# Promise of tomorrow, profits of today: Towards a micro-foundations perspective of ambidexterity

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# Abstract

Global competition forces firms to increase efficiency to stay competitive in the short term. At the same time, ever faster innovation cycles require firms to innovate to stay relevant in the long term. These forces push firms in opposing directions: Exploring innovative opportunities requires flexibility; in contrast, efficiency and exploiting existing assets requires standardization. To ensure survival, organizations must address these contradictory forces and "engage in sufficient exploitation to ensure its current viability and (…) devote enough energy to exploration to ensure its future viability" (Levinthal & March, 1993, p. 105).

Management research into ambidexterity has recently focused on integrative solutions, which allow companies to host both exploration and exploitation within the same organization (Smith & Lewis, 2011). This relies on the capability of individual managers to autonomously combine exploration and exploitation (Gibson & Birkinshaw, 2004). However, extant research offers little insight into how this crucial capability can be developed or how and under what conditions this managerial capability leads to organizational level ambidexterity (Mom et al., 2018). Developing theory to describe the causal mechanisms ambidexterity emergence and validating this theory empirically answers multiple calls for research in large-scale reviews on the literature (Birkinshaw & Gupta, 2013; Lavie et al., 2010; Raisch et al., 2009; Raisch & Birkinshaw, 2008) and substantially develops ambidexterity theory.

Against this background my dissertation adopts a micro-foundations perspective to illuminate these research gaps. In three distinct empirical contributions, I demonstrate how the social context in an organization shapes individual capabilities, how these capabilities lead to individual ambidexterity, and, finally, how individual ambidexterity emerges as ambidexterity at higher levels of analysis. In the final chapter, I integrate these distinct perspectives into a full micro-foundations view of ambidexterity. I discuss both the theoretical contribution of the dissertation and limitations of the empirical and methodological setting. Promising avenues for future research are discussed as well as managerial implications highlighted and illustrated with practical examples.

## Zusammenfassung

Der globale Wettbewerb zwingt Unternehmen zu Effizienzsteigerungen, um kurzfristig wettbewerbsfähig zu bleiben. Gleichzeitig erfordern immer schnellere Innovationszyklen Anpassungsfähigkeit, um langfristig relevant zu bleiben. Das treibt Unternehmen in entgegengesetzte Richtungen: Die Erschliessung von Innovationschancen erfordert Agilität; Effizienz im Tagesgeschäft dagegen Standardisierung. Um das Überleben zu sichern, müssen Unternehmen diese widersprüchlichen Kräften integrieren und " genug Exploitation betreiben, um die aktuelle Wettbewerbsfähigkeit zu sichern und (…) genug Exploration betreiben, um die Zukunfsfähigkeit zu sichern" (Levinthal & March, 1993, S. 105).

Aktuelle Ambidextrieforschung konzentriert sich auf integrative Lösungen, die es Unternehmen ermöglichen, sowohl Exploration als auch Exploitation innerhalb derselben Strukturen durchzuführen (Smith & Lewis, 2011). Zentral dafür ist die Fähigkeit der einzelnen Manager, Exploration und Exploitation eigenständig zu kombinieren (Gibson & Birkinshaw, 2004). Die bisherige Forschung gibt jedoch wenig Aufschluss darüber, wie diese entscheidende Fähigkeit entwickelt werden kann oder wie und unter welchen Bedingungen sie zu Ambidextrie auf Organisationsebene führt (Mom et al., 2018). Die Entwicklung einer Theorie zur Beschreibung der kausalen Mechanismen, die zur Entstehung der Ambidexterität führen, und die Validierung dieser Theorie beantwortet mehrere Forschungsaufrufe relevanten Literaturübersichten (Birkinshaw & Gupta, 2013; Lavie et al., 2010; Raisch et al., 2009; Raisch & Birkinshaw, 2008).

Vor diesem Hintergrund nimmt meine Dissertation eine Micro-Foundations-Perspektive ein, um diese Forschungslücken zu beleuchten. In drei verschiedenen empirischen Beiträgen zeige ich auf, wie der soziale Kontext einer Organisation individuelle Fähigkeiten formt, wie diese Fähigkeiten zu individueller Ambidextrie führen und schließlich, wie individuelle Ambidextrie zu Ambidextrie auf höheren Analyseebenen führt. Im letzten Kapitel integriere ich diese verschiedenen Perspektiven in eine vollständige Micro-Foundations-Sicht der Ambidextrie. Ich diskutiere sowohl den theoretischen Beitrag der Dissertation als auch die Grenzen des empirischen und methodischen Rahmens. Vielversprechende Wege für die künftige Forschung werden diskutiert und die praktischen Implikationen aufgezeigt und mit Beispielen illustriert.

