit and hence active performance. In contrast, if individuals lean towards exploitation, a planned project management style that guides action leads to contextual fit and is supportive of active performance.

The theoretical model we develop and test is illustrated in Figure 3.1. After discussing the concept of exploration versus exploitation orientation and its relevance for the individual level of analysis, we link individual differences in this orientation to chronic goal orientations. We then differentiate project management styles and build on regulatory fit theory (Higgins, 2005) to derive the central contextual fit hypothesis. In the remainder of this article, we use the term exploration orientation to refer to a single dimension with the poles exploration and exploitation orientation (i.e. high values refer to exploration orientation, low values refer to exploitation orientation).

### 3.1.1. Exploration and exploitation

Innovation, the development and implementation of new ideas, requires exploration and exploitation (Bledow, Frese et al., 2009a). "Exploration includes things captured by terms such as search, variation, risk taking, experimentation, play, flexibility, discovery, innovation. Exploitation includes such things as refinement, choice, production, efficiency, selection, implementation, execution" (March, 1991, p. 71). The literature emphasizes that exploration and exploitation are necessary but inconsistent activities that compete for scarce

resources, rely on different mindsets, and demand trade-offs (Benner & Tushman, 2003). The tensions between exploration and exploitation that characterize innovation have been observed on the individual, team and organizational level (Bledow, Frese et al., 2009a).

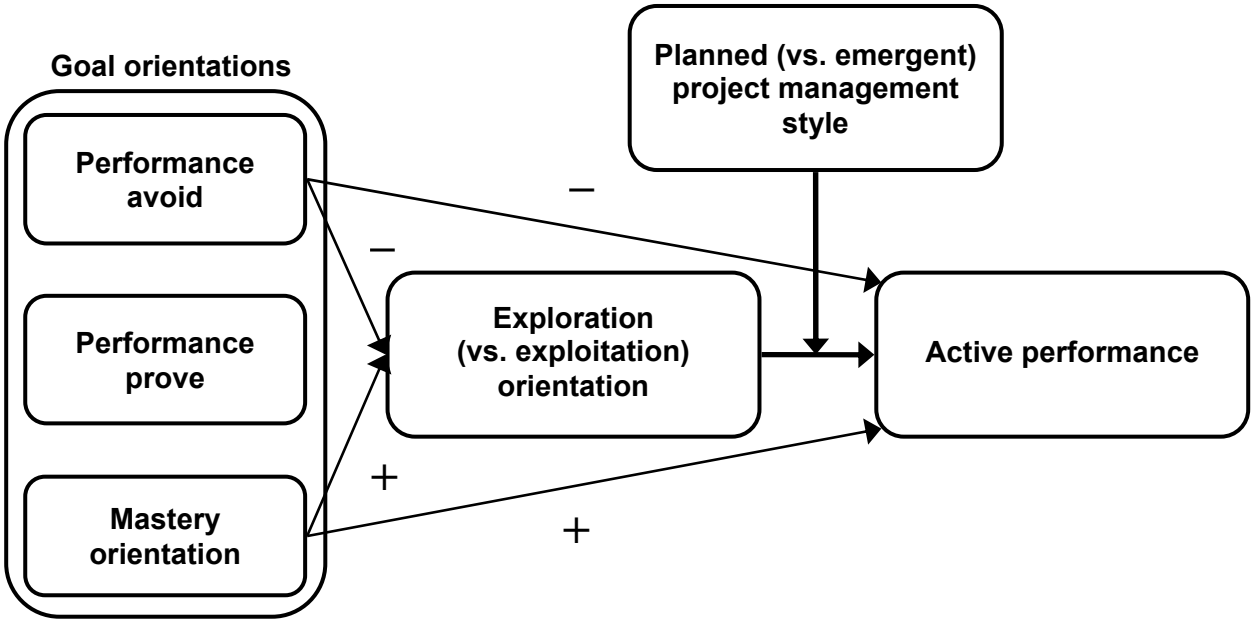


*Figure 3.1*. Theoretical model of antecedents of active performance

March, (1991) conceptualized exploration and exploitation as two opposing poles of a continuum (Gupta, Smith, & Shalley, 2006). We follow this conceptualization for the purpose of the present study and argue that individuals differ in their relative orientation between exploration and exploitation. Uotila et al. (2009) have recently demonstrated that conceptualizing exploration versus exploitation as a relative orientation has explanatory utility on the firm level of analysis. They found that firms vary in their relative exploration orientation. The relationship between a firm's relative orientation and financial performance was moderated by technological dynamism. In industries with high technological dynamism, a relative orientation towards exploration was related to financial performance. A question not yet addressed by past research is whether relative exploration orientation has explanatory value on the individual level of analysis. Ultimately, it is the individual employee embedded in the context of a research and development environment, who performs exploratory and exploitative activities. An individual's relative exploration orientation may have a functional relationship with individual performance similar to that of a firm's exploration orientation with firm performance, such that the relationship depends on contextual features.

Individual differences in exploration orientation among members of R&D project teams concern preferences in task-related activities. Employees with a low exploration orientation will tend to perform a task consistent with how they have been successful in the past and make only small adaptations, proceed in a systematic and well-planned manner, and choose tasks that allow them to exploit their expertise rather than to explore new pathways (see also Kirton, 1976). In contrast, employees high in exploration orientation tend to experiment and try out new ways of performing a task, search for new opportunities and proceed in a flexible manner, and prefer tasks that allow them to innovate and build up new expertise (Miron et al., 2004).

### 3.1.2. Exploration orientation and chronic goal orientations

We hypothesize that exploration orientation is related to chronically activated goal orientations (e.g., Ford, Smith, Weissbein, Gully, & Salas, 1998; VandeWalle & Cummings, 1997). Goal orientations describe individual differences in achievement situations. The literature on goal orientations posits that individuals differ along three dimensions in terms of chronically activated goals which guide their behavior in achievement settings (VandeWalle, 1997): mastery orientation, performance-prove orientation, and performance-avoid orientation.

Mastery orientation is reflected in the desire to acquire new skills and master new situations. Both exploration and exploitation encompass some degree of learning (March, 1991). However, exploitation requires only adaptation of existing knowledge and incremental learning; whereas the defining features of exploration are gaining new knowledge and learning new procedures. Given that exploration necessitates high willingness to learn, individuals with high mastery orientation should be oriented more towards exploration than towards exploitation.

*Hypothesis 1*: Mastery orientation is positively related to exploration orientation.

As illustrated in Figure 3.1, we also hypothesize a direct relationship of mastery orientation with active performance, independent of the relationship between mastery orientation and exploration orientation. Whereas exploration orientation describes the relative focus towards different activities, mastery goal-orientation describes the general focus on learning. Mastery orientation can contribute to learning independent of an individual's relative focus. Individuals high in mastery orientation believe in the malleability of abilities (Elliot, 1999) and exert effort towards both explorative and exploitative forms of learning.

The willingness of mastery oriented individuals to engage in learning and invest effort even in the face of setbacks and difficulties should be directly related to active performance (Farr, Hofmann, & Ringenbach, 1993). In support of this hypothesis, Janssen and Van Yperen (2004) found a positive relationship between mastery orientation and innovative as well as in-role job performance.

*Hypothesis 2*: Mastery orientation is positively related to active performance.

The performance-prove goal orientation dimension reflects the goals of striving to prove one's ability compared to others and to gain recognition by others (VandeWalle & Cummings, 1997). Proving one's ability to others can be achieved by exploratory activities such as developing new ideas and by exploitative activities such as excelling on routine tasks. Therefore, we do not posit a hypothesis on the relationship between performance-prove orientation and exploration orientation. Furthermore, we do not expect that performance-prove orientation is related to active performance. The motivational intensity and proactivity which are distinctive of active performance are directed towards the task and not primarily towards the goal of performing better than others (Frese & Fay, 2001). In support of this reasoning, Janssen and Van Yperen (2004) found performance orientation to be unrelated to innovative job performance, a manifestation of active performance.

The performance-avoid goal orientation dimension refers to the tendency to avoid showing lack of competence and receiving negative feedback about one's performance (VandeWalle & Cummings, 1997). We hypothesize that performance-avoid oriented employees have a low exploration orientation and show low active performance. Exploration carries the risk of failure and creates variability in performance (potential for high losses or high returns). In contrast, exploitation ensures stable and predictable levels of performance (Taylor & Greve, 2006). As performance-avoid oriented individuals want to avoid risk, failure, and negative feedback (Elliot, 1999), a strategy to build on past success and to exploit one's knowledge is in line with their dominant goal. A tendency to avoid negative feedback is dysfunctional in achievement settings. Consequently, performance-avoid orientation has been found to be negatively related to performance (Porath & Bateman, 2006). We therefore expect a negative relationship of performance-avoid goal orientation and exploration orientation as well as active performance.

*Hypothesis 3*: Performance-avoid orientation is negatively related to exploration orientation.

*Hypothesis 4*: Performance-avoid orientation is negatively related to active performance.

### 3.1.3. Contextual fit and active performance

Concerning the most central relationship of our theoretical model between exploration orientation and active performance, we hypothesize that its direction and magnitude depends on the context individuals are working in. Employees in R&D are usually embedded in the context of a project team. We address project management style (Lewis et al., 2002) as the contextual condition which influences how employee's exploration orientation is related to active performance.

Lewis et al. (2002) distinguished planned and emergent styles of project management: "An emergent style involves facilitating team members' creativity, flexibility, and improvisation [i.e. exploration], and a planned style provides managerial discipline and direction [i.e. exploitation] (p. 547)." A planned style of project management follows a rational, top-down problem solving approach focused on efficiency and alignment of goals and behavior. In contrast, an emergent style emphasizes the ambiguous and unpredictable nature of research and development projects. It capitalizes on employee's capabilities to improvise and develop innovation from the bottom up (Moorman & Miner, 1998).

We distinguish three facets that describe overall differences in project management style along a continuum between the poles of planned and emergent styles of project management: *Structure* refers to the extent employees receive instructions on what tasks to perform and how to perform their tasks (Stogdill, 1963). *Managerial control* is present if performance standards are clearly expressed and meeting of these standards is controlled (Henderson & Soonchul, 1992). *Directives* refers to the extent that clearly defined objectives, fixed time schedules, and detailed financial budgets are imposed on project team members. Projects that are managed by structure, managerial control and directives are characterized by a planned project management style; the less these features are present the more emergent is the project management style. Project management style influences how employees perform their tasks and the manner in which the team coordinates its efforts to meet its objective. The manner of goal-pursuit is an important component of regulatory fit theory (Higgins, 2005).

We apply regulatory fit theory to individual differences in exploration orientation and argue that project management style leads to contextual fit or misfit. Regulatory fit theory addresses the relation between the "motivational orientation of the actor and the manner in

which that actor pursues the goals" (Cesario, Higgins, & Scholer, 2008, pp. 444-445). Actors differ in their preference for different kinds of goal-pursuit means. Whether or not an actor uses the preferred goal-pursuit means has consequences for how action is performed and experienced. Regulatory fit is present if the preferred goal-pursuit means are used (Freitas & Higgins, 2002). In the case of regulatory fit, actors experience that what they are doing feels right, they show high degrees of engagement (i.e. active performance; Frese, 2009), and they achieve better outcomes (Higgins, 2005). Regulatory fit is a general theoretical notion that is not limited to a particular motivational orientation such as prevention or promotion focus (Cesario et al., 2008). Applied to the concept of exploration orientation, regulatory fit theory predicts that employees show high levels of active performance if they can perform activities in a manner that is consistent with their exploration orientation.

The manner, in which employees can pursue goals is constrained by the work environment. The context of a person needs to be taken in into account in determining if fit occurs in real-world settings. In R&D, project management style is an important contextual factor which determines how individual employees perform their tasks. We use the term contextual fit to connote a fit between project management style and an individual's exploration orientation. Contextual fit is a cross-level phenomenon, as it is influenced by characteristics of R&D project teams as well as characteristics of individual employees.

A planned project management style leads to contextual fit for employees with a low exploration orientation. Structure, managerial control, and clear directives are supportive of exploitative action (Keller, 2006). The manner of goal-pursuit which is demanded by a planned project management style is consistent with an orientation towards exploitation. A planned project management style provides guidance and clarifies the path by which goals can be achieved (House, 1996). Exploitation oriented employees can contribute to the project with their preferred goal-pursuit means: by applying their available knowledge and skills in a systematic, goal oriented manner. As employees with a low exploration orientation experience contextual fit if the project management style is planned, they should – according to regulatory fit theory - show higher levels of active performance. Following a similar line of argument, Keller (1989) hypothesized that initiating structure behavior by a leader differentially affects employees depending on their need for clarity. He found partial support for the hypothesis that initiating structure behavior was more highly related to employee performance and satisfaction in research and development if employees' need for clarity was high.

For employees with a high exploration orientation there is contextual misfit if project management style is planned. High structure, managerial control and fixed directives do not provide leeway to experiment, the option to make use of unforeseen opportunities, and the possibility of allowing the path towards successful project performance to emerge on the way (Lewis et al., 2002). Working on a project in which the contextual conditions do not allow one to work according to one's orientation should lead to low levels of active performance. Therefore, we hypothesize a negative relationship between exploration orientation and active performance in teams with a planned style of management.

An emergent style of project management, on the other hand, does not impose on employees with an exploration orientation a manner of performing the project which leads to contextual misfit. The less external structure, managerial control and directives are present, the more such employees are provided with an environment that fits their orientation towards exploration. They can move beyond the tasks assigned to them, try out new ways to get a task accomplished, and structure the task themselves (Keller, 1989). As the context fits their motivational orientation, they show high engagement and thus perform in an active rather than passive way. In contrast, for individuals with a low exploration orientation, an emergent style of project management should lead to contextual misfit. They lack the directions and guidance that allow them to perform actively. Therefore, in teams with an emergent style of project management there is a positive relationship between exploration orientation and active performance.

To summarize, a planned management style as reflected in structure, managerial control, and fixed directives facilitates exploitative action. Employees with a low exploration orientation show active performance in the context of a planned management style. In contrast, an emergent style of project management characterized by low structure, absence of managerial control, and few directives facilitates exploratory actions. Employees with a high exploration orientation show active performance if project management style is emergent.

> *Hypothesis 3:* Project management style moderates the relationship between exploration orientation and active performance such that exploration orientation is positively related to active performance if project management style is emergent and negatively related to active performance if project management style is planned.

# 3.2. Method

## 3.2.1. Participants and procedure

The study was conducted with research and development project teams of the Fraunhofer- and the Max Planck Society and applied research projects at German universities. The Fraunhofer Society is the largest organization for applied research in Europe including 80 research units at 40 different locations in Germany. It undertakes applied research for private and public enterprises. The Max Planck Society performs basic research in the interest of the general public in 80 institutes in Germany.

Criteria for project teams to be included in the study were that projects were running for at least 6 months at the time of data collection and that project teams consisted of at least two team members and one supervisor, furthermore, that team members worked the majority of their time on the project, and that the project lasted for at least 18 months. We screened the websites of the research societies for projects that met these criteria. We sent out questionnaires to 240 project managers who managed projects that matched the criteria. Project managers received a set of questionnaires and were asked to distribute them among the project team. They also rated the performance for each team member who participated in the study.

In total, we received 178 team member questionnaires. For several project teams supervisor ratings could not be obtained because of internal policies regarding the confidentiality of performance appraisals. Furthermore, several team member questionnaires could not be matched with supervisor ratings. Therefore, the final sample for which both employee self-ratings and supervisor ratings were available was 111 team members working in 49 project teams. On average 2.6 team members (range: 1-6 team members per team) participated for each project (mean age: 31, gender: 36 % female). Project managers were on average 42 years old, 17 % were female.

## 3.2.2. Measures

*Exploration orientation.* We developed a measure on people's orientation towards exploration or exploitation based on the March's (1991) theoretical definition. The scale measures the relative focus on exploration or exploitation. High values on the scale reflect an orientation towards exploration; low values on the scale reflect an orientation towards exploitation. We presented participants with pairs of activities, one representing exploration,

the other representing exploitation. Each pair of activities was linked to a work situation. Participants were instructed to indicate which one out of each pair of activities they would be more likely to perform. We used a six-point scale allowing participants to give gradual responses. Participants could answer if they lean somewhat, predominantly, or exclusively either towards exploration or exploitation. An example item is: "Your supervisor asks you to perform an urgent and novel task. How do you proceed to accomplish the task? I proceed in the manner that appears most appropriate even if it is completely new to me (*Exploration*) vs. I proceed in a manner that is consistent with how I have successfully performed similar tasks in the past (*Exploitation*)". The full set of items is listed in the appendix.

We used the theoretical definition of March (1991) and several published scales to derive items for exploration and exploitation (Bierly & Daly, 2007; Jansen, Van Den Bosch, & Volberda, 2006; Lubatkin, Simsek, Yan, & Veiga, 2006; Mom, Van Den Bosch, & Volberda, 2007). However, none of these measures conceptualized exploration versus exploitation as an individual's relative orientation. Moreover, items did not refer to exploration and exploitation activities in the context of working in R&D projects. We therefore formulated pairs of activities relevant for R&D projects based on the available scales. Items were refined through several rounds of discussions among the authors and graduate students of psychology. Items were pilot tested in a convenience sample of N = 80 employees and further refined based on their psychometric properties. Maximization of internal consistency was not a criterion for item development, as the breadth of the theoretical construct should be reflected in the items.

Exploration orientation is conceptualized as a composite scale that measures the overall preference of an individual towards either exploratory or exploitative activities. The specific activities that comprise exploration or exploitation and the situations they are linked to are heterogeneous. For instance, making incremental adaptations and planning in detail are activities that have been referred to as examples of exploitation (March, 1991). Although they represent the same theoretical concept within the exploration versus exploitation framework, they do not necessarily covary highly and they are not reflective indicators of a single latent psychological trait (for a detailed discussion on composite scales see Bledow & Frese, 2009). In line with this reasoning, principle component analysis showed that all items loaded on one first factor. However, item loadings were rather low (factor loadings: .30 - .76). Internal consistency of the eight item scale was $\alpha = .63$.

*Project management style.* Between-team differences in project management style were assessed along a dimension with the poles emergent and planned project management style. The three subdimensions of project management style were *structure*, *managerial control* and *directives*. Higher values indicate a planned rather than an emergent project management style. All items are listed in Table 3.1. For *structure* four items of the *Leader Behavior Description Questionnaire* dimension of initiating structure were used (Schriesheim & Kerr, 1974; Stogdill, 1963). Items were adapted to refer to the project rather than to a single supervisor. For control three items of the managerial control scale by Henderson and Soonchul (1992) were used. After interviews with project team leaders, we developed three additional items to capture whether there were precise directives concerning the objective of a project, the time scheduling and the financial budgeting. Respondents answered on a five-point Likert scale. Factor analysis supported a three factor solution with intercorrelated factors. Cronbach's alpha for the overall measure of project management style was .79. We report results for the subdimensions as well as for the overall measure.

Table 3.1

*Items and item loadings for project management style*

| Subscales and items for project management style | *Factor loadings* | $\alpha$ | *ICC (1)* | $R_{wg,j}$ |
|---|---|---|---|---|
| *Structure* | | .75 | .19 | .79 |
| We receive clearly defined instruction on how to perform our tasks. | .77 | | | |
| We receive specific work assignments. | .78 | | | |
| There are guidelines that direct work on the project. | .67 | | | |
| We follow instructions that are laid out in detail to perform our work. | .68 | | | |
| *Managerial control* | | .67 | .17 | .78 |
| On this project there is control that employees invest full effort. | .81 | | | |
| On this project meeting of performance standards is reviewed on a regular basis. | .83 | | | |
| The level of performance that is expected is made clear to project team members. | .61 | | | |
| *Detailedness of planning* | | .71 | .19 | .80 |
| For this project there is a clearly defined objective. | .62 | | | |
| This project has a detailed time scheduling. | .79 | | | |
| The financial budgeting for this project is comprehensive. | .87 | | | |

As project management style is a team level variable, we examined intraclass correlation (*ICC 1*) and agreement for multiple item scales ($r_{wg.j}$) to justify aggregation of responses of individual team members to the project team level (Bliese, 2006). These analyses were conducted with the subset of 41 project teams on which more than one team member had participated. *ICC 1* and $r_{wg.j}$ for the three subdimensions of project management style are listed in Table 3.1. For the overall measure of project management style *ICC 1* was .23 indicating that 23% of the variance in responses was due to differences between teams. The mean $r_{wg.j}$ value was .88.

*Goal-orientations.* Goal orientations were assessed with the work domain self-report instrument by VandeWalle (1997). Each dimension was measured with five items on a five-point Likert scale. For mastery orientation, Cronbach's alpha was .83. An example item is: "I enjoy challenging and difficult tasks at work where I'll learn new skills". For performance-prove orientation Cronbach's alpha was .68; an example item is: "I'm concerned with showing that I can perform better than others". For performance-avoid goal orientation an example item is: "I prefer to avoid situations at work where I might perform poorly". Cronbach's alpha for the scale was .85

*Active performance.* Supervisors assessed team member's active performance on five items of the personal initiative scale developed and validated by Frese, Fay, Hilburger, and Leng (1997). An example item is: "This employee actively attacks problems". Cronbach's alpha for the five-point Likert scale was .90. Items of the scale measure to what extent employees in general perform in an active rather than passive way. Frese (2008) proposed active performance as a concept that integrates personal initiative and related constructs such as engagement and taking charge. We therefore use the term active performance rather than personal initiative.

## 3.3. Results

Table 3.2 presents means, standard deviations and intercorrelations of all variables. Mastery orientation was significantly related to exploration orientation ($r = .29$; $p < .01$) and to active performance ($r = .25$; $p < .05$). Performance-avoid orientation was negatively related to exploration orientation ($r = -.21$; $p = .03$) and unrelated to active performance. As expected, performance-prove orientation was unrelated to exploration orientation. Performance-prove orientation as well as exploration orientation were unrelated to active performance.

Table 3.2

*Means (M), standard deviations (SD) and intercorrelations of all variables*

| | Variable | *M* | *SD* | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Age | 31.16 | 7.80 | - | | | | | | | | |
| 2 | Gender | 1.60 | 0.48 | .08 | - | | | | | | | |
| 3 | Tenure | 4.20 | 6.50 | .77** | .01 | - | | | | | | |
| 4 | Mastery orientation | 3.70 | 0.57 | .03 | -.01 | .01 | - | | | | | |
| 5 | Performance-prove orientation | 2.96 | 0.63 | -.10 | -.01 | -.01 | .05 | - | | | | |
| 6 | Performance-avoid orientation | 2.23 | 0.76 | .02 | .03 | .01 | -.13 | .44** | - | | | |
| 7 | Exploration orientation | 3.71 | 0.54 | -.01 | .20 | -.02 | .29** | -.14 | -.21* | - | | |
| 8 | Active performance | 3.78 | 0.76 | -.14 | -.03 | -.15 | .25** | .13 | -.06 | .14 | - | |
| 9 | Project management style[a] | 2.98 | 0.48 | .15 | -.03 | .22 | -.25 | .02 | .02 | -.18 | -.10 | - |

*Note*: Sample size is *N* = 111.

[a] Project management style is a team level variable. Individual level variables were aggregated to the team level to calculate correlations with project management style. High values indicate a planned project management style; low values indicate an emergent project management style. Sample size for these correlations is *N* = 49.

* $p \leq .05$. ** $p \leq .01$. *(two-sided test of significance).*

Table 3.3 presents three hierarchical linear models to test hypotheses 1 to 5. After entering individual level predictors in Model 1 and 2, we entered the team level predictor project management style in Model 3. In Model 1 exploration orientation was regressed on goal orientations after controlling for age, gender and tenure. Performance-prove goal orientation was not included, because it was unrelated to the dependent variables of interest and was not of theoretical interest in the present study. In Model 2 we predicted active performance by individual level variables. In model 3 team level predictors were added.

Table 3.3

*Hierarchical linear models*

| Independent variables | Model 1 | Model 2 | Model 3 |
|---|---|---|---|
| Dependent variables | Exploration orientation | Active performance | Active performance |
| *Individual level* | | | |
| Age | -0.00 (.01) | -0.01 (.01) | -0.01 (.01) |
| Gender | 0.23 (.10) | -0.01 (.01) | -0.04 (.15) |
| Tenure | 0.00 (.01) | -0.02 (.02) | -0.02 (.02) |
| Mastery orientation | 0.26 (.09)** | 0.33 (.13)* | 0.30 (.13)* |
| Performance-avoid orientation | -0.12 (.06) † | -0.03 (.09) | -0.01 (.09) |
| Exploration orientation [a] | | 0.08 (.14) | -0.04 (.14) |
| *Team level* | | | |
| Planned vs. emergent project management style (main effect)[b] | | | 0.02 (.17) |
| Planned vs. emergent project management style (cross-level interaction) [b] | | | -0.76 (.31)* |
| Model $R^2$ | .10 | .13 | .19 |

*Note*. The values are unstandardized parameter estimates for the regression weights (γ). Standard errors are indicated in parenthesis. Sample sizes are $N_I$ = 111 at the individual level and $N_T$ = 49 at the team level. † $p \leq .10$ * $p \leq .05$ ** $p \leq .01$ *(two-sided).*

[a] High values indicate an orientation towards exploration

[b] High values indicate a planned project management style; low values indicate an emergent project management style.

In support of Hypothesis 1, mastery orientation explained significant variance in exploration orientation (Model 1: $\gamma = 0.26$, $p < .01$). In Model 2 mastery orientation incrementally predicted active performance, providing support for Hypothesis 2 ($\gamma = 0.33$, $p < .01$). Thus, employees high in mastery-orientation were oriented towards exploration and showed higher degrees of active performance. The relationship between mastery orientation and active performance remained significant if team level predictors were included (Model 3). Concerning the hypothesized negative relationship between performance-avoid orientation and exploration orientation (Hypothesis 3), model 2 shows that performance-avoid orientation was negatively related to exploration orientation ($\gamma = -0.12$, $p = .054$). If we

included the 67 participants for whom supervisor ratings were not available in this analysis, the negative relationship between performance-avoid orientation and exploration orientation was significant at the $p < .05$ level. As can be seen in model 2, no support was found for Hypothesis 4. Performance-avoid orientation was not significantly related to active performance.

Model 3 in Table 3.3 provides the test of hypothesis 5 that postulated a moderating effect of project management style on the relationship between exploration orientation and active performance. In this model, the team-level variable project management style was added as a predictor of active performance (main effect) and as a predictor of the relationship between exploration orientation and active performance (cross-level moderation). In support of hypothesis 5, the coefficient for the cross-level moderation effect of project management style was significant ($\gamma = -0.76$, $p = .02$).

Figure 3.2 illustrates the cross-level moderation. The relationship between exploration orientation and active performance was positive if project management style was emergent and negative if project management style was planned. Thus, people high in exploration orientation were high in active performance if project management style was emergent and low in active performance if project management style was planned. The reverse was true for people with a low exploration orientation, i.e. people with focus on exploitation. Region-of-significant tests (Preacher et al., 2006) for different values of the moderator showed that the slope for exploration orientation and active performance was significantly positive for values < 0.4 standard deviations below the mean of the moderator (i.e. a more emergent project management style). Slopes were significantly negative for values that were > 1.42 standard deviations above the mean of the moderator (i.e. a more planned project management style). We conducted additional analyses using the subscales of project management style rather that the composite variable. Cross-level moderation was significant for managerial control ($\gamma = -0.66$, $p < 01$) and project directiveness ($\gamma = -0.44$, $p = .02$). For structure, the coefficient had the same algebraic sign but was not significant ($\gamma = -0.29$, $p = .14$).

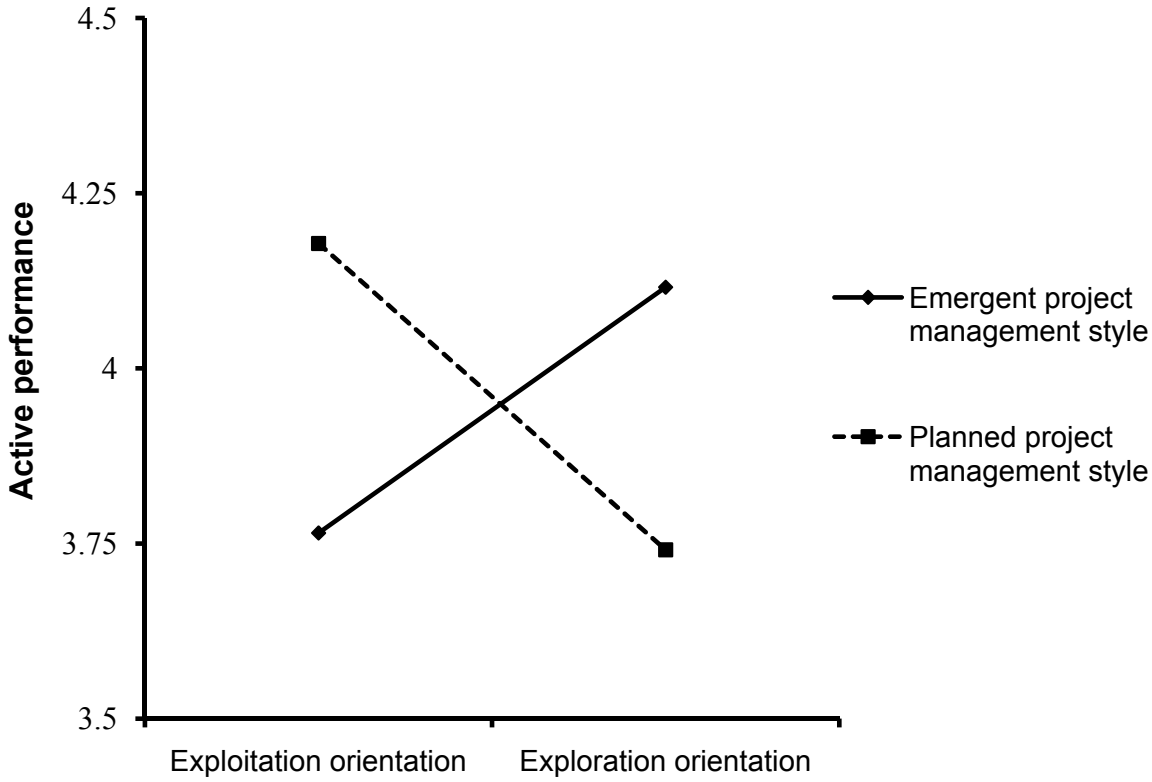


*Figure 3.2.* Cross-level moderation of project management style

In order to interpret interactions as cross-level moderation, the interaction needs to remain significant after all between-team variance is removed from the individual level predictor (Hofmann & Gavin, 1998). We therefore conducted cross-level moderation analyses after group-mean centering exploration orientation, which removes between-team variance. As group-mean centering is only possible for teams for which more than one employee had participated, the sample size was reduced to 104 individuals working in 41 project team. The cross-level moderation for this model was also significant ($\gamma = 0.89$, $p = .03$). Thus, team members with a higher exploration orientation as compared to the other members of their team were higher in active performance if project management style was emergent. The reverse was true if project management style was planned.

## 3.4. Discussion

This study demonstrated that individuals differ in their relative orientation between exploration and exploitation and that this orientation is linked to individual differences in goal orientations. Moreover, exploration orientation predicted under which contextual conditions employees showed active performance. If project management style was planned,

employees with a low exploration orientation showed active performance. If project management style was emergent, exploration oriented employees showed active performance.

The findings provide support for the notion of contextual fit. Active performance of an employee depended not only on personal characteristics but also on the interaction between person and context (Magnusson & Endler, 1977). This is in line with regulatory fit theory, which predicts superior outcomes if the means with which a person pursues a goal are consistent with the person's motivational orientation. To date, regulatory fit has been mostly studied in experimental settings and with respect to prevention and promotion focus (Higgins, 2005). As we have demonstrated, the phenomenon of regulatory fit is not limited to prevention and promotion focus. It also applies to exploration orientation. In organizations, contextual conditions at the individual, team and organizational level influence the means with which a person pursues a goal and therefore the extent to which regulatory fit can occur. Regulatory fit and the notion of contextual fit may prove useful for future research on person-environment fit. They specify a motivational mechanism by which fit leads to intended outcomes, i.e. the congruence between motivational preferences and the manner of goal pursuit.

The way a project is managed is a contextual condition that differentially affects individuals working on the project. Past research has found that neither a planned nor an emergent style of project management is more effective in general (Lewis et al., 2002). One explanation has been the variety and dynamics of task demands of R&D projects (Bledow, Frese et al., 2009a). Some demands are better met by a planned style while others are better met by an emergent style of management (Lewis et al., 2002). This study contributes to the literature on project management by showing that individual differences need to be taken into account when addressing the effectiveness of different project management styles. The performance of individual employees is higher if project management style is congruent with employees' orientation and active performance of employees is likely to contribute to the success of a project.

Concerning goal orientations, our findings underline the importance of mastery orientation for active performance in R&D settings. A focus on refining and extending rather than merely demonstrating one's knowledge, skills, and abilities is essential for innovation (Janssen & Van Yperen, 2004). In the present study, mastery orientation was directly related to exploration orientation and active performance. Through its relationship with exploration

orientation, mastery orientation was also indirectly related to active performance for projects with an emergent style of management. The pattern of relationships of goal-orientations with exploration orientation supported the hypothesized nomological net of variables related to exploration orientation. Moreover, results showed that exploration orientation was a distinct and useful concept at the individual level of analysis which predicted active performance independent of goal orientations. Although we found a negative relationship between performance-avoid goal orientation and exploration orientation, we did not find the expected negative relationship between performance-avoid orientation and active performance. We cannot clarify if this is a sample-specific finding or if there are contextual conditions which influence the relationship between performance-avoid orientation and active performance.