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*We have to deploy past experiences while staying focused on current execution and, at the same time, shape the future. The greatest challenge for top managers is to enable the organization to achieve the right balance between these objectives.*
(P. Brabeck [Chairman Nestlé], quoted in Raisch, 2008)

## "Innovate or Die" Revisited

Why do companies die? Companies are becoming ever more short-lived. Only 0.1% of them last 40 years, with 90% of companies ceasing to exist in the first 10 years after being founded (Stubbart & Knight, 2006). The average lifespan for S&P500 companies continues to decrease and is expected to be just 12 years by the year 2027 (Anthony, Viguerie, Schwartz & Van Landeghem, 2018). Studies estimate that residual life expectancy for them ranges from 5.8 to 14.6 years (Agarwal & Gort, 1996). These results give rise to the question of why companies, even large companies, given their experience and resources, are not able to persist for longer periods of time (cf. Stubbart & Knight, 2006).

March (1991) argues that the fundamental tension between the exploration of new business opportunities and the exploitation of existing capabilities is central to this conundrum: "The basic problem confronting an organization is to engage in sufficient exploitation to ensure its current viability and, at the same time, devote enough energy to exploration to ensure its future viability" (ibid., p. 105). Too little exploitation and a failure to consolidate costs will strain margins in today's hyper-competitive world, while too little exploration leaves companies vulnerable, particularly to disruption by more agile competitors in the wake of technological, discontinuous change.

The management literature is filled with examples of previously strong, incumbent companies, such as *Kodak* or *Nokia,* which failed to innovate their business in the face of disruptive technologies, a dynamic prominently described in *The Innovator's Dilemma* (Christensen, 1997) and *The Business Model Navigator* (Gassmann, Frankenberger & Csik, 2014). At the same time, radically innovative start-ups, such as *Tesla* or *Uber,* have struggled to translate the promise of tomorrow into the profits of today.

A particularly striking example of this dynamic, one that has been less explored in publications, is the case of *WeWork*. Started in 2010 by Israeli entrepreneur Adam Neumann, the co-working company exhibited explosive growth towards a private valuation of 47 billion United States Dollars (USD). The investment round was led by a 10 billion USD investment from SoftBank's Vision Fund, and the valuation corresponds to that of several renowned start-ups, such as *Airbnb*, *Stripe* or *SpaceX*. For their planned Initial Public Offering (IPO) in August 2019, WeWork had to file detailed records to the Security and Exchange Commission (SEC) – records that revealed billions in losses, questionable oversight (for example, Adam Neumann reportedly had the company lend him 7 million USD for private expenses) and aggressive further spending plans. In other words, the company, which was by all accounts very innovative, lacked good practices for exploitation. As investors and analysts began to dig deeper, the IPO had to be postponed several times. In the end, the absence of governance and financial discipline led to halting the IPO plan and a bail-out from the Vision Fund, and also forced Adam Neumann and his wife off the executive board. In this final deal, WeWork was valued at around 8 billion USD, which corresponds to a rather eye-watering loss of more than 80% of company value. As part of this deal, Adam Neumann reportedly received 1.7 billion USD to step down from the board and give up his voting power. [1]

## The Ambidexterity Challenge

While an overwhelming majority of senior executives would agree that being able to manage multiple strategy styles and transition between them is an important capability to develop, only a tiny minority of companies can be categorized as consistently successful at combining exploration and exploitation – as being "ambidextrous" (e.g. Reeves, Haanes & Hollingsworth, 2013). The unique challenge of ambidexterity can be explained by two interacting factors. On the one hand, exploration and exploitation generally present contradictory requirements. This makes it extremely