### 3.4.1. Limitations and future research

Although exploration orientation was a useful explanatory construct in this study, several questions and limitations about its theoretical meaning and measurement at the individual level need to be addressed. First, this study examined exploration orientation as a relative orientation; it did not examine the extent and effectiveness of exploration and exploitation. As performance requires people to explore and exploit, more research is needed which examines the absolute level of both activities. According to Bledow and colleagues (2009) the ability to integrate exploration and exploitation by repeatedly shifting between both activities requires further attention. For people with a strong orientation towards either activity, effective performance of the activity that is inconsistent with their orientation should be a particular challenge.

Second, although factor analysis found support for a general factor underlying responses on the exploration versus exploitation items, factor loadings were partly low. People's preferences varied between specific examples of exploration versus exploitation activities. This can be explained by the variety of different activities referred to as exploration and exploitation and the situational variance introduced by items (Bledow & Frese, 2009). The resulting low level of internal consistency does not affect the usefulness of the scale as a predictor (Motowidlo et al., 1990). However, exploration should not be interpreted in terms of a homogenous trait factor. It is a composite measure of preferences concerning exploration versus exploitation (Law & Wong, 1999). The internal structure of these preferences and their relationship to other constructs requires further investigation.

Third, although we found sufficient between-team variance to aggregate project management style to the team level, the reliability of the mean of project management style across members of one project was low (*ICC 2* for project management style was .45). *ICC 2* depends on the number of participants per team (Bliese, 2000). In this study, the number of participants per team was low. The resulting unreliability in project management style made the test of the contextual fit hypothesis more conservative (Bliese, 1998). This unreliability suggests that there are different perceptions of project management style within a team. Between team differences in project management were nevertheless reflected in participants' ratings.

There are also limitations concerning the generalizability of findings. The sample consisted of employees in R&D projects. The differentiation of exploration versus exploitation is particularly important for this setting and future research needs to address whether exploration orientation is related to active performance in other settings. Moreover, in work settings without a project-based structure, contextual conditions other than project management style which influence the means by which employees pursue goals, need to be considered as well. The climate of a team or department and behavior of the leader are factors that influence the behavior of individual employees and that may influence whether contextual fit or misfit occurs (Miron et al., 2004). Third, the outcome studied was chosen based on its importance for overall performance and its direct link to regulatory fit theory. The question whether contextual fit and active performance translate to objective performance criteria such as quality and market performance of new products requires further research.

## 3.4.2. Practical implications

Active performance can be promoted by ensuring congruence between employee's exploration orientation and the work context. This study suggests that employees benefit if they can self-select projects or work environments that are in accordance with their exploration orientation. Crafting one's job such that it is more in line with one's exploration orientation can contribute to active performance (Frese, Garst, & Fay, 2007). Project managers can ensure active performance by adopting project management styles that are congruent with the project team (Keller, 1989). As members of a project team differ in terms of their exploration orientation, there are tradeoffs in selecting the right project management

style. A certain project management style leads to contextual fit for some employees and to misfit for other employees.

One possibility to deal with this trade-off is that project managers do not routinely apply their preferred style of management but adapt project management style to individual employees. Within the boundary of a given project, project managers and project team members may need to show different behaviors towards individual employees. One possible pathway may be to offer clear guidelines and structure and at the same time allow exploration oriented employees to deviate from this planned project management style (Birkinshaw & Gibson, 2004). Individual differences thus pose conflicting demands on project managers and members of project teams. The ability to meet such conflicting demands by showing variability in behavior in different situations and towards different people has been referred to as ambidextrous leadership (Bledow, Frese et al., 2009a).

Although a conclusion of this study is that value can be created by increasing contextual fit, maximization of fit by selecting employees with a similar exploration orientation for a project may be problematic (cf. Schneider, 2001). On the team level, a certain extent of heterogeneity among team members in exploration orientation may prove functional because both exploration and exploitation activities are essential for R&D projects (Miron-Spektor, Erez, & Naveh, 2006). Selecting employees with a similar exploration orientation for a project may facilitate contextual fit; however, it comes at the expense of diversity within a project team. Thus, the requisite diversity in project teams is not easily reconcilable with fit for every project team member. Therefore, we suggest that a flexible management approach, which enables contextual fit for different employees within one project, is more promising than an attempt to increase fit primarily through selection.

Even on the individual level, we argue that a healthy level of fit is more desirable than a maximization of fit. People differ in their orientation towards either exploration or exploitation and working in a consistent environment increases active performance. However, in order to remain adaptive, people need to explore and exploit and be able to meet demands that are inconsistent with their orientation (Bledow, Frese et al., 2009a). Maximization of fit may reduce this ability if it strengthens an orientation toward one activity rather than enabling a balanced orientation towards both activities.

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# 3.6. Appendix

*Exploration versus exploitation orientation*

| | |
|---|---|
| 1. What course of action do you prefer at work? | To ensure that opportunities and new ideas can be made use of.<br>To plan in detail and make fixed arrangements. |
| 2. What kind of work tasks do you prefer? | Novel tasks that require a new approach.<br>Well known tasks for which I can use my experience. |
| 3. What way of proceeding do you prefer at work? | To proceed in a flexible manner and to make use of promising opportunities.<br>To proceed in a systematic, goal oriented manner. |
| 4. You can perform a task either in a way that is consistent with how you performed it in the past or you can try a out a new way of performing the task. How would you decide to perform the task? | I try out a new way of performing the task to find out if it works well.<br>If I have been successful in performing the task in the past, I continue performing the task in that way. |
| 5. You are asked if you would like to work on a project. What does your decision primarily depend on? | My decision depends on whether the project sounds promising.<br>My decision depends on whether the project fits to my experience. |
| 6. Your supervisor asks you to perform an urgent and novel task. How do you proceed to accomplish the task successfully? | I proceed in the manner that appears most appropriate even if it is completely new to me.<br>I proceed in a manner that is consistent with how I have successfully performed similar tasks in the past. |
| 7. There are two different projects your organizations launches. You can decide on which project you work on. Which project would you select? | An exciting project for which success is unclear.<br>An ordinary project I know I can perform well. |
| 8. In the past, what kind of suggestions for changes at work have you made primarily compared to other people? | Fundamental changes aimed at significant improvements.<br>Small adaptations aimed at optimization. |

# Chapter 4

# Innovation Implementation in Leader-Team Systems: Effective Modes of Management

## Abstract

The authors take a functional perspective on innovation implementation in leader-team systems and argue that different configurations of leader and team member roles can be effective. The authors propose that implementation success is a function of leader and team engagement and that the distribution of decision-making between leaders and team members is critical. The effectiveness of different modes of decision-making is hypothesized to depend on characteristics of the leader-team system. Hypotheses are tested using a multilevel research design that investigates implementation of 139 innovations in 39 leader-team systems. Support is found for the hypotheses that engagement is a key component of effective innovation management and that effective distribution of decision-making depends on boundary conditions. Implications for assisting leaders and team members to choose effective modes of management are derived.

## 4.1. Introduction

Work teams are open systems that interact with the environment they are embedded in and transform inputs to outputs to create value (Katz & Kahn, 1978). Complex and dynamic environments place high demands on systems to innovate, that is, to produce new outputs or to transform the internal processes that link inputs to outputs (Van de Ven, Angle, & Poole, 2000). Successful innovation enables a system to continue performing its tasks and to remain competitive if the demands of a system's environment change: R&D departments develop products from which a company's future revenues depend, teams of architects and engineers implement new solutions to serve changing customer needs, and service teams reconfigure internal processes to improve quality or reduce costs.

Although innovation is of key concern for work teams (West, 2002b) and social systems in general (Schumpeter, 1934), the rate of success in introducing new ideas and innovative products is low (Goldenberg, Lehman, & Mazursky, 2001). Success or failure at innovating is first and foremost a matter of management (Bledow, Frese et al., 2009a). Effective management of innovation in leader-team systems depends on the behavior of both leaders and team members (e.g. Hoegl & Gemuenden, 2001; Keller, 2006). Leadership and team processes have been found to be among the strongest predictors of innovation success (Hulsheger, Anderson, & Salgado, 2009; Mumford, Scott, Gaddis, & Strange, 2002; West & Anderson, 1996). Although the importance of innovation management is widely acknowledged, the modes of management that enable a leader-team system to successfully implement innovation have only rarely been examined directly (West, 2002a). By modes of management we refer to the configuration of roles leaders and team members perform in the process of innovation implementation. Throughout this article we use the term leader-team system for the system as a whole and the terms leader and team members (or team), as two interacting components of the leader-team system.

Building on the concept of equifinality, Bledow et al., (2009) argued that multiple modes of management can lead to implementation success: Some leaders contribute to successful implementation by directing and structuring team member activity (Keller, 2006), whereas other leaders provide a team with autonomy, such that the team can self-regulate the task of implementation (Hoegl & Parboteeah, 2006). Past research has not yet conducted a fine-grained analysis of the mechanisms underlying different modes of management, their relationship to implementation success, and the boundary conditions of their effectiveness.

Towards the goal of an improved understanding of effective modes of management, the present study examines the roles leaders and team members perform at different occasions of implementing innovation. This approach departs from past research, which has focused only on overall differences between leader-team systems in leader behavior, team processes and innovation performance. We develop and test a model which proposes leader engagement, team engagement, and context sensitive distribution of decision-making as predictors of successful innovation implementation.

## 4.2. Modes of managing implementation in leader-team systems

From a functional perspective (e.g. Zaccaro, Rittman, & Marks, 2001), the effectiveness of a mode of management depends on whether or not leaders and team members meet the requisite task demands through the configuration of roles they perform. For innovation implementation, active performance and effective decision-making stand out as particularly important task demands. Due to the difficulties, set-backs, and resistance that characterize innovation (Hauschildt & Gemunden, 1999), active performance is essential for successful implementation. Active performance refers to behavior that is characterized by high degrees of motivation and a proactive approach (Frese, 2008). Besides active performance, effective decision-making is a second core task demand of innovation. As each innovation that is implemented is a novel task, available routines are not sufficient and there is high demand on decision-making throughout the process (Louis & Sutton, 1991). We use the term decision-making broadly to refer to decisions concerning the specific steps to implement innovation, decisions concerning specific features of an innovation, as well as decisions on how the team coordinates the task.

When implementing innovation the task demands of active performance and effective decision-making can be met by different distributions of roles between leaders and team members. Roles are sets of task-related activities that vary in their importance to the team's performance (Humphrey, Morgeson, & Mannor, 2009; Mumford, Van Iddekinge, Morgeson, & Campion, 2008). Figure 4.1 distinguishes four roles that are critical for innovation implementation because they relate to the task demands of active performance and decision-making. On each occasion of innovation implementation, leaders show a certain level of the roles of *leader engagement* and *leader directiveness*. *Leader engagement* refers to a role in which leaders contribute to meet the demand of active performance by focusing their activity and the activity of the team on innovation implementation. *Leader directiveness* reflects to

what extent a leader performs the role of decision-making and directing of team members. For team members, we distinguish the two roles *team engagement* and *team autonomy*. *Team engagement* reflects the amount of effort, initiative and persistence team members display and thus the extent to which team members meet the task demand of active performance (Campbell, 1990; Frese & Fay, 2001). *Team autonomy* refers to a role in which team members perform decision-making activities autonomously.

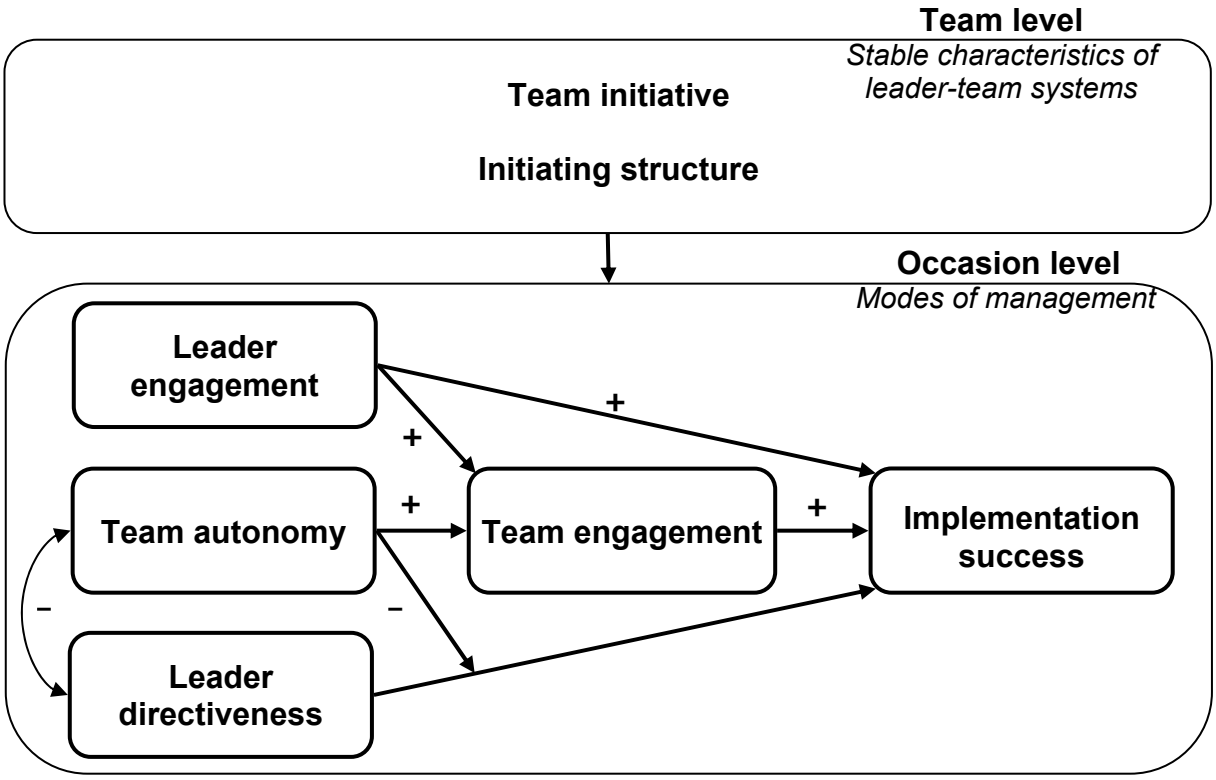


*Figure 4.1.* Theoretical model of modes of management and implementation success

The four roles leaders and team members perform are conceptualized as four interrelated empirical dimensions. The configuration of roles when implementing a particular innovation constitutes the mode of management for that innovation. Over different occasions of implementing innovation leaders and team members can use different modes of management. For instance, leaders can engage and direct on one occasion and provide autonomy to team members on a different occasion. Besides the modes of management for a particular occasion, Figure 4.1 distinguishes *team initiative* and *initiating structure* as two stable characteristics of leader-team systems that do not vary across different occasions. In the following, we first develop hypotheses on how modes of management are related to implementation success on specific occasions of innovation implementation. In a second step,

we examine stable characteristics of leader-team systems as boundary conditions for the effectiveness of different modes of management.

An important theoretical criterion according to which modes of management can be differentiated is the degree of integration or separation of activities between leaders and team members (Bledow, Frese et al., 2009a). For instance, decision-making can be separated between the leader and the team such that the leader plans, decides, and controls, while the team executes specified plans. In contrast, if leaders and team members take an integrated approach, the team has autonomy in decision-making and the leader performs implementation activities together with the team.

An integrated mode of management has been proposed to be most effective (Bledow et al., 2009). The term integrated connotes that decision-making and the execution of the task are not separated into the subsystems of leader or team members. Theoretically, we expect an integrated mode of management to be most effective, because it makes best use of the system's capabilities (Emery & Trist, 1969). It integrates effective leadership by leader engagement and effective self-regulation of team members by team autonomy and team engagement. However, the preconditions for taking an integrated approach are not always met. A leader may not have the time resources to show high engagement for a particular innovation or team members may lack initiative and the requisite knowledge to self-regulate implementation.

### 4.2.1. Engagement and implementation success

The model in Figure 4.1 links the roles leaders and team members perform to implementation success. It proposes that for any specific innovation, implementation success is a direct function of leader and team engagement. Leader engagement and team engagement are interrelated and complementary. They are interrelated because leader engagement should increase team engagement; they are complementary as they serve different functions.

If *leader engagement* is high, the leader plays an active role and contributes to implementation success directly and indirectly. Leader engagement directly increases the likelihood of implementation success, as leaders contribute with their resources such as their time and expertise (Murphy, Blyth, & Fiedler, 1992). According to the model, leader engagement also has an indirect effect on implementation success, because it leads to higher levels of team engagement directed toward innovation implementation.

Leader engagement should lead to higher team engagement, because the leader signals the importance of the task, provides direction, and supports innovation (Eisenbeiss, van Knippenberg, & Boerner, 2008; Yammarino, 1994). Leader engagement is to some extent directive, as it focuses team effort on a particular innovation. Although leader engagement influences a team's activity, leader engagement does not imply that leaders are directive concerning the means with which the team should implement innovation. Leader engagement reflects the directiveness that is a key facet of transformational leadership: energizing team engagement toward goals without compromising autonomy of the team (Kuhnert, 1994; Yammarino, 1994).

*Team engagement* is a proximal predictor of implementation success, because the amount of effort, initiative and persistence the team displays should directly increase the likelihood of successful implementation (Campbell, 1990). The challenges of innovation implementation demand that a team invest high effort, take initiative to perform the necessary tasks (M. Baer & Frese, 2003), and persist in the face of difficulties (West, 2002b). In summary, leader engagement and team engagement serve different and complementary functions for implementation success. An integrated mode of management in which leaders and team-members are engaged, is mostly likely to succeed. Leader engagement directly contributes to implementation success and stimulates team engagement. Therefore, we hypothesize a partial mediation of the relationship between leader engagement and implementation success through team engagement.

*Hypothesis 1a*: Leader engagement and team engagement are incrementally related to implementation success.

*Hypothesis 1b*: Team engagement partially mediates the relationship between leader engagement and implementation success.

### 4.2.2. Modes of decision-making and implementation success

Besides active performance, effective decision-making is a core task demand for successful innovation implementation. *Leader directiveness* and *team autonomy* are the variables in the model that refer to how decision-making is distributed between a leader and team members. For a particular occasion of innovation implementation, leader directiveness and team autonomy are hypothesized to be negatively related because leader directiveness tends to reduce team autonomy (see Figure 4.1). If leader directiveness is high, decision-

making resides primarily with the leader. If team autonomy is high, team members perform decision-making activities autonomously. However, leader directiveness and team autonomy are separate empirical dimensions that are not mutually exclusive and that can co-occur in the process of implementing innovation. Over time and concerning different aspect of a task, leaders can be directive and provide autonomy (Sagie, 1997; Sagie, Zaidman, Amichai-Hamburger, Te'eni, & Schwartz, 2002). Although a team may have high autonomy because the leader delegates implementation, the leader may still be directive about the deadline, a certain part of the overall task, or require team members to adhere to certain guidelines. If leaders choose to primarily direct implementation, team members may still need to make their own decisions concerning subtasks, because a leader may not know about all details or lack the time to be involved in every decision. We will first consider the consequences of team autonomy and leader directiveness separately and, as a second step, we will consider their joint and interactive effect (Sagie et al., 2002).

If team autonomy is high on an occasion of innovation implementation, team members are empowered to make task-related decisions. We expect team autonomy to be related to team engagement because autonomy enables effective self-regulation and increases team member motivation. Several studies have found that team autonomy and participation in decision-making are related to enhanced team processes. For instance, Hoegl and Parboteeah (2006) found that team autonomy is related to higher quality of teamwork behavior. Somech (2006) showed that participation in decision-making is related to higher team reflection in functionally heterogeneous teams. According to DeDreu and West (2001), teams benefit from minority dissent only if participation in decision-making is high. On the individual level, there is direct evidence linking autonomy to high motivation and a proactive approach, which are the defining features of engagement (Frese et al., 2007; Parker et al., 2006; Ryan & Deci, 2000).

*Hypothesis 2a*: Team autonomy is related to team engagement.

Through its positive relationship with team engagement, team autonomy should also contribute to implementation success. Past research on the relationship between team autonomy and performance outcomes has provided mixed results (Sagie, 1994). Somech (2006) found that participation in decision-making in teams was positively related to innovation performance but negatively related to in-role performance. Krause, Gebert, & Kearney (2007) argued that high autonomy does not only hold advantages for innovation implementation but also specific risks. For instance, innovation may not be implemented

consistent with the goal of the leader or the objective of the organization. In the next section, we specify contingency conditions of the relationship between team autonomy and implementation success. In general, however, we expect that team autonomy contributes to implementation success through its positive relationship with team engagement.

*Hypothesis 2b*: Team engagement mediates the relationship between team autonomy and implementation success.

In contrast to team autonomy, leader directiveness refers to a mode of management in which the leader centrally decides how the task is performed and directs the implementation process. Through directiveness, leaders can ensure that team members commit to the task and that the task is performed consistent with the leader's expectations and expertise (Murphy et al., 1992). Whereas leader engagement influences a team by emphasizing the importance of the task and by focusing a team's effort on the task, leader directiveness is directive concerning the specific activities the team needs to perform (Hackman, 1987). According to the path-goal theory of leadership (House, 1996), such directive leader behavior can be effective and accepted if the task is ambiguous and the leader complements the lack of ability of a team. However, leader directiveness can also interfere with self-regulation of the team (Hoegl & Parboteeah, 2006) and provoke negative reactions (Morgeson, 2005; Zhou, 2003). The notion that there is no simple positive or negative relationship between directive leadership and implementation success is supported by the research of Somech (2006) and Drach-Zahavy, Somech, Granot, and Spitzer (2004). They found differential relationships depending on the specific outcome (innovation vs. in-role performance) and depending on characteristics of the team.

To address the question as to when directive leader behavior helps and when it hinders a team to meet the task demands of innovation implementation, we posit that team autonomy needs to be taken into account. Leader directiveness and team autonomy refer to the same set of functions (i.e. decision-making) that can be performed by the leader, by team members or distributed between leaders and team members. If team autonomy is low, we expect leader directiveness to be positively related to implementation success. In situations in which leaders constrain team autonomy and the team does not have the freedom to make decisions and to self-regulate implementation, leaders need to take on the role of decision-making and need to direct team members. If team autonomy is low and the leader does not perform the role of decision-making and directing, implementation success is at risk. A lack of decision-making on both the part of the leader and the team is likely to fail because necessary activities are not

performed and the task demands of innovation implementation are not met. Thus, leader directiveness should be positively related to implementation success if team autonomy is low.

In contrast, in situations of high team autonomy decision-making activities are performed by the team and there is no need for leaders to compensate for a lack of decision-making on the part of the team by being directive. In situations with high team autonomy, we expect that leader directiveness is negatively related to implementation success because directiveness can interfere with team self-regulation (Hoegl & Parboteeah, 2006; Wageman, 2001). For instance, a leader may be directive about a specific aspect that is not compatible with the overall team plan. Leader directiveness and team autonomy are alternative pathways to implementation success; one capitalizes on the leader's ability to decide and direct the team, and the other on the team's ability to self-regulate (Murphy et al., 1992). However, a combination of team autonomy and leader directiveness holds risks for successful implementation. If leader directiveness does not compensate for a deficiency of a team, it should be neither accepted by the team nor should it be effective (House, 1996). A combination of team autonomy and leader directiveness can also reduce leadership clarity. A lack of leadership clarity, which is defined as conflict or disagreement over the person who is in charge of decision-making, has been found to be detrimental to team processes and innovation outcomes (West et al., 2003). In summary, we propose that team autonomy moderates the relationship between leader directiveness and implementation success.

> *Hypothesis 3*: Team autonomy moderates the relationship between leader directiveness and implementation success such that the relationship is positive if team autonomy is low and negative if team autonomy is high.

### 4.2.3. Boundary conditions for the effectiveness of different modes of management

Thus far, we have focused on roles leaders and team members perform that can vary over different occasions of innovation implementation. Here, we extend our model to include stable characteristics of leader-team systems on the two dimensions *team initiative* and *initiating structure* (see Figure 4.1). Team initiative (Baer & Frese, 2003) and the leadership style initiating structure (Stogdill, 1963) are functional characteristics of leader-team systems. They refer to how roles are distributed between leaders and team members across different occasions of innovation implementation and concerning task performance in general. These characteristics of a leader-team system provide the context in which specific innovations are

implemented. We posit that the effectiveness of modes of management depends on these functional characteristics of leader-team systems.

A leader-team system is focused on the leader if the leader initiates high structure. Leaders initiate high structure if they ensure team members adhere to guidelines, invest full effort and meet deadlines (Judge, Piccolo, & Ilies, 2004). Initiating structure means clarifying roles and responsibilities, coordinating the work flow and centrally regulating action from the position of the leader. Judge, Piccolo, and Ilies (2004) found initiating structure to be related to leader and group performance. Keller (2006) found initiating structure to be an effective leadership style for innovation implementation in R&D teams. On the team part of the leader-team system, an important functional characteristic is to which extent a team shows initiative and self-regulates. In leader-team systems with high team initiative, team members self-start to perform tasks and to improve the work context (Baer & Frese, 2003). High team initiative means that team members exploit opportunities quickly, invest extra effort, and are persistent when confronted with problems (Frese & Fay, 2001).

*Team initiative* and *initiating structure* are related to the mode of management that is used most frequently for innovation implementation. If team initiative is high rather than low, we expect that there is more team autonomy and there are higher levels of team engagement on specific occasions of innovation implementation. Initiative and autonomy are reciprocally connected such that over time autonomy increases initiative and initiative increases autonomy (Frese et al., 2007). Leaders who perceive high initiative by their team members can rely on team initiative and therefore provide autonomy. In teams with a leader who initiates structure we expect leaders to direct more and to grant less autonomy to the teams. Leader directiveness reflects the general leadership style of initiating structure in the context of implementing a specific innovation (Keller, 2006). The leader provides detailed instruction about the actions team members need to perform.

Even though leader-team systems differ in the modes of management they typically apply, we expect that they also show variation in the modes of management across different occasions (cf. Mischel & Shoda, 1995). A leader who directs implementation of innovation for the most part may sometimes delegate decision-making to the team. For instance, a leader may lack time or expertise for a given innovation and therefore refrain from being directive. In the same vein, a leader who generally provides autonomy to the team may be directive on some occasions of innovation implementation. This can be the case, for example, if the leader

attaches great importance to an innovation or has a very specific idea on how it should be implemented.

We argue that effectiveness of a mode of management results from contextual fit between the roles leaders and team members perform on a specific occasion and functional characteristics of the leader-team system. The term *contextual fit* refers to the notion that congruence of a certain management approach and the context in which it is applied leads to intended outcomes. Stable characteristics of a leader team system provide the context in which modes of management are applied on specific occasion. Contextual fit is present if modes of management are congruent with the stable characteristics of a leader-team system.

If team initiative is high, team autonomy on a specific occasion of innovation implementation leads to contextual fit. Teams high in initiative are characterized by employees who are proactive and who self-start and persist. By delegating control to the team, a leader can capitalize on these characteristics of a team (Sagie, 1994). If the team is given responsibility, team members will take initiative and will not give up quickly in the face of set-backs. Thus, high team initiative provides the conditions for team autonomy to be effective.

> *Hypothesis 4a*: Team initiative moderates the relationship between team autonomy and implementation success such that this relationship is positive if team initiative is high and negative if team initiative is low.

In contrast to team autonomy on a specific occasion of innovation implementation, there is *contextual misfit* if the leader is directive about a specific innovation and the leader-team system is characterized by high team initiative (Chan, 1996). The team is oriented towards being proactive rather than reacting to the leader's instruction so that leader directiveness can interfere with the team's characteristic of showing high initiative. A misfit between leader directiveness and team initiative can lead to low acceptance of the leader behavior and to a lower investment of effort. Leader directiveness is only effective when it compensates for deficiencies of a team (House, 1996). A lack of initiative in a team is a deficiency which can be compensated by leader directiveness. The relationship between leader directiveness and implementation success should therefore depend on team initiative.

> *Hypothesis 4b*: Team initiative moderates the relationship between leader directiveness and implementation success such that this relationship is negative if team initiative is high and positive if team initiative is low.

For teams with a leader who typically initiates high degrees of structure a different configuration of roles is hypothesized to lead to contextual fit. For such teams, we expect the active role of the leader (Bass, 1990) in terms of leader engagement and leader directiveness to contribute to successful implementation. If the leader refrains from taking this active role for a specific innovation, there is a misfit with the functional characteristic of the leader-team system and innovation is likely to fail. In leader-team systems with a leader who initiates structure, there is a dependency on the leader as the person who directs the team. Team members are oriented towards following the instructions of the leader and expect the leader to perform this role (Keller, 1989). If leaders show high engagement and direct implementation, they perform the role consistent with how the system generally functions. In contrast, if leader engagement and leader directiveness are low, team members are required to perform autonomously. In this case, there is contextual misfit between the roles a leader performs and the functional characteristic of the team towards closely adhering to the leaders instructions.

Hypothesis 5a: Initiating structure moderates the relationship between leader engagement and implementation success such that this relationship is stronger if initiating structure is high.

Hypothesis 5b: Initiating structure moderates the relationship between leader directiveness and implementation performance such that this relationship is positive if initiating structure is high and negative if initiating structure is low.

## 4.3. Method

The hypotheses of this study concern the roles leaders and teams perform when implementing innovation and their relationship to successful implementation. Therefore, it was important to use a research design that addressed the phenomenon at the level of specific occasions of innovation implementation. We adapted a methodological approach by Morgeson et al. (2005) and asked participants about both stable characteristics of the leader-team system and about the roles the team and the leader had displayed on specific occasions of innovation implementation. The sample of the study was teams in industries for which innovation implementation is an important task.

### 4.3.1. Procedure

The study involved two steps. In a first step, we asked leaders in an open-ended questionnaire to describe 4 innovations that were implemented in the leader-team system within the last 18 months. Leaders were asked to name two innovations that were successfully implemented and two innovations for which implementation was difficult or did not succeed. Leaders were instructed to name the most important innovations that were implemented in this time period and to name only those innovations that affected the entire team.

In a second step, we handed the list of four innovations back to the leader along with questionnaires that asked a set of standardized questions referring to the four innovations. Leaders were asked to answer one questionnaire and to distribute the other questionnaires to up to three team members. Questionnaires were tailored for each team such that participants were asked only about the specific innovations that were implemented by their team. For each of the four innovations participants answered the same set of questions. Leaders rated the extent to which each innovation was successfully implemented. Team members provided ratings on leader directiveness, team autonomy, and team engagement for the implementation of each innovation. In addition, team members rated stable characteristics of the leader-team system and team leaders assessed the general level of implementation performance of the team.

### 4.3.2. Participants

The sample consisted of teams in German companies. To recruit a sample, we contacted small businesses and teams in larger organizations through company directories and private networks. We only contacted teams, for which innovation implementation was likely to be an important task, which the team frequently performs. At first contact, we informed the leader about the purpose of the study and asked if innovation implementation was an important task demand for the team. Approximately 20% of the teams we contacted met this criterion and agreed to participate. We obtained complete data sets from 39 teams. Ninety-three team members and 39 leaders were included in the final data set. On average 2.38 employees of each team participated in the study. Ratings of multiple team members were pooled for each team (see below). Participants provided information about the implementation of 136 innovations (on average 3.49 innovations per team; the range was 2 to 4 innovations per team). The sample was thus N = 136 innovations (occasion level) nested within N = 39 teams (team level).

The goal of the sampling strategy was to recruit a sample that exhibited variability with respect to leader and team behavior and that allowed for generalization across industries. Rather than recruiting teams from a single industry, we thus sampled teams across different industries. Furthermore, we only included one team per organization, as a shared culture within one organization might restrict the variability in terms of leader and team behavior across teams. 72% of the sample consisted of professional teams in small businesses with less than 50 employees in the areas of architecture, engineering, design and advertising. 28% of the sample were teams in larger organizations, for which implementation of innovation is an important task demand such as R&D teams, marketing teams and cross-functional project teams.

We did not pose any restrictions on the kind of innovations leaders should name because our sample consisted of teams in different industries and our focus was not on the content of innovation. Due to reasons of confidentiality, some leaders did not provide us with the specific content of each innovation and directly told team members which innovations they should refer to in the questionnaire. Illustrative examples of the 136 innovations are: implementation of a centralized IT-System, development of a control system for the rear luggage cover of cars, new spatial distribution of employee to single offices and open-plan offices, development of a new TV-program on addiction-aid.

### 4.3.3. Measures

*Initiating structure* was measured by seven items from the Leader Behavior Description Questionnaire-Form XII (Stogdill,1963). Items were translated and retranslated to German. Two example items are: “My supervisor encourages the use of uniform procedures and my supervisor lets group members know what is expected of them”. Team members rated the level of initiating structure on a 5-point scale ranging from 1 (never) to 5 (always). Cronbach’s alpha was .79. For 34 of the 39 teams we obtained ratings from more than one team member. For these teams we examined agreement ($r_{wg.j}$) and intraclass correlation (*ICC 1*) to justify aggregation. Agreement of different team members of a team for the multiple item scale initiating structure was on average $r_{wg.j}$ = .90 (Bliese, 2006). *ICC 1* for the scale was .32, indicating that 32% of the variance in team member ratings was attributable to between-team differences.

*Team initiative.* To measure team initiative four items of the climate for initiative scale were used (Baer & Frese, 2003). Items were reformulated to refer to the team rather than the

organizational level. Two example items are: "My team takes initiative immediately—more often than other teams" and "my team actively attacks problems". Participants responded on a 5-point scale ranging from 1 = "does not apply" and 5 = "fully applies". Cronbach's alpha for the scale was .81. $R_{wg,j}$ for multiple item scales was on average .93 and *ICC 1* indicated that 45% of variance in climate for initiative was attributable to between-team differences.