[1] A possible explanation for this impressive pay-out in the face of obvious malpractice lies in the political dynamic: After the postponed IPO, Neumann had two competing bail-out offers, one from JPMorgan offering 5 billion in debt, and one from Vision Fund at 10 billion in equity. If Neumann had taken the bail-out from JPMorgan and the company were later to be liquidated, as seems likely, JPMorgan would has gotten the vast majority of this liquidation, since debt would have been prioritized over the 10 billion USD in equity invested earlier by the Vision Fund. Besides the financial loss, this would have also carried a huge loss in credibility, as WeWork was the first lead-investment for the Vision Fund. Because the timing coincided with SoftBank trying to raise Vision Fund 2 and aiming for over 100 billion USD in investment capital, this provided Mr. Neumann with an enormous amount of leverage over the man behind the Vision Funds, Masayoshi Son.

hard for businesses to focus on both exploration and exploitation at the same time. If this tension causes businesses to overly focus on either exploration or exploitation, they become subject to the second factor, i.e. vicious self-reinforcing cycles. These self-reinforcing cycles gradually increase the chosen focus and make it more and more difficult to balance exploitation and exploration (Levinthal & March, 1993).

The contradictory requirements of exploration and exploitation span many dimensions of the organization but can be traced to a basic conundrum: exploration is dependent on variance-increasing activities, while exploitation requires variance-decreasing activities (cf. Benner & Tushman, 2003). This fundamental difference has wide-ranging consequences for optimizing the company in terms of leadership, organizational structure and organizational context for exploration or exploitation, respectively (cf. Raisch & Birkinshaw, 2008). Variance-decreasing organizational designs that optimize for exploitation are often contradictory to variance-increasing organizational designs that optimize for exploration.

Exploitation is increased by focusing on control-oriented organizational designs, such as employing standardization, centralization, hierarchy and bureaucracy. This allows for a very detailed control of operations, which increases the potential for efficiency gains through coordination and synergies across divisions. However, this strict control and standardization are antithetical to the freedom and flexibility needed for successful innovation that engenders future growth. Innovation, on the other hand, can be optimized for by employing more organic structures and increasing levels of autonomy and decentralization. However, change and variation brought upon by higher levels of flexibility and autonomy, in turn, hinder coordination and process optimization that are necessary for operational efficiency. Some of the contradictory requirements for businesses posed by the opposing demands of exploration versus exploitation are illustrated in figure 1:

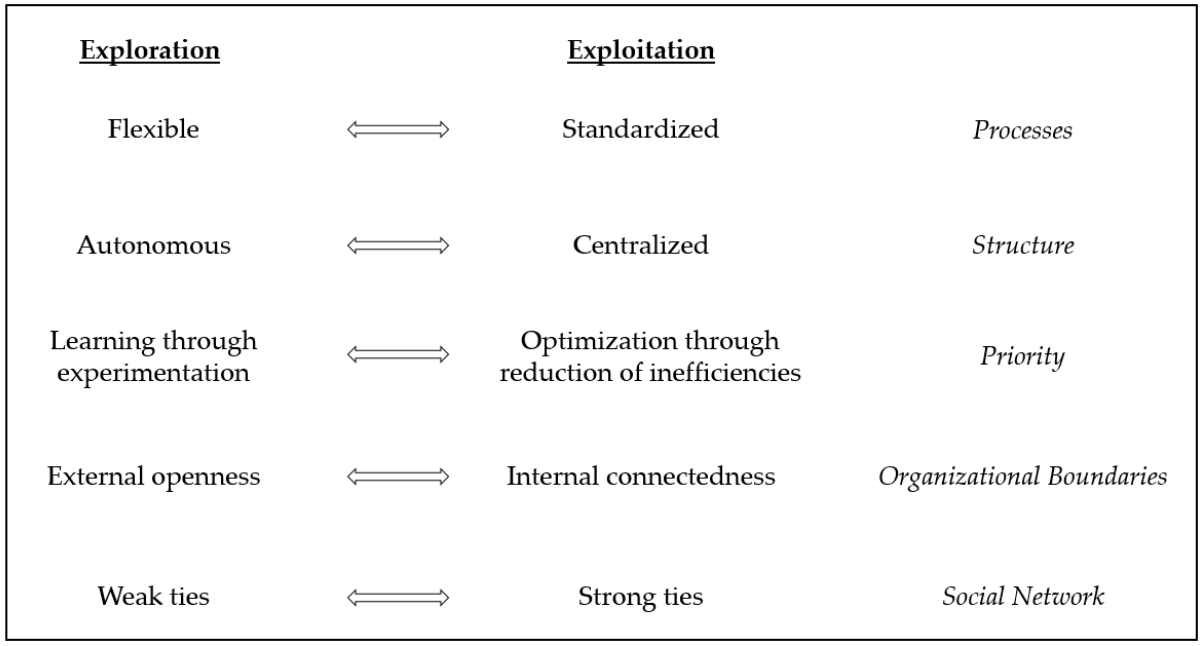


Figure 1 Contradictory requirements of exploration versus exploitation across the dimensions of process, structure, organizational priorities, organizational boundaries and social network structure.