*Team implementation performance*. Items for innovative behavior (Scott & Bruce, 1994) were translated to German and adapted to refer to the team rather than the individual level. Leaders were asked six items as to how they assessed the capability of the team to implement new ideas. Example items are: "Team members promote and champion ideas to others", "team members investigate and secure funds needed to implement new ideas", "team members develop adequate plans and schedules for the implementation of new ideas". In an exploratory factor analysis all items loaded higher than .50 on a single factor. Cronbach 's Alpha for the scale was .83.

*Leader and team roles on specific occasions.* To our knowledge no scales were available for measuring team and leader roles concerning implementation of specific innovations. Therefore, we developed items to measure the dimensions of leader engagement, leader directiveness, team autonomy, and team engagement based on interviews with subject matter experts and available scales for measuring between team and leader differences. The set of roles was derived from unstructured interviews and the theoretical model in Figure 4.1. We formulated items such that they directly reflected the meaning of each role. Working with a group of twelve graduate students, the authors discussed, modified and finally selected the group of items listed in Table 4.1. Multiple team members of each team were asked to respond to the items on a five-point scale ranging from 1 = "does not apply" and 5 = "fully applies" for each occasion of innovation implementation.

Using multilevel confirmatory factor analysis (Mplus, Muthen & Muthen, 2004) we examined the latent factor structure of role dimensions to ensure that the items for each scale measured the same construct and that the constructs could be differentiated. A four-factor model showed a better fit to the data than models with fewer latent factors, indicating that the four dimensions of *leader engagement, leader directiveness, team autonomy* and *team engagement* were measured by their respective items and that constructs could be differentiated ($\chi^2 = 496.3$, $df = 55$, $CFI = 0.96$, $RMSEA = 0.06$, $SRMR = 0.07$). Item loadings are displayed in Table 4.1.

Table 4.1

*Items for leader and team roles*

| Scales and items | *Factor loading* | *α* | *ICC1* | $R_{wg.j}$ |
|---|---|---|---|---|
| *Leader engagement* | | .85 | .43 | .77 |
| Our supervisor actively engaged in implementing this innovation. | .74 | | | |
| Our supervisor emphasized that this innovation was very important for our work. | .87 | | | |
| Our supervisor granted highest priority to implementation of this innovation. | .83 | | | |
| *Leader directiveness* | | .79 | .34 | .71 |
| Our supervisor set clear deadlines for the implementation of this innovation. | .62 | | | |
| We received detailed instruction on how to implement this innovation. | .77 | | | |
| We were expected to adhere to clearly defined rules and guidelines when implementing this innovation. | .85 | | | |
| *Team engagement* | | .73 | .46 | .78 |
| My team has taken high initiative to implement this innovation. | .86 | | | |
| Concerning this idea members of my team have worked harder than obliged. | .65 | | | |
| My team has persistently pursued implementation of this innovation even if barriers occurred. | .59 | | | |
| *Team autonomy* | | .84 | .56 | .79 |
| Our supervisor granted us high autonomy in implementing this innovation. | .82 | | | |
| We could decide for ourselves how to implement this innovation. | .90 | | | |

Table 4.1 also shows $r_{wg.j}$ and *ICC 1* values of the scales for 106 of the 136 innovations, for which more than one team member provided ratings on leader and team roles. $R_{wg.j}$ indicates to what extent team members agreed on average for each innovation. For all scales levels of agreement were above the recommended level of .70 (Bliese, 2000). *ICC 1* specifies the proportion of variance that is due to differences between innovations relative to variance attributable to rating differences between team members of the same team. All *ICC 1* values indicate that there is substantial and significant ($p < .01$) variance between innovations. Taken together $r_{wg.j}$ and *ICC 1* showed that multiple team members agreed in their ratings and that they differentiated between different innovations regarding leader and team behavior. Based on these results, we averaged the ratings of multiple team members for one innovation if multiple ratings were available.

*Implementation success.* Implementation success was measured with three items rated on a five-point scale between 1 = "does not apply" and 5 = "fully applies" by the leader: "This idea was implemented successfully", "implementation of this idea succeeded better than the implementation of other ideas", "implementation of this ideas was not successful" (reverse coded). Cronbach's alpha for the three-item scale was .88. Consistent with the instructions to the leaders to name two ideas that were successfully implemented and two ideas for which implementation was difficult or failed, 99% of the variance in implementation success was within teams. Thus, between team differences in pooled implementation success over the four ideas named by each team were negligible. Between-team differences in implementation performance were captured in the measure of implementation performance which was not linked to specific innovations (see above).

### 4.3.4. Analyses

Multilevel modeling and multilevel path-analysis were used to test hypotheses. Variables at the occasion level (level 1) concerned specific innovations (*roles, implementation success*). Variables at the team level (level 2) concerned stable characteristics of the leader-team system (*initiating structure, team initiative, implementation performance*). We performed additional analyses to examine if support for our hypotheses would also hold for an outcome on the team level (all hypotheses concerned an outcome at the occasion level). To do so, we aggregated the occasion level measures for each team and used the aggregated values to predict implementation performance (i.e. a team level outcome).

For correct interpretation of results, different methods of centering occasion level variables were used for multilevel models (Hofmann & Gavin, 1998). For analyses involving innovation specific variables only, predictors were centered around the grand-mean of the sample. The variables thus had within- and between-team variance. To examine cross-level interactions (slope-as-outcome), between-team variance was removed in the predictors by means of group-mean centering (Hofmann & Gavin, 1998). Thereby, scores in the predictors represented the relative deviation in a predictor from each team's mean. These scores reflected, for instance, whether a leader has more or less engaged in implementing a specific innovation relative to other occasions of innovation implementation. By this means of centering, the slopes were unconfounded by between-team variance and interactions can be interpreted as functioning across levels (Enders & Tofighi, 2007).

## 4.4. Results

Table 4.2 presents means, standard deviations, variance proportions, and intercorrelations of the main variables of the study. Correlations above the diagonal are the average occasion-level correlations. Correlations below the diagonal are the team-level correlations. Variance proportions indicate how the variance was distributed between within-team variation (occasion level) and between-team variations (team level). The proportion of within-team variance ranged from 54 % for team autonomy to 99% for implementation success.

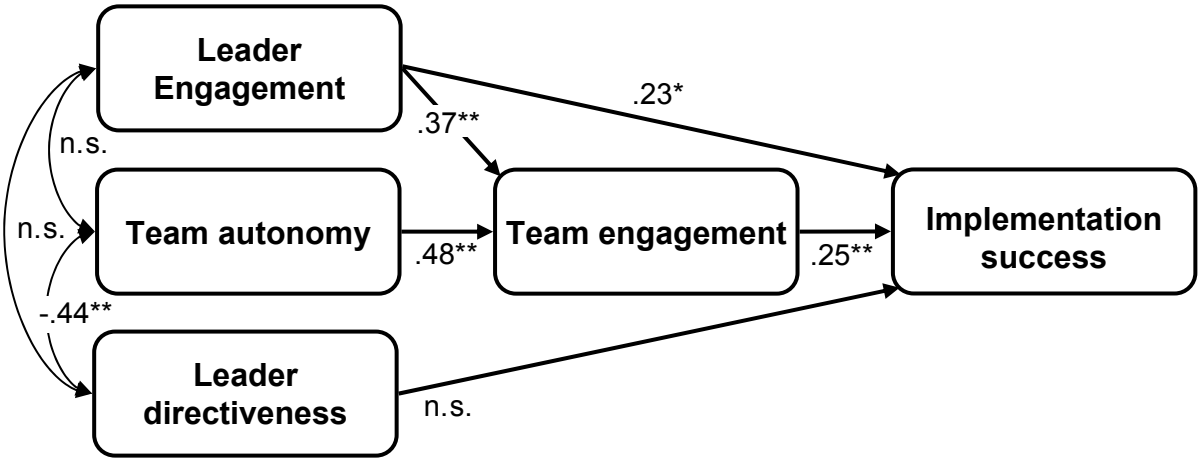


Figure 4.2. *Path-model of leader and team roles and implementation success*

*Leader and team engagement*. Figure 4.2 displays the results of a path model in which implementation success was predicted by leader engagement, leader directiveness, team autonomy, and team engagement. All model fit indices indicate that the model fitted the data well ($\chi^2 = 0.65$, $df = 2$, $CFI = 1.00$, $RMSEA = 0.00$, $AIC = 693.69$). Hypothesis 1a posits that leader engagement and team engagement incrementally predict implementation success. In support of hypothesis 1a the direct path between leader engagement and implementation success was significant and there was also a direct effect of team engagement on implementation success. According to Hypothesis 1b, team engagement partially mediates the relationship between leader engagement and implementation success. In support of this hypothesis, there was a significant indirect effect of leader engagement on implementation success via team engagement in addition to the direct effect of leader engagement on

Table 4.2

*Means (M), variance proportions ($\sigma^2$), standard deviations (SD) and intercorrelations of main variables*

| | Variable | *M* | *SD* | $\sigma^2$ occa. (%) | $\sigma^2$ team (%) | *1* | *2* | *3* | *4* | *5* | *6* | *7* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Occasion level* | | | | | | | | | | | | |
| *1* | Implementation success | 3.36 | 1.25 | 99 | 1 | | .33** | .05 | .11 | .34** | | |
| *2* | Leader engagement | 3.70 | .93 | 71 | 29 | .19 | | .36** | -.01 | .40** | | |
| *3* | Leader directiveness | 2.95 | .88 | 66 | 34 | -.02 | .21 | | -.32** | .07 | | |
| *4* | Team autonomy | 3.29 | .93 | 54 | 46 | .06 | .01 | -.44** | | .44** | | |
| *5* | Team engagement | 3.15 | .77 | 79 | 21 | .44** | .30 | .03 | .51** | | | |
| *Team level* | | | | | | | | | | | | |
| *6* | Climate for initiative | 3.58 | .63 | - | 100 | .32* | .32* | .32* | .14 | .38* | | |
| *7* | Initiating structure | 3.50 | .54 | - | 100 | .22 | .22 | .57** | -.36** | -.03 | -.01 | |
| *8* | Team implementation performance | 3.32 | .62 | - | 100 | .30† | .22 | -.19 | .12 | .40** | .34** | .13 |

*Note*. Correlations below the diagonal are at the team level of analysis (*N*= 39). In order to calculate team-level correlations, occasion level variables (1-5) were aggregated. Correlations above the diagonal are at the occasion level (*N*= 136), i.e. they concern within-team variance.

* $p \leq .05$ ** $p \leq .01$ (two-sided).

implementation success (indirect effect: β = .09, p < .01). The total effect of leader engagement on implementation success was β = .32 (p < .01). We compared the model to a more parsimonious full-mediation model with no direct path between leader engagement and implementation success; as expected the model fitted the data less well ($\chi^2$ = 7.68, *df* = 3, *CFI* = .94, *RMSEA* = 0.11, *SRMR* = 0.05, *AIC* = 698.72).

*Team autonomy*. Concerning team autonomy and its relationship to team engagement and implementation success, Table 4.2 shows that team autonomy was significantly related to team engagement ($\beta$ = .44, $p$ < .01) but that it was not related to implementation success. In support of hypothesis 2a, results of the path-model showed that team autonomy was incrementally related to team engagement ($\beta$ = .48, $p$ < .01) after controlling for leader engagement. Hypothesis 2b stated that team engagement is a mediator in the relationship between team autonomy and implementation success. Providing support for this hypothesis, the indirect effect of team autonomy on implementation success through team engagement was significant ($\beta$ = .12, $p$ < .01). However, there was no significant correlation between team autonomy and implementation success, which is commonly considered a precondition for mediation (Baron & Kenny, 1986). Thus, team autonomy was related to team engagement and indirectly related to implementation success. However, results do not support the interpretation that team autonomy was related to implementation success in general. The relationship between team autonomy and implementation success is clarified if leader directiveness is taken into account.

*Leader directiveness*. As expected, there was a negative correlation between leader directiveness and team autonomy ($r$ = -.44, $p$ < .01) and there was no direct relationship between leader directiveness and implementation success (see Table 4.2 and Figure 4.2). According to Hypothesis 3 the relationship between leader directiveness and implementation success is moderated by team autonomy. To test for moderation, we examined two hierarchical linear models. In Model 1 in Table 4.3 implementation success was predicted by the four independent variables. Consistent with the results of the path-model, only leader engagement and team engagement significantly predicted implementation success. For Model 2 in Table 4.3 we added the interaction term of leader directiveness and team autonomy. It explained an additional 3% of variance in implementation success ($\beta$ = - .25, $p$ = .03). The interaction is displayed in Figure 4.3. For low team autonomy the relationship between leader directiveness and implementation success was positive. For high team autonomy the relationship between leader directiveness and implementation success was negative. The

results suggest that either leader directiveness or team autonomy need to be high for successful innovation implementation.

Table 4.3

*The relationship between team autonomy, leader directiveness and implementation success*

| Independent variable | Model 1 | Model 2 |
|---|---|---|
| Intercept | 3.36 (0.10)** | 3.30 (0.10)** |
| Leader engagement | 0.41 (0.15)** | 0.43 (0.15)** |
| Team engagement | 0.41 (0.16)* | 0.38 (0.16)* |
| Leader directiveness | 0.10 (0.13) | -0.04 (0.13) |
| Team autonomy | -0.03 (0.13) | 0.01 (0.13) |
| Leader directiveness * team autonomy | | -0.25(0.12)* |
| *Model* $R^2$ | .13 | .16 |

*Note*: Implementation success is the dependent variable. The values are unstandardized parameter estimates for the regression weights (γ). Standard errors are indicated in parenthesis. *N* = 136 innovations nested within 39 teams.
* $p \leq .05$ ** $p \leq .01$ (two-sided).

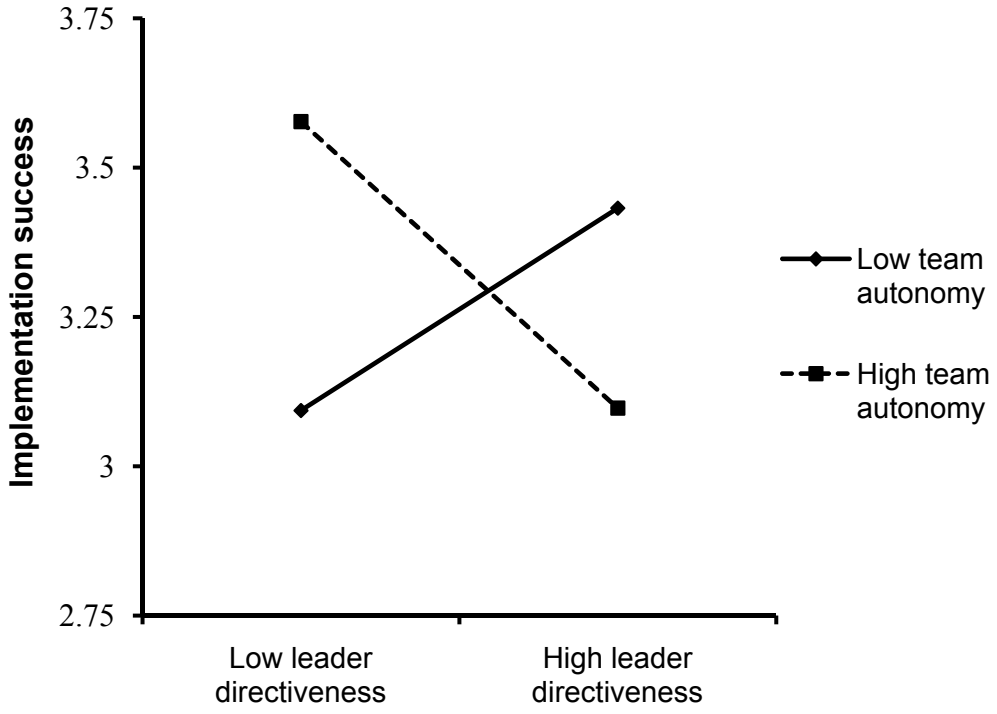


*Figure 4.3.* Interactive effects of team autonomy and leader directiveness

*Team level analyses*. The results we have thus far presented refer to the hypotheses on specific occasion of innovation implementation. We performed exploratory analyses to test if relationships consistent with our hypotheses could also be observed on the level of between-team differences. For instance, we expected that a team with high levels of active performance shows better implementation performance compared with teams with low levels of team engagement. To do so, we conducted regression analyses with predictors and outcome variables at the team level ($N = 39$, see Table 4.4). As an outcome variable we used the variable of implementation performance. This variable measured the general implementation performance of a team as assessed by the supervisor (In contrast, the variable implementation success refers to specific occasions and only varies within teams). The predictor variables were averaged across the specific innovations for each team (e.g. average level of team autonomy, team members reported over four occasions of innovation implementation).