This tension between the exploration of novel business opportunities and the exploitation of existing capabilities is aggravated by the fact that overly focusing on one aspect at the expense of the other leads to vicious, self-reinforcing cycles (O'Reilly & Tushman, 2008). Organizations that initially overemphasize exploration often lack the capabilities to succeed in the new market. In combination with the high-risk nature of exploration, this leads to a high failure rate, which prompts constant shifting between alternatives and more exploration. Or, more concisely, the more a business explores, the greater its chances of failure, and the more failure a business experiences, the more exploration and search ensues. Organizations that overemphasize exploitation, on the other hand, can get trapped by their competency. Their strong capability base for a given market leads to repetition and strongly held dominant logics, which favors more exploitation and hinders exploration. This dynamic is illustrated in figure 2:

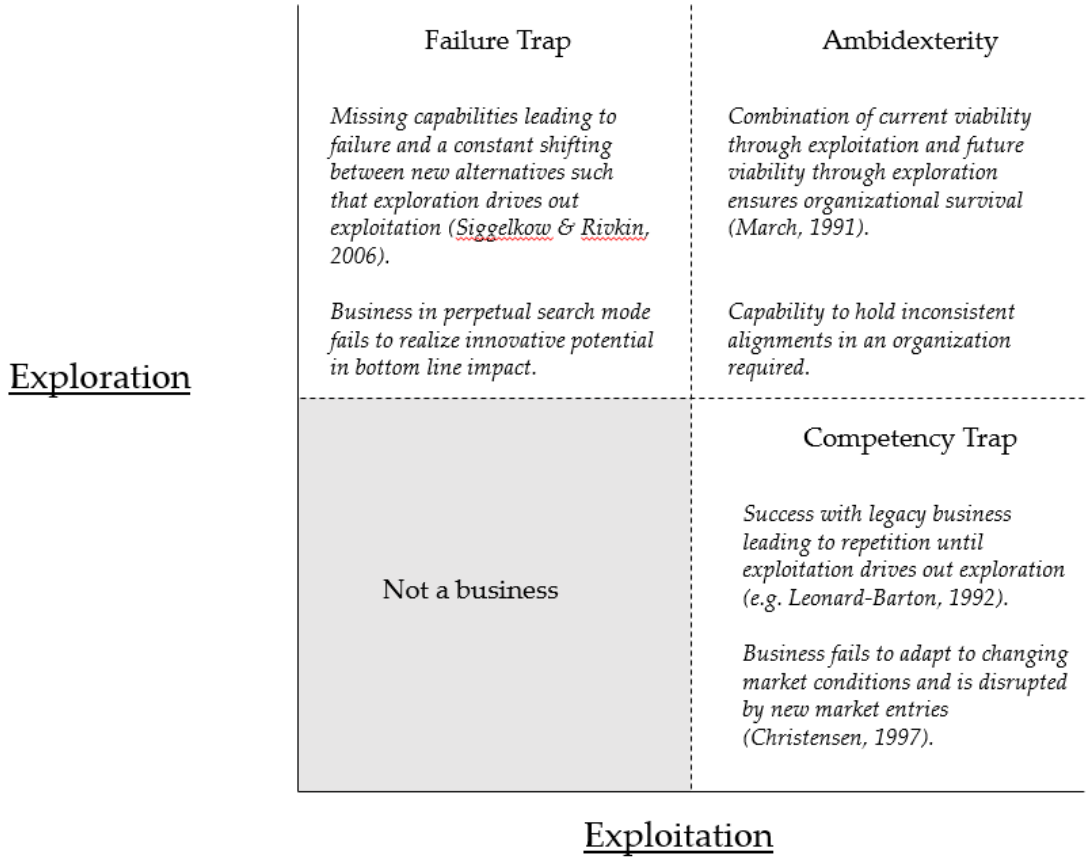


Figure 2 Exploration by exploitation orientation and its impact on organizational survival.