Table 4.4

*Team-level differences in implementation performance*

| Independent variable | Model 1 | Model 2 | Model 3 |
|---|---|---|---|
| Leader engagement | .26 (0.15) † | .12 (0.15) | .11 (0.16) |
| Leader directiveness | -.23 (0.17) | -.36 ( 0.16) * | -.27 ( 0.15) † |
| Team autonomy | .03 (0.17) | -.33 (0.19) | -.35 (0.16) † |
| Team engagement | - | .54 ( 0.17)** | .49( 0.21)** |
| Team engagement * leader engagement | | | .30 (0.34)* |
| Model $R^2$ | .10 | .27 | .35 |

*Note*: Implementation performance is the dependent variable. The values are standardized parameter estimates for the regression weights (β). Standard errors are indicated in parenthesis. $N = 39$ teams.
* $p \leq .05$ ** $p \leq .01$ (two-sided).

Model 1 in Table 4.4 shows that leader engagement was marginally significantly related to between-team differences in implementation performance ($\beta = .26$, $p = .09$, *Model* $R^2 = .10$). Team autonomy and leader directiveness were not related to implementation performance. In Model 2, team engagement was added to the regression. It was significantly related to implementation performance ($\beta = .54$, $p < .01$, *Model* $R^2 = .27$). Moreover, exploratory analyses showed that the interaction term of team engagement and leader

engagement explained significant variance in implementation performance (Model 3: $\beta = .30$, $p < .03$, *Model* $R^2 = .35$): The relationship between team engagement and implementation performance was more positive if leader engagement was high. In sum, these exploratory findings are consistent with results on the occasion level. Moreover, the significant interaction of team engagement and leader engagement suggests that there was a synergy such that team engagement was particularly beneficial if leader engagement was high.

Table 4.5

*Cross-level moderation of climate for initiative and initiating structure*

| | Model | Slope as outcome | Team initiative | Initiating structure | Explained variance |
|---|---|---|---|---|---|
| *1* | Team autonomy and implementation success | 0.44 (0.20)* | 0.78 (0.31)** | 0.21 (0.35) | 4% $\Delta R^2$(d.v.)[a]<br>80% $R^2$ (slope) |
| *2* | Leader directiveness and implementation success | -0.31 (0.18) | -0.43 (0.25)† | 0.30 (0.32) | 2% $\Delta R^2$(d.v.)<br>25% $R^2$ (slope) |
| *3* | Leader engagement and implementation success | 0.78 (0.18)** | 0.13 (0.28) | 1.04 (0.41)* | 3% $\Delta R^2$(d.v.)<br>40% $R^2$ (slope) |
| *4* | Team autonomy and team engagement | 0.40 (0.10)** | 0.32 (0.15)* | -0.07 (0.17) | 3% $\Delta R^2$ (d.v.)<br>3% $R^2$ (slope) |
| *5* | Leader directiveness and team engagement | 0.13 (0.10) | -0.04 (0.14) | 0.28 (0.14)* | 2% $\Delta R^2$(d.v.)<br>22% $R^2$ (slope) |
| *6* | Leader engagement and team engagement | 0.47 (0.11)** | 0.34 (0.17)* | 0.10 (0.25) | 4% $\Delta R^2$(d.v.)<br>18% $R^2$ (slope) |

*Note*. For Models 1-3 the occasion-level slope between implementation success and each leadership role was predicted by the team level variables team initiative and initiating structure. For Models 3-6 the slope between team engagement and each leadership role was predicted by the team level variables team initiative and initiating structure. The values are unstandardized parameter estimates for the regression weights (γ). Standard errors are indicated in parenthesis. $N$ = 136 innovations nested within 39 teams.

[a] $\Delta R^2$ (d.v.) is the variance explained in the dependent variables implementation success and team engagement. $R^2$ (slope) refers to the proportion of variance in the relationships across teams which is explained by the predictors team initiative and initiating structure.

† $p \leq .10$ * $p \leq .05$ ** $p \leq .01$ (two-sided).

*Contextual fit*. According to Hypotheses 4a to 5b, the relationships between leader and team roles and implementation success are not uniform but depend on characteristics of the leader-team system. To test these hypotheses, we used slopes as outcomes in hierarchical linear models. That is, we predicted the team-specific relationship between each role and implementation success with initiating structure and team initiative as general characteristics

of the team. The "slope as outcome" column in Table 4.5 reports the pooled relationships between roles and implementation success for each model across teams. The relationships were predicted by the team level variables initiating structure and team initiative. In Table 4.5 we also report results on how the relationships between roles and team engagement (instead of implementation success) were predicted by the general characteristics of the team.

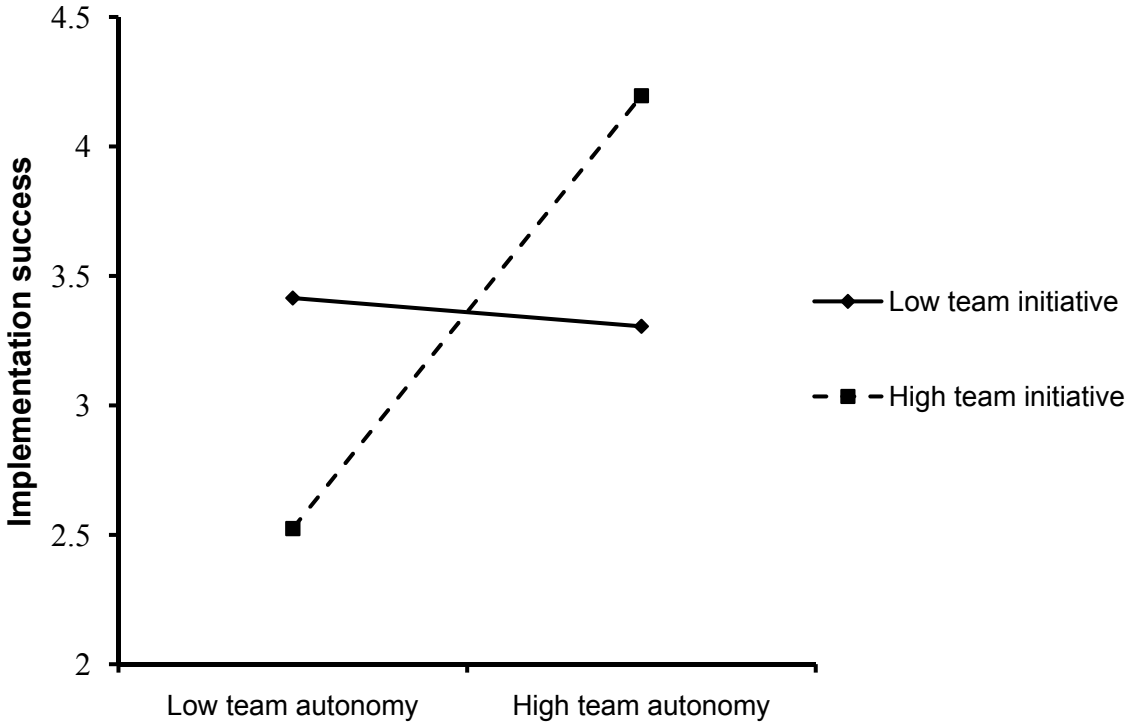


*Figure 4.4.* Cross-level moderation of team initiative

Hypothesis 4a states that the direction and magnitude of the relationship between team autonomy and implementation success depends on team initiative. In support of the hypothesis, Model 1 in Table 4.5 shows that team initiative explained significant variance in the relationship between team autonomy and implementation success across teams ($\gamma = 0.78$, $p < .01$). The interaction is displayed in Figure 4.4. In teams with high initiative there was a positive relationship between team autonomy and implementation success. Contrary to the hypothesized negative relationship, there was no relationship between team autonomy and implementation success in teams with low initiative. In line with the theoretical rational of Hypothesis 4a, the relationship between team autonomy and team engagement was moderated by team initiative ($\gamma = 0.32$, $p = .04$). In teams with high team initiative, the relationship

between team autonomy and team engagement was stronger than in teams with low team initiative. In sum, these findings provide support for the notion of contextual fit. However, in the case of contextual misfit, no negative relationship was observed.

According to Hypothesis 4b, the direction and magnitude of the relationship between leader directiveness and implementation success depends on team initiative. Model 2 in Table 4.5 shows that team initiative moderated the relationship in the hypothesized direction; however, it was only marginally significant ($\gamma = -0.43$, $p < .09$). There was a tendency such that the relationship between leader directiveness and implementation success was more negative for teams with high initiative compared to teams with low initiative. This finding provides some support for the hypothesis that there is contextual misfit of leader directiveness if team initiative is high. An unexpected finding on cross-level moderation was that the relationship between leader engagement and team engagement was moderated by team initiative (Model 6: $\gamma = 0.34$, $p = .03$). The relationship between leader engagement and team engagement was stronger for teams with high rather than low initiative. Thus, whereas leader directiveness was problematic if team initiative was high, leader engagement served an important motivational function.

Hypotheses 5a and 5b propose a moderation effect of initiating structure. In support of Hypothesis 5a, the relationship between leader engagement and implementation success was predicted by initiating structure (Model 3: $\gamma = 1.04$, $p = .01$). In teams with a leader who initiated high structure the relationship was more positive than in teams with a leader who initiated low structure. The interaction is displayed in Figure 4.5. Hypothesis 5b states that leader directiveness is positively related to implementation success if initiating structure is high and negative if initiating structure is low. Although the sign of the coefficient was in the expected direction, it was not significant (Model 2: $\gamma = 0.30$, $p = .32$). Thus, Hypothesis 5b was not supported. However, the relationship between leader directiveness and team engagement was moderated by initiating structure (Model 5: $\gamma = 0.28$, $p = .05$). In teams with high initiating structure, leader directiveness was more strongly related to team engagement compared to teams in which initiating structure is low[3]

[3] Results show that leader directiveness and team autonomy interact in their effect on implementation success. Therefore, we examined whether the interaction of both roles was moderated by the team level variables of team initiative and initiating structure. The three-way interaction was not significant.

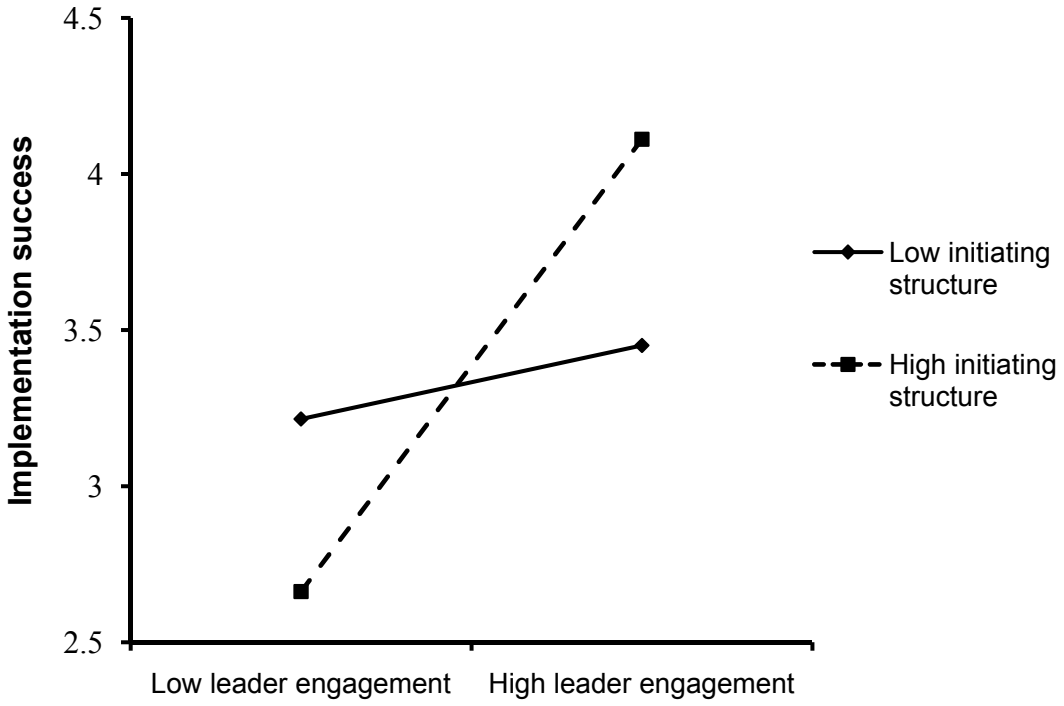


*Figure 4.5.* Initiating structure as a cross-level moderator

## 4.5. Discussion

From the functional perspective we have taken (cf. Zaccaro et al., 2001), it follows that innovation implementation in leader-team systems succeeds if the roles leaders and team members perform are consistent with the task demands of innovation. An active approach towards the task by leaders and team members appeared to be a decisive task demand (Bledow, Frese et al., 2009a). In this study, implementation success was a direct function of leader engagement and team engagement. Engagement refers to an active approach towards the task (Frese, 2008). By getting directly involved, pointing out the importance of the task, and thereby mobilizing a team's activity, leaders contributed to implementation success. Moreover, additional analyses, in which we compared the implementation performance of different teams, revealed a synergy of leader engagement and team engagement: The more engaged the leader was over different occasions, the stronger was the positive relationship between team engagement and implementation performance of a team. Thus, concerning the task demand of active performance a "both/and" approach appears to be most promising (Cameron & Quinn, 1988), such that both leaders and team members show high engagement.

In contrast, such an approach was not the most effective mode of management concerning the task demand of decision-making. In support of our hypotheses, we found that two different modes of decision-making lead to implementation success. Innovation was successfully implemented if either the team had autonomy or the leader was directive. First, team members can take on the role of decision-making if team autonomy is high. Team autonomy was related to team engagement and indirectly related to implementation performance. In a situation of high team autonomy, leader directiveness was negatively related to implementation success. A lack of clarity concerning decision-making (West et al., 2003) and a leader who interferes with team-autonomy, reduce the likelihood of implementation success. Therefore, if a situation is such that team members have autonomy, leader directiveness that goes beyond leader engagement can be detrimental for implementation success. Second, if team autonomy was low such that team members could not take on the role of decision-making, we found leader directiveness to be positively related to implementation success. This constituted a second effective mode of decision-making, in which the role of decision making resided with the leader. Implementation success was low if neither the leader nor the team performed the role of decision-making.

If both task demands of innovation implementation are taken into account, we found support for the notion that an integrated mode of management is most effective in leader-team systems. This means that performance of the task and decision-making are not separated between leaders and team members. A separated mode of management is present, if decision-making activities are separated from the execution of the task. This would be the case, for example, if leaders decide and direct team members without showing engagement in the process of implementation. We found two distinct modes for how an integrated mode of management can be realized. First, there can be high team autonomy and leader engagement such that the leader is actively engaged without being directive. This requires that a leader maintain the delicate balance of being involved in the process of implementation without making decisions in a way that constrains a team. Second, a mode of management can also be referred to as integrated if decision-making resides primarily with the leader and the leader shows high engagement. This mode of management depends more heavily on the leader. Decision-making and task performance are only integrated if the leader shows both high engagement and high decision-making. If leaders are only directive without showing engagement, decision-making and task performance are separated between leaders and team members. Such a mode of management proved to be less successful. The relative

effectiveness of the two integrated modes of management depended on functional characteristics of the leader-team system. Thus, a mode of management for a particular innovation does not only need to be consistent with the task demands of innovation, it also needs to fit to the context of a given team.

In support of our proposition, the active role of the leader was particularly important for leader-team systems with a leader who initiates high structure. If the role a leader performs for a given innovation is consistent with overall leadership style, innovation implementation is more likely to succeed. The team is dependent on the leader's engagement and guidance. If a leader, who initiates high structure does not perform this role on a given occasion, implementation is more likely to fail than in leader-team systems with a leader who initiates low structure. Although we found support for this general notion, the pattern of results was more differentiated than expected (see Table 4.5). The moderating role of initiating structure was only significant for the relationship between engagement and implementation success. For the relationship between leader directiveness and implementation success, the moderating effect failed to reach significance. Initiating structure did, however, moderate the relationship between leader directiveness and team engagement. If initiating structure was high, team members showed higher engagement if the leader was directive. In sum, for leader-team systems with a leader who initiates high structure, leader engagement is particularly important for implementation success and leader directiveness can contribute to ensure that a team shows high engagement.

A different configuration of roles was found to be effective for leader-team systems with high team initiative. In such leader-team systems, team autonomy was a decisive factor for team engagement and implementation success. The path from team autonomy through team engagement to implementation success was stronger than in leader-team systems with low team initiative. In line with our reasoning, there was also a marginally significant moderator effect of team initiative on the relationship between leader directiveness and implementation success. The relationship was negative for high team initiative. According to our theory, leader directiveness in teams with high initiative can inhibit effective self-regulation by the team (Hoegl & Parboteeah, 2006). However, such a detrimental effect of a leader's behavior was limited to leader directiveness. Leader engagement was beneficial across leader-team systems. Unexpectedly, we even found leader engagement to be more strongly related to team engagement if team initiative was high. This suggests that the beneficial effects of leader engagement work differently in teams depending on team initiative

and leader initiating structure. If team initiative is high, leader engagement works through its motivational impact on team members (relationship between leader engagement and team engagement). If initiating structure is high, leader engagement works primarily directly through the active contribution of a leader (direct relationship between leader engagement and implementation success).

On a general level, the findings support the theoretical notion of contextual fit. Implementation success was more likely if the roles leaders and team members performed were consistent with how the leader-team system functions. The findings provide less consistent evidence on the notion of contextual misfit. When leaders and team members performed roles that were inconsistent with characteristics of a leader-team system, there was no negative relationship of roles with implementation success (with the exception of leader directiveness in teams with high initiative). For instance, team autonomy was unrelated to implementation success if team initiative was low. Thus there is a payoff if contextual fit is present but not necessarily a detrimental effect in cases of contextual misfit.

For appropriate interpretation of the findings, it must be taken into account that team initiative and initiating structure are two independent characteristics of how leader-team systems function. In fact, in this study both dimensions were completely unrelated and we found distinctive patterns of fit for both dimensions. The roles that lead to contextual fit concerning team initiative do not necessarily lead to contextual misfit concerning initiating structure. For instance, the relationship between team autonomy and implementation success was moderated by team initiative but was unaffected by initiating structure. Due to the small sample size on the level of leader-team systems, interactions between both dimensions could not be examined. Future research needs to investigate how both dimensions interact and what modes of implementation are effective, for instance, for leader-team systems in which both team initiative and initiating structure are high.

From our reasoning and empirical findings, it should not be inferred that leader-team systems should maximize contextual fit and always choose the preferred mode of innovation implementation. There may be good reasons to show variability in modes of management and to apply modes of management for which contextual fit is low. A leader who generally builds on team member initiative may be the one who has the highest expertise for a particular innovation. In such a situation, being directive can be highly functional (Fiedler & Chemers, 1984). Moreover, although we found a higher likelihood of success if contextual fit was present, the results provided only weak support for the hypothesis on misfit, i.e. that

implementation is likely to fail if modes of management are applied that do not fit the context of a leader-team system. Thus, choosing modes of management that are inconsistent with what is preferred may at times be necessary, however, achieving implementation success is more difficult. Future research needs to examine how teams can be supported such that they select the most effective mode of management for a particular innovation and are able to effectively perform different modes of management.

We expect that the preferred modes of management and the functional characteristics of a system are reinforced over time. Leaders and team members learn what modes of management are more likely to succeed and tend to select promising modes more frequently. If leaders repeatedly experience that providing autonomy to a team with high initiative leads to success, they will continue along this line. If leaders experience that initiating structure and directiveness are related to success over different occasions, a leader-centered mode of management will be reinforced. Whether such a learning process takes place and whether it is effective, is an open question for future research. The learning process may also lead a system to get locked into a certain way of doing things by losing the ability to apply different modes of management.

### 4.5.1. Limitations and future research

A first limitation of this empirical study, which is of theoretical importance, concerns the detailedness, with which we studied leader and team behavior. We only addressed the overall level on the role dimensions for a particular innovation. At a finer-grained level of specific activities, leaders may not only differ in the average level on a role dimension such as leader directiveness. They may also differ in their pattern of behavior across different work related situations (Mischel, 2004). Future research should therefore address the situations in which the team or the leader performs decision-making activities. One can use Mischel's notion of behavioral signatures (Mischel & Shoda, 1995) to connote the pattern of situations in which a leader is directive. Even if two leaders show the same level of directiveness, their signatures of directiveness can be distinct. We assume that in an effective leader-team system leaders only direct when the team lacks the ability to perform a task autonomously. In an ineffective team, a leader directs tasks the team can perform autonomously and lacks clear directives for tasks the team is unable to perform. The ability of leaders to integrate leader directiveness and team autonomy by situation-specific shifting between the different modes of

decision-making is expressed in the loose-tight leader ship model (Sagie, 1997) and the concept of ambidextrous leadership (Bledow, Frese et al., 2009a) .

The focus of this study on implementation activities over multiple occasions of innovating in one leader-team system came at the cost of studying a large sample of leader-team systems. The small sample and its heterogeneity are a limitation. More specific features of leader-team systems and their environment such as the organizational context, the industry, and team longevity could not be systematically examined. These factors can have an influence on the effectiveness of different modes of management. However, our focus was on functional characteristics of leader-team systems. We think the basic functions that are performed when implementing innovation can be compared across very different leader-team systems.

A further limitation of the study is that it abstracted from the level of individual team members. The level of autonomy and active performance is not necessarily uniform across team members for any particular innovation. Although we found acceptable levels of agreement, there was substantial variance in the ratings of different team members. This might be partly due to random error variance, but it can also reflect systematic differences among team members. For instance, leadership is partly a dyadic phenomenon and leaders differ in the extent of autonomy they grant to different team members (Graen & Uhl-Bien, 1995). Future research is needed which takes into account the team and the individual level and performs a more detailed analysis of the internal structure of modes of management in teams.

Concerning the method we used, two main limitations need to be mentioned. First, we relied on participants' memories to recall behavioral episodes and the implementation success of particular innovations. Memory bias and attributional bias may therefore be a problem (Mezulis, Abramson, Hyde, & Hankin, 2004). However, acceptable levels of agreement between the ratings of different team members indicated that the behavioral episodes were adequately remembered and reported. Moreover, the potential alternative explanation that participants may be biased in how they remembered and reported activities related to successful vs. unsuccessful innovations cannot account for the pattern of interaction effects. To reduce the problem of biases and common method variance, the independent variables were collected from the team and the dependent variables were collected from the leader. Second, causal inferences can only be made indirectly on the basis of this study. Although our research was cross-sectional, we predicted implementation success with activities that had occurred before eventual success or failure and that directly referred to the target of interest.

Therefore, assuming a causal relationship between activities and the outcome is reasonable. However, reciprocal relationships may still exist. For instance, leaders may become less directive if they see that an innovation is on the way to success. Such dynamic phenomena could not be addressed with the present study.

### 4.5.2. Practical implications

The most important practical implication that follows on how to increase the likelihood of innovation success is that a good understanding of a leader-team system and of the task demands of innovation is necessary. According to our reasoning and empirical findings, the art of good leadership for innovation is to actively contribute by showing high engagement without constraining team members' autonomy, and by being directive only when the task demands so.

The notion that investment of high degrees of motivational energy towards implementation is a primary means to increase innovation success is intuitive and supported by this study. But what are effective means to ensure high motivation? Effective leadership is one important factor and it implies that leaders play an active role in the implementation process. By pointing out the priority of innovation and by engaging in its implementation, leaders can increase team engagement and the likelihood of implementation success. By engagement a leader can also ensure that team effort is invested in an innovation that really matters to the team. For effective decision-making, we suggest that either the team or the leader need to consistently perform this role. Furthermore there needs to be clarity in terms of whether the leader or the team is in charge of decision-making (West et al., 2003). A combination of team autonomy and a directive leader did not prove to be successful.

Contextual fit is present if leaders and team members perform roles that are consistent with functional characteristics of their leader-team system. Our findings warn against one-best-way approaches. Although providing high autonomy to a team may be most effective if team initiative is high, other teams depend much more on the leader as the one, who decides and directs. When a leader-team system uses its preferred mode of management, it is most successful. One way to increase the likelihood of success is to understand how the system one is in functions and, what its preferred mode of management is, and then to apply this mode of management. For the long-term adaptability of a system, its ability to use a variety of modes of management rather than its reliance on only the modes of management with the highest fit, may turn out to be crucial (Bledow, Frese et al., 2009a).

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# General Conclusion

Throughout this dissertation I have emphasized the complexity of the innovation process and have warned against simplistic one-best-way approaches to innovation management. Practical recommendations such as "Leadership style X increases the success rate of innovation" are not consistent with the current approach. The downside of the attempt to take complexity into account is the difficulty in producing practical useful knowledge. In fact, this approach can be misunderstood such that everything and anything goes. In the introduction section I have suggested if-then statements as a way to make practical recommendations on a "medium" level of complexity. If-then statements capture regularities of the innovation process. They specify conditions under which relationships between antecedent conditions and outcomes of innovation can be expected. Such if-then statements may provide guidelines to make informed decisions.

In this conclusion section, I derive if-then statements from the three empirical chapters. If-then statements specify conditions of contextual fit. Contextual fit refers to the congruence between the environment and a certain management approach, characteristics of a person, or characteristics of a social system. Contextual fit is proposed to lead to desired outcomes. Contextual fit is not limited to congruence between stable characteristics of environment and person; it also addresses whether specific actions are aligned with situations and whether individuals adapt their actions to changing task demands.

In the *second chapter* I developed and tested the assumption that congruence between personality (action versus state orientation) and work situation leads to creativity. The strength of action orientation is effective goal-pursuit. Action-oriented individuals can quickly initiate action and are not hampered by demanding or threatening situations. If a situation is such that it supports these distinctive characteristics of action orientation, contextual fit is present and action-oriented individuals engage in creativity. The study supported the validity of the following if-then statement related to action orientation:

*Action-oriented individuals are creative*

*... if work demands are high.*

*... if there is low structure in a work situation.*

*... if self-efficacy is high in a work situation.*

Compared to action orientation, state orientation implies different advantages and the situations in which creativity is facilitated are distinct. State-oriented individuals can be more

objective information processors and spend more time elaborating discrepant information. They are dependent on a supportive environment and the ability to shift to positive affect after prolonged phases of negative affect. Contextual fit is present if a situation supports these distinctive characteristics of state-oriented individuals. The empirical findings provided support for the following if-then statements concerning state orientation:

*State-oriented individuals are creative*

*... if a shift from negative to positive affect occurs.*

*... if social support is experienced when negative affect is high.*

*... if work demands are low.*

*....if structure at work is high.*

A core finding of the *second* c*hapter* relates to the dynamic interplay between positive and negative affect and how it influences creativity. This finding relates to intraindividual processes only and is therefore not a form of contextual fit. Nevertheless, it also demonstrates that contingency conditions need to be specified which qualify the relationship between affect and creativity. In line with past research, we found support for the unconditional statement "positive affect is related to creativity". However, the relationship between negative affect and creativity also needs to be considered to gain a more complete account of the relationship between affect and creativity. Negative affect is positively related to creativity if a subsequent shift to positive affect occurs.

In the *third chapter* I examined antecedent conditions of active performance in research and development teams. In support of the hypothesis, active performance was high under conditions of contextual fit. Contextual fit was present if there was congruence between an individual's exploration orientation and project management style. For individuals high in exploration orientation, contextual fit was present if the project management style of the project they were working on was emergent. An emergent project management style supported their motivational orientation towards exploration and thus active performance. In contrast, individuals with a low exploration orientation (i.e. exploitation orientation) showed active performance if project management style was planned. A planned project management style supported their motivational orientation towards exploitation. These findings are captured in the following if-then statements:

*Exploration-oriented individuals show active performance*

*... if project management style is emergent.*

*Exploitation-oriented individuals show active performance*

*...if project management style is planned.*

In the *fourth chapter*, the effectiveness of different modes of managing innovation implementation in leader-team systems was examined. The configuration of roles related to the core task demands of active performance and decision-making was hypothesized to determine implementation success. Concerning active performance, we found positive relationships between leader and team engagement and implementation success that do not require contextual conditions to be specified. In contrast, effective decision-making in leader-team systems requires taking into account both leader directiveness and team autonomy. The relationship between leader directiveness and implementation success was qualified by team autonomy, and vice versa. Therefore, the contextual condition of whether or not a team has autonomy needs to be taken into account in determining the relationship between leader directiveness and implementation success:

*Leader directiveness contributes to implementation success*

*...if team autonomy is low.*

*Team autonomy contributes to implementation success*

*...if leader directiveness is low.*

The effectiveness of modes of management was found to vary across different leader-team systems, such that effectiveness was a function of contextual fit. Innovation was most likely to be successfully implemented if a mode of management was used that was congruent with functional characteristics of a leader-team system:

*Leader-team systems high in initiating structure successfully implement innovation*

*... if leader engagement is high.*

*... if leader directiveness is high.*

*Leader-team systems high in team initiative successfully implement innovation*

*... if team autonomy is high.*

*... if leader directiveness is low.*

So far I have summarized the results of the three empirical studies in terms of if-then statements. To conclude, I will articulate and discuss a theoretical if-then statement which aims at integrating the findings of this dissertation:

***Innovation succeeds***

***…if a system capitalizes on its strengths.***

Each empirical study referred to a different aspect of the innovation process and examined antecedent conditions that are supportive of each aspect. A common theme across the three empirical studies was that innovation relevant outcomes were most likely to be achieved under conditions of contextual fit because systems capitalized on their strengths. Individuals were creative if a work situation was congruent with the strengths of action or state orientation. Employees of R&D teams showed active performance if project management style was consistent with their orientation towards exploration or exploitation. Leader-team systems were most likely to successfully implement innovation if they used a mode of management that was consistent with how the system generally functioned. In each of these cases, a system used its preferred modus operandi. In other words, if a system approached a task in the manner that made best use of its distinctive functional characteristics, it was most likely to show creativity, active performance, and successful innovation implementation.

I interpret contextual fit as an incident of optimal functioning, such that a system achieves a state of optimal functioning under conditions of contextual fit. The conditions that lead to contextual fit and hence optimal functioning depend on a system's functional characteristics. Viewed from a positive angle, these functional characteristics are the strength of a system because they have functional value for innovation. For instance, a strength of action-oriented individuals is that they can effectively implement plans of action. In contrast, a strength of state-oriented individuals is that they spend more time elaborating on discrepant information. Optimal functioning in the context of innovating means that these strengths are made use of such that they contribute to the innovation process. However, there is not one best way of optimal functioning because what constitutes optimal functioning is related to the strengths of a system. Moreover, the contextual conditions which facilitate or inhibit optimal functioning depend on these strengths of a system.

Innovation is particularly dependent on optimal functioning because it requires, more than other performance outcomes, an effective integration of different mental processes and behaviors. I argue that this integration succeeds if a system capitalizes on its strengths. It is

important to note that I refer to strengths related to how a system performs a task, not to strengths concerning what a system does. The explanatory constructs of this dissertation such as action versus state orientation or project management style refer to how a system functions. In contrast, an individual's creative performance or an organization's ability to produce a certain product refers to what a system does. Therefore, in the present context I refer to strengths concerning the manner of goal pursuit independent of the specific content of an activity.

The notion that innovation succeeds if a system capitalizes on its strengths may help to inform the observation made in the *first chapter* that innovation has many different entry points and can be achieved via multiple pathways. For instance, it suggests that successful organizational innovation is not primarily a function of an organization's size, formalization, its internal structure or its cultural characteristics compared to other organizations. Instead, organizations innovate successfully if they make use of their distinctive strengths. The success of the group of companies termed "hidden champions" illustrates how companies made use of their distinctive strengths. These companies do not fit our innovative stereotype well and have been reported to do most things differently from the norm suggested by popular management books. However, they capitalized on their distinctive strengths such as their focus on quality, efficiency, and their close relationships with a well-defined group of costumers. In the same vein, one can argue, on the individual level of analysis, that it is not a certain personality disposition such as openness to experience or conscientiousness which determines innovation success. Rather, innovation success should depend on whether an individual is able to use the strengths that are associated with a certain personality disposition for innovation.

From the current perspective, a warning label needs to be attached to an unreflected use of benchmarking procedures and off-the-shelf solutions at the consultancy market place. If certain practices have been found to work for many systems or even if they have been identified as "best practices", it cannot be inferred that it is a good decision for a given system to adopt these practices. The quintessential question is whether practices lead to contextual fit and hence optimal functioning. Throughout this dissertation I have mentioned exemplary practices to which this reasoning applies, for instance, extrinsic rewards, project management styles, and ambidextrous organizational designs. To determine whether a practice is compatible for a given system, a good understanding of the system's internal functioning and its strengths is of primary importance.

An implication for future research on innovation is that more attention needs to be paid to the internal functioning of systems and to the identification of specific strengths. From my point of view, research designs that compare attributes in a population of systems and relate these attributes to outcome criteria do not suffice. Such research is useful in determining the overall effectiveness of practices or attributes in a population of systems. However, it does not readily inform a given system on what measures to take in order to innovate successfully. This does not mean that I argue in favor of qualitative and ideographic approaches. By taking a closer look at the internal dynamics of systems across different points in time, functional characteristics of systems can be identified within a nomothetic, quantitative approach. Such research may generate knowledge which assists individuals, teams and organizations in making informed decisions on how to manage innovation successfully.