## Research Phases

Early organizational scholars (e.g. Tushman & Romanelli, 1985) perceived this contradiction to be insurmountable and took a contingency perspective on exploration and exploitation. Dominant research was concerned with conditions under which an organizational focus on exploration was preferable to a focus on exploitation and vice versa (Tushman & Romanelli, 1985), with a general consensus that a more dynamic market environment lent a comparative advantage to companies with a stronger relative focus on exploration.

The subsequent research phase went beyond this binary distinction and began to look at ways in which companies could reap the benefits of both exploration and exploitation, and addressed the tension between the two by suggesting that businesses separate these activities.

The most dominant approach in this regard is separation through different structures. In this way, an established company could host the exploitation activities, while exploration would take place in internal corporate ventures (Burgelman, 2002) or spin-offs (Rosenbloom & Christensen, 1994). While the structural separation allows each entity to optimize for the respective activity, and thus circumvent the paradoxical tension, links between both structures need to be established by joint strategic goals, a shared set of values and a strong senior management (Tushman & O'Reilly, 2013). A classic example of this solution is the printing company *Xerox*, which founded the *Palo Alto Research Center* (PARC) in 1970 to host its exploration activities.

Alternatively, companies can employ a temporal separation of exploration and exploitation by cycling between exploitative and explorative phases as the market environment changes (Lavie et al., 2010; Tushman & O'Reilly, 2013). This cyclicality is underscored by Boumgarden, Nickerson and Zenger (2012), who compare it with an oscillating movement between exploration and exploitation. A classic example of this approach would be *Sony Corporation*, which cycled between different organizational forms focusing on growth or profit maximization, respectively, between 1990 and 2012. Other approaches that followed the separation logic to resolve the tension suggested separation by domain or a spherical separation, but these approaches didn't get as much traction as structural or temporal separation.

The introduction of contextual ambidexterity from Gibson and Birkinshaw in the *Academy of Management Journal* (2004) can be considered a caesura in the literature. Gradually, the research focus began to shift away from approaches to avoid cross-contamination between exploration and exploitation through differentiation mechanisms, such as structural separation. Instead, research increasingly analyzed ways to engender cross-fertilization between exploration and exploitation through integration mechanisms. This can be ascribed to growing insights into potential synergies between exploration and exploitation: While exploration and exploitation compete for resources in the short-term, they are considered to be mutually reinforcing in the long-term (He & Wong, 2004). This reciprocity mostly lies on the level of organizational learning (Andriopoulos & Lewis, 2009). Exploration is necessary to create organizational knowledge to exploit. However, without exploitation, companies don't have the foundational knowledge necessary to build the absorptive capacity to integrate new knowledge and guide experimentation. Synthesis between exploration and exploitation

is mostly achieved by pushing this paradoxical tension down to the level of the individual employees and leaving them responsible for deciding how much time should be spent on alignment or adaptability (Gibson & Birkinshaw, 2004).

Contextual ambidexterity optimizes for synergies between exploration and exploitation by omitting structural barriers that impede transfer of tacit or procedural knowledge in particular. While this explains the benefit of integrating exploration and exploitation, it doesn't change the fact that they are largely contradictory. In the original formulation of contextual ambidexterity, this was solved through an organizational context that combines performance aspects such as discipline or "stretch" with social support (Gibson & Birkinshaw, 2004). The contrast between structural and contextual ambidexterity is illustrated in figure 3:

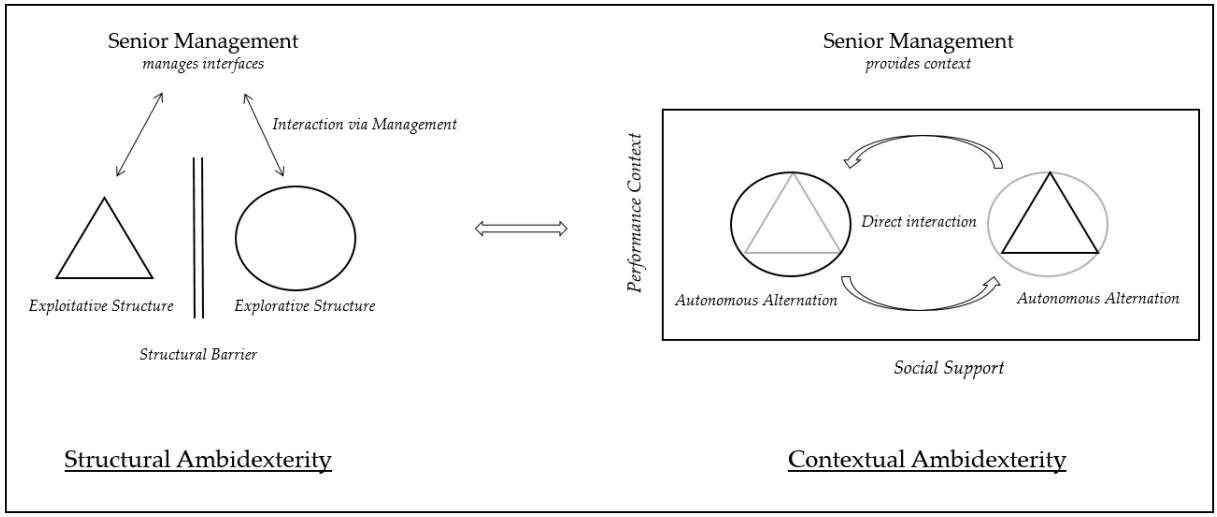


Figure 3 Structural versus contextual ambidexterity. In structural ambidexterity, exploration and exploitation are separated into bespoke units that mostly interact indirectly via the senior management, which oversees both activities. Senior managers control the interfaces, orchestrate resource transfer, and strive to provide a unifying identity through an integrative vision. In contextual ambidexterity, individual managers autonomously alternate between exploration and exploitation. In this way, there is direct interaction between exploration activities and exploitation activities within an organization. Senior management provides an organizational context characterized by both performance stretch and social support to help individual managers integrate the contradictory demands of explorative and exploitative activities.

The current research phase builds on this understanding but is strongly influenced by paradox theory (Papachroni et al., 2015). Paradox theory has emerged in the 21st century as a new theoretical framework to describe and analyze competing yet

interrelated demands, such as exploration-exploitation tensions (Lewis, 2000; Smith & Lewis, 2011).

## Paradox Theory

*The thinker without paradox is like a lover without feeling: a paltry mediocrity.*
(S. Kierkegaard)

Paradox theory draws from a rich conceptual background, from thinkers such as Aristotle, Hegel, Freud and Kierkegaard (cf. Chen, 2008; Hampden-Turner, 1981; Harris, 1996; Smith & Berg, 1987) to reflect on modern challenges posed by seemingly irreconcilable demands. Paradoxes can be differentiated from related constructs, such as tradeoffs or compromises (Lewis, Andriopoulos & Smith, 2014). Paradoxes are defined as persistent contradictions between interdependent elements (Schad et al., 2016). Compromise denotes an integration of contradictory elements through the identification of common ground between the two elements. In contrast, paradoxes are persistent and cannot be integrated. Tradeoffs denote competing alternatives, which respectively possess pros and cons that have to be evaluated before one alternative is chosen. In contrast, it is not possible to decide on one pole of a paradox because each pole is logically dependent on its counter pole also being present.

The operation in paradoxical logic is especially challenging for Western thinkers (Keller et al., 2017). Trying to understand even artificial paradoxes, such as the Cretan Epimenides stating that "all Cretans are liars", in terms of truth or falsehood or computational "one and zero" creates self-referential, regressive loops. If Epimenides is stating the truth he is lying, and if he is lying, he is stating the truth. This caricatures the practice of adjudicating competing systems of true or false statements, which are linkable in Boolean logic. This practice, however, is central to the Socratic dialogue method and to Aristotle's formal logic (Ford & Ford, 1994), which in turn are arguably the basis for much of the modern Western scientific method (cf. Schad et al., 2016). In contrast, Eastern traditions, such as Buddhist, Taoist and Hindu teachings, consider the tension between paradoxical elements, such as truth and falsehood, to be fluid, interdependent and natural (Chen, 2002; Peng & Nisbett, 1999). Hence, paradoxes cannot and should not be resolved, but rather embraced and transcended (Capra, 1975).

In this framework, the choice between competing demands from contingency theory is replaced by the insight that these demands are often interrelated in a persistent relationship over time. For example, exploration creates the necessary foundation to exploit, whereas exploitation creates the necessary resources to fund exploration. Against this background, choosing between the two competing demands is impossible. If today's long-term is tomorrow's short-term, focusing on one of the two necessitates preserving the other. Instead, a balance or dynamic equilibrium (Smith & Lewis, 2011) between the opposing poles of the paradox is required in order to create long-term viability. This, in turn, requires a paradigm shift away from strategic choices between alternatives towards embracing the unity of opposites.

Since its early roots (Lewis, 2000) paradox theory and paradox scholars have converged on some of the basic building blocks of theory development, i.e. the what, how, why and the who, when and where of paradoxes (cf. Whetten, 1989). Paradoxical tensions are defined as "persistent contradictions between interdependent elements" (Schad et al., 2016, p. 6). They can generally be categorized in four types: paradoxical tensions, i.e. learning (exploration vs. exploitation); performing (social vs. financial), belonging (individual vs. collective); and organizing (control vs. flexibility) (Smith & Lewis, 2011, regarding the "*what"*). As outlined above, managing paradoxes does not mean choosing between alternatives, but rather working through the tension in a dynamic iteration between both poles, using mechanisms of differentiation and integration (Lüscher & Lewis, 2008; Smith & Lewis, 2011; Smith & Tushman, 2005; regarding the "*how"*). Choosing or over-emphasizing one side of the paradox only fuels vicious reinforcing cycles (Tsoukas & Cunha, 2017) and ultimately spurs organizational decline (Sundaramurthy & Lewis, 2003; regarding the "*why"*). Paradoxes become salient under conditions of complexity, scarcity and plurality (Smith & Lewis, 2011). Individuals differ in their capacity to recognize and their comfort in engaging with paradoxical tensions (Miron-Spektor et al., 2018; regarding the "*who, when and where"*). The central elements of paradox theory are illustrated in figure 4:

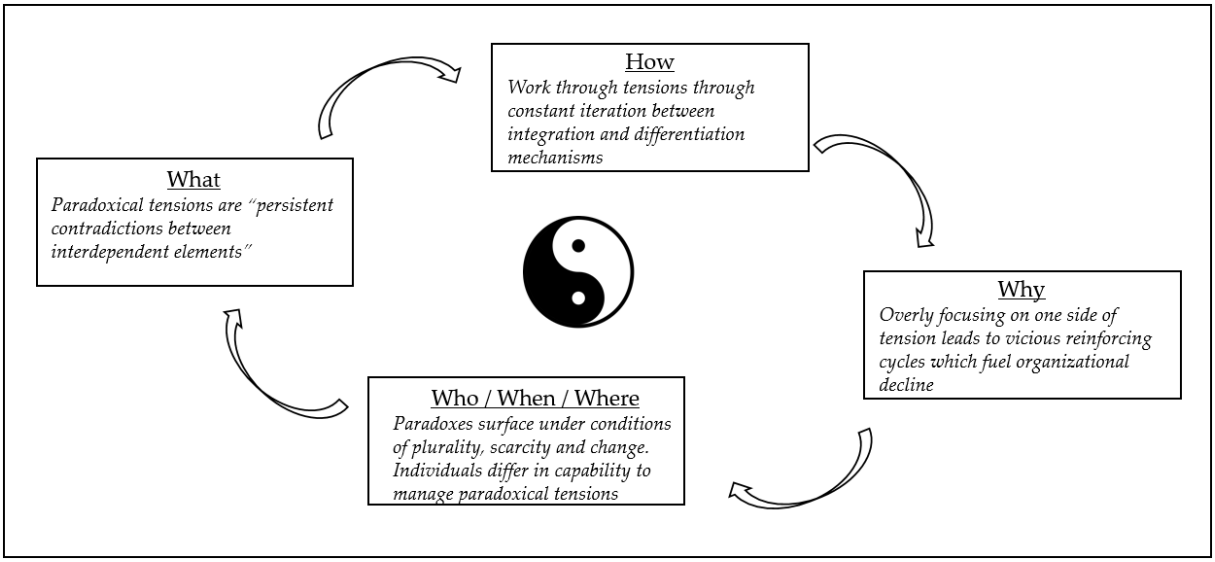


Figure 4 Central building blocks of paradox theory.