# GERMAN SUMMARY
# [DEUTSCHE ZUSAMMENFASSUNG]

## Einführung

Das Ziel dieser Dissertation besteht darin, einen Beitrag zum theoretischen Verständnis von Innovation zu leisten und praktische Implikationen für das Innovationsmanagement abzuleiten. Die Arbeit basiert auf einer dialektischen Sichtweise von Innovation und auf empirischer Feldforschung. Im ersten Kapitel wird eine dialektische Sichtweise entwickelt, die darauf abzielt, die bisherige Forschung über Innovation zu integrieren und Wege für zukünftige Forschung und effektives Innovationsmanagement aufzuzeigen. Die drei empirischen Artikel der Dissertation untersuchen Bedingungsfaktoren, die drei zentrale Aspekte des Innovationsprozesses unterstützen: Kreativität, aktives Arbeitshandeln und Implementierung. Die zentrale theoretische Überlegung, die den drei empirischen Artikeln zugrunde liegt, besagt, dass erfolgreiche Innovationen durch kontextuelle Passung entstehen.

Unter kontextueller Passung wird die Kongruenz zwischen Umwelt und einem bestimmten Management Ansatz, Merkmalen einer Person oder Merkmalen eines sozialen Systems verstanden. Es wird erwartet, dass Kongruenz zu Innovationserfolg führt. Kontextuelle Passung umfasst das Konzept der Person-Umwelt Passung und erweitert dieses Konzept (Schneider, 2001). Kontextuelle Passung ist nicht auf stabile Merkmale von Umwelt und Person begrenzt, die im Mittelpunkt der Literatur über Person-Umwelt Passung stehen. Kontextuelle Passung bezieht sich auch darauf, ob spezifische Handlungen mit situativen Merkmalen übereinstimmen und ob Personen ihre Handlungen an sich verändernde Arbeitsanforderungen anpassen.

Als zentrale praktische Implikation folgt aus den Überlegungen zu kontextueller Passung, dass allgemeine Ratschläge über erfolgreiches Innovationsmanagement, die kontextuelle Aspekte nicht berücksichtigen, von begrenztem Wert sind. Auch wenn ein bestimmter Ansatz im Allgemeinen mit Innovationserfolg zusammenhängt, ist die Schlussfolgerung nicht zulässig, dass jede Organisation, jedes Team oder jedes Individuum von einem im Allgemeinen erfolgreichen Ansatz profitiert. Als Konsequenz wird vorgeschlagen, *wenn-dann* Zusammenhänge zu formulieren, die spezifizieren, unter welchen kontextuellen Bedingungen ein Ansatz innovationsrelevante Ergebnisse erzielt. Daraus folgt

zum Beispiel, dass es nicht ausreicht, Führungsstile zu identifizieren, die mit Innovationserfolg zusammenhängen. Es sollten zusätzlich die Bedingungen benannt werden, unter denen ein Führungsstil zum Innovationserfolg beiträgt. Auch die Prozessaspekte, auf die sich ein Führungsstil positiv oder negativ auswirkt, sollten konkretisiert werden (Morgeson, 2005). Diese allgemeinen Überlegungen zu kontextueller Passung werden in den drei empirischen Artikeln angewendet.

# Kapitel 1

## Eine Dialektische Sichtweise auf Innovation: Widersprüchliche Anforderungen, verschiedene Wege und Beidhändigkeit

Innovation, die Entwicklung und Umsetzung neuer und nützlicher Ideen durch Individuen, Teams und Organisationen, ist essentiell für die Anpassung an sich verändernde Umwelt- und Marktbedingungen (Schumpeter, 1934). Die Forschung in unterschiedlichen Disziplinen und auf unterschiedlichen Analyseebenen hat in den letzen Jahrzenten eine Fülle von Wissen darüber generiert, wie Innovation entsteht und welche Faktoren Innovation fördern und behindern (Anderson, De Dreu, & Nijstad, 2004). Dieses Wissen bedarf der Integration. Das Ziel der Autoren[4] ist es, mithilfe einer dialektischen Sichtweise einen Beitrag zu einer Integration des vorhandenen Wissens zu leisten.

Die dialektische Sichtweise soll die Grenzen dichotomen Denkens überwinden und dazu beitragen, ein realitätsangemessenes Verständnis von Innovation zu entwickeln (Engels, 1940). Die Autoren entwickeln drei zentrale Überlegungen: Erstens, wird aufgezeigt, dass Innovation widersprüchliche Anforderungen an Individuen, Teams und Organisationen stellt, die im Laufe des Innovationsprozesses bewältigt werden müssen. Als zentrale Herausforderung für erfolgreiche Innovation wird die Integration unterschiedlicher und teils widersprüchlicher Aktivitäten betrachten. Die Autoren betonen, dass im Laufe des Innovationsprozesses iterativ zwischen unterschiedlichen Aktivitäten gewechselt werden muss. Zweitens wird anhand der empirischen Literatur und konkreten Beispielen aufgezeigt, dass Innovation von unterschiedlichen Ausgangsbedingungen ausgehend und auf unterschiedlichen Wegen entstehen kann. Dieser Befund stellt die Allgemeingültigkeit von

[4] Ich verwende für die vier Kapitel der Dissertation den Plural, da an dem Zustandekommen der einzelnen Artikel mehrere Personen mitgewirkt haben. Michael Frese (National University of Singapore), Neil Anderson (University of Amsterdam), Miriam Erez (Technion – Israel Institute of Technology), und James Farr (Pennsylvania State University) sind Coautoren des Kapitels über eine dialektische Sichtweise auf Innovationen. An dem Zustandekommen der empirischen Artikel haben Studenten und Kollegen mitgewirkt.

Praktiken des Innovationsmanagement in Frage, die kontextuelle Faktoren nicht berücksichtigen. Drittens wird das Konzept der Beidhändigkeit („Ambidexterity“) entwickelt. Es bezeichnet die Fähigkeit von Individuen, Teams und Organisationen die Bandbreite an notwendigen explorativen und exploitative Verhaltensweisen aufzuzeigen. Die Autoren diskutieren und kontrastieren unterschiedliche Möglichkeiten, wie Beidhändigkeit erreicht werden kann. Die in der Literatur viel diskutierte Strategie, Beidhändigkeit durch organisatorische Trennung explorativer und exploitativer Aktivitäten zu erreichen, wird kritisch hinterfragt (O'Reilly & Tushman, 2004).

Im letzten Teil des Kapitels wird die Beziehung zwischen Innovationsforschung und der Praxis des Innovationsmanagement aus einer dialektischen Perspektive beleuchtet. Es wird festgestellt, dass der gegenwärtige Stand der Forschung keine konkreten normativen Richtlinien für das Innovationsmanagement bereitstellen kann, dass aber allgemeine Prinzipien abgeleitet werden können, die in zukünftiger Forschung spezifiziert werden müssen.

# Kapitel 2

## Signaturen der Kreativität: Eine Integration von Intraindividuellen Prozessen, Persönlichkeitsdimensionen und Merkmalen der Arbeitssituation.

Aufbauend auf der Theorie der Interaktion psychischer Systeme (PSI-Theorie, Kuhl, 2001) entwickeln die Autoren Hypothesen über das Zusammenwirken von Bedingungsfaktoren bei der Entstehung von Kreativität in Arbeitskontexten. Gemäß der PSI-Theorie spielt die Dynamik von positivem und negativem Affekt die entscheidende Rolle bei der Entstehung von Kreativität. Die der Kreativität zugrundeliegenden mentalen Funktionen sind an negativen und positiven Affekt gekoppelt (George & Zhou, 2007). Negativer Affekt geht mit einem analytischen Modus der Informationsverarbeitung einher, wohingegen positiver Affekt mit intuitiven mentalen Prozessen assoziiert ist (Clore, Schwarz, & Conway, 1994). Analytische sowie intuitive mentale Prozesse sind für kreative Leistung notwendig. Daher wird argumentiert, dass kreative Leistung sowohl positiven als auch negativen Affekt benötigt und dass dem Affektwechsel eine entscheidende Rolle zukommt.

Persönlichkeitsunterschiede in der Affektregulation, die als Handlungs- oder Lageorientierung bezeichnet werden, beeinflussen unter welchen situativen Bedingungen die für Kreativität wichtigen mentalen Prozesse stattfinden können (Kuhl, 1994). In

Abhängigkeit von Handlungs- oder Lageorientierung unterscheiden sich daher die Arbeitssituationen in denen Personen kreativ sind. Unterschiedliche Muster von Arbeitssituationen, in denen Kreativität hoch oder niedrig ist, werden als Signaturen der Kreativität bezeichnet (Mischel & Shoda, 1995).

Die Hypothesen wurden in einer „experience-sampling“ Studie mit 102 Angestellten überprüft, für die Kreativität eine bedeutsame Arbeitsanforderung darstellt. Über den Zeitraum von einer Woche berichteten die Teilnehmer jeden Morgen über ihre Arbeitssituation und ihren aktuellen Zustand. Jeden Abend berichteten die Teilnehmer über ihre tagesspezifische kreative Leistung und ihr Befinden während des Arbeitstags. Die erhobenen Daten wurden mithilfe der Mehrebenen-Analyse ausgewertet.

In Übereinstimmung mit den Hypothesen zeigte sich, dass ein Wechsel von negativem zu positivem Affekt mit Kreativität assoziiert war. Weiterhin zeigte sich, dass handlungsorientierte Personen in Arbeitssituationen kreativ waren, die durch hohe Anforderungen, geringe Aufgabenstruktur und eine hohe Selbstwirksamkeitserwartung gekennzeichnet waren. Im Gegensatz dazu waren lageorientierte Personen in Arbeitssituationen kreativ, in denen die Anforderungen niedrig und die Aufgabenstruktur hoch waren, und in denen sie soziale Unterstützung erfuhren. Weiterhin waren lageorientierte Personen besonders auf den Wechsel von negativem zu positivem Affekt angewiesen.

Die Ergebnisse werden im Rahmen der allgemeinen Überlegung zu kontextueller Passung interpretiert. Kreativität kann dadurch gefördert werden, dass Arbeitssituationen so beeinflusst werden, dass sie mit Persönlichkeitsmerkmalen einer Person übereinstimmen. Eine weitere Implikation der Studie ist, dass die Regulation affektiver Zustände einen Ansatzpunkt für Maßnahmen zur Steigerung von Kreativität bietet.

# Kapitel 3

## Aktives Arbeitshandeln in Forschung und Entwicklung: Der Wert kontextueller Passung

Die Autoren argumentieren, dass dem aktiven Arbeitshandeln eine entscheidende Rolle für den Erfolg von Forschungs- und Entwicklungsprojekten zukommt, da Forschungs- und Entwicklungsprojekte durch hohe Unsicherheit und Interdependenz gekennzeichnet sind (Griffin, Neal, & Parker, 2007). Aktives Arbeitshandeln ist durch eine selbststartende, proaktive und persistente Herangehensweise an Arbeitsaufgaben gekennzeichnet (Frese &

Fay, 2001). Es wird die Hypothese entwickelt, dass aktives Arbeitshandeln durch kontextuelle Passung gefördert wird.

Aufbauend auf der Arbeit von March (1991) wird das Konzept der Explorationsorientierung auf Ebene des Individuums als Bedingungsfaktor für aktives Arbeitshandeln untersucht. Es wird davon ausgegangen, dass sich Personen hinsichtlich ihres relativen Fokus zwischen Exploration und Exploitation unterscheiden (cf. Uotila, Maula, Keil, & Zahra, 2009). Hoch explorationsorientierte Personen bevorzugen neuartige Aufgaben und ein flexibles Vorgehen, wohin wenig explorationsorientierte (d.h. exploitationsorientierte) Personen ihnen bekannte Aufgaben und ein systematisches Vorgehen bevorzugen.

Die zentrale Hypothese der Untersuchung ist, dass Personen aktives Arbeitshandeln zeigen, wenn die Art und Weise wie ein Projekt geleitet wird mit ihrer Explorationsorientierung übereinstimmt, d.h. wenn kontextuelle Passung vorliegt (Lewis, Welsh, Dehler, & Green, 2002). Im Falle eines klar strukturierten, detailliert geplanten und eng geführten Projektmanagement Stils zeigen Personen mit einer geringen Explorationsorientierung aktives Arbeitshandeln. Im Falle eines emergenten Projektmanagement Stils, der durch hohe Freiheitsgrade gekennzeichnet ist, zeigen Personen mit einer hohen Explorationsorientierung aktives Arbeitshandeln. Diese Hypothese wird aufbauend auf der Theorie der Regulatorischen Passung entwickelt, die besagt, dass Personen dann aktiv handeln, wenn die Mittel zur Zielerreichung mit ihrer motivationalen Orientierung übereinstimmt (Higgins, 2005).

Die Hypothese wird in einer Mehrebenen-Studie mit 111 Angestellten von 49 Forschungs- und Entwicklungsprojekten überprüft. In Übereinstimmung mit den Annahmen, bewerten Vorgesetzten diejenigen Mitarbeiter als hoch in aktivem Arbeitshandeln, für die kontextuelle Passung zwischen Explorationsorientierung und Projektmanagement Stil vorliegt. Praktische Implikationen für die Förderung aktiven Arbeitshandelns werden diskutiert.

# Kapitel 4

## Effektives Management bei der Implementierung von Innovationen in Teams

In diesem Kapitel gehen die Autoren der Frage nach, welche Aktivitäten von Führungskräften und Teammitgliedern zur erfolgreichen Implementierung von Innovationen beitragen. Aktives Arbeitshandeln und effektive Entscheidungsprozesse werden als zentrale

Anforderungen des Umsetzungsprozesses identifiziert (Baer & Frese, 2003; Gebert, Boerner, & Lanwehr, 2003). Die Autoren gehen davon aus, dass der Erfolg der Implementierung davon abhängt, inwiefern die Konfiguration von Aktivitäten der Führungskraft und der Teammitglieder diesen Anforderungen gerecht wird. Die Konfiguration von Aktivitäten bei der Implementierung einer spezifischen Innovation wird als Management Modus bezeichnet.

Die Autoren argumentieren, dass der Implementierungserfolg einer Innovation eine Funktion des Engagements der Führungskraft und der Teammitgliedern ist (Macey & Schneider, 2008). Außerdem wird angenommen, dass der Aufteilung von Entscheidungen im Umsetzungsprozess zwischen Führungskraft und Teammitgliedern eine Schlüsselrolle zukommt. Zwei unterschiedliche Modi der Entscheidungsfindung werden als potentiell effektiv identifiziert: Entweder kann die Führungskraft entscheiden und direktiv die Mitarbeiter anleiten oder die Mitarbeiter haben hohen Handlungsspielraum und können notwendige Entscheidungen selbst treffen (Murphy, Blyth, & Fiedler, 1992). Weiterhin wird angenommen, dass die Effektivität unterschiedlicher Management Modi von funktionalen Merkmalen eines Teams abhängt.

Als funktionale Merkmale von Teams werden der Grad an Initiative in Teams und das Ausmaß der Strukturierung durch die Führungskraft unterschieden (Baer & Frese, 2003; Keller, 2006). Es wird davon ausgegangen, dass kontextuelle Passung zwischen Management Modus und Merkmalen eines Teams die Erfolgswahrscheinlich bei der Implementierung einer Innovation erhöhen. In Teams mit hoher Initiative ist Handlungsspielraum erfolgsentscheidend. In Teams mit einer strukturierenden Führungskraft ist die aktive Rolle der Führungskraft besonders wichtig.

Die theoretischen Überlegungen werden in einem Mehrebenen-Forschungsdesign überprüft. Teammitglieder und Führungskräfte von 39 Teams wurden zu der Implementierung von 139 Innovationen befragt (e.g., Morgeson, 2005). Die Hypothesen wurden weitgehend bestätigt. Abschließend diskutieren die Autoren praktische Implikationen für die Wahl effektiver Strategien bei der Implementierung von Innovationen.

## Allgemeine Schlussfolgerung

In der allgemeinen Schlussfolgerung werden die Ergebnisse der empirischen Studien im Rahmen der These der kontextuellen Passung betrachtet. Dafür werden die einzelnen Ergebnisse als *wenn-dann* Zusammenhänge formuliert. Darauf aufbauend wird die Überlegung entwickelt, dass Individuen, Teams und Organisationen dann erfolgreiche

Innovationsprozesse aufzeigen, wenn Sie an ihren funktionalen Stärken ansetzen. So sind zum Beispiel handlungsorientierte Personen dann kreativ, wenn situative Gegebenheiten es ihnen erlauben, ihre funktionale Stärke, effektiv Handlungen zu initiieren, einzusetzen. Im Gegensatz dazu sind lageorientierte Personen dann kreativ, wenn es Sie nach einer Phase des Zögerns und Grübelns in einen positiven affektiven Zustand wechseln können. Aus diesen Überlegungen folgt für Individuen, Teams und Organisationen, dass die Kenntnis der eigenen funktionalen Stärken für Innovationserfolg bedeutsam ist. Die Übernahme von Praktiken, die nicht zu den eigenen funktionalen Stärken passen, ist hingegen kritisch zu hinterfragen.

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Gießen, den 24. November 2009

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(Ronald Bledow)