The application of a paradox theory perspective to ambidexterity research yields several interesting implications for the literature. To illustrate this, I will briefly discuss the paradigm shift regarding the value of tensions instigated by paradox literature.

The tension between exploration and exploitation is largely perceived as something negative in classic ambidexterity literature. While the potential for cross-fertilization between the two activities is acknowledged (Andriopoulos & Lewis, 2009), the tension between them, and thus the danger of cross-contamination, is largely conceptualized as independent from the potential for cross-fertilization. Dominant ambidexterity solutions, both in structural and contextual approaches, thus try to engender cross-fertilization while minimizing experienced tensions and cross-contamination. In contrast, the paradox framework conceptualizes cross-fertilization and cross-contamination as two sides of the same coin. Tensions "both hamper *and* encourage organizational development" (Lewis, 2000, p. 760). Experiencing and addressing the paradoxical tension is necessary to achieve adaptive outcomes: "Staying with the paradox makes it possible to discover a link between opposing forces and opens up the framework that gives meaning to apparent contradictions" (Vince & Boussine, 1996, p. 4). This value and the necessity of tension can be illustrated by Rothenberg's (1979) analysis of the creative cognitive processes of artistic and scholarly geniuses: "In an apparent defiance of logic or of physical possibility, the creative person consciously formulates the simultaneous operation of antithetical elements and develops those into integrated entities and creations. It is a leap that transcends ordinary logic." (p. 55). For example, in his theory of special relativity, Einstein (1905) juxtaposed how an object

can be simultaneously in motion and at rest, depending on the physical frame of reference. On a more systematic note, individual level research has demonstrated that paradoxical tensions can engender individual creativity and adaptation (e.g. Miron-Spektor, Gino & Argote, 2011). However, this adaptive potential can only be realized to the degree the actual tension is experienced (Leung et al., 2018). In conclusion, efforts to minimize the experienced tension between exploration and exploitation, either through structural separation or a supportive organizational context, run counter to a central proposition of paradox theory. Instead, the tension between exploration and exploitation should be embraced and confronted in order to create adaptive outcomes (Lewis, 2000).

In a practical example, Luscher and Lewis (2008) conducted action research at a turnaround project at the *Lego* company to demonstrate how managers work through paradoxical tensions. In the study, the researchers conducted sparring sessions with the managers, which highlighted the paradoxical tension until a workable certainty was reached. This workable certainty both allowed action towards both / and solutions as well as highlighting the paradoxical tension, which in turn engendered recursive cycles of sense-making even as the paradoxical tension was engaged. Notice how this approach differs from the classic approach in contextual ambidexterity: Even though individual employees engaged in both exploration and exploitation in contextual ambidexterity, there is no link between the two activities. Instead, individuals exclusively focused on either exploration or exploitation at a given point in time (Laureiro-Martinez et al., 2015?). In this way, the goal is very much to both explore and exploit while minimizing the experienced paradoxical tension (cf. Gibson & Birkinshaw, 2004). In contextual ambidexterity, individuals do not *both* explore *and* exploit but *either* explore *or* exploit at any given point in time.

An interesting application of the paradox framework in the ambidexterity literature is described in Raisch and Zimmermann (2017). As paradox literature describes exploration-exploitation tensions as persistent over time, the rather static approach in much of the ambidexterity literature can be criticized (Zimmerman, Raisch & Birkinshaw, 2015). Accordingly, the authors use paradox theory as a vantage point to illuminate the processual dynamics behind different approaches to ambidexterity (Raisch & Zimmermann, 2017).

In their analysis, the authors conceptualize the ambidexterity process as consisting of three different stages. In the first stage, initiation, the paradox becomes salient and a plan for addressing the paradox is devised. The second stage, contextualization, describes the development of the appropriate design elements, such as structures, processes and culture, to manage the identified tension. In the final stage, implementation, organizations routinize their work through the paradox.

Interestingly, the three phases of the ambidexterity process follow a path-dependent logic depending on the ambidexterity form.

Structural ambidexterity requires fairly invasive changes to the organizational structure, as dedicated explorative units must be formed and subsidized from the exploitative core business. Thus, initiation usually flows from the senior management in a top-down manner into the organization, as only the top management tends to possess the political clout to make these changes happen (cf. O'Reilly & Tushman, 2008). Usually, initiation also stems from external pressure, such as a discontinuous shift in the market or technology (O'Reilly & Tushman, 1996, 2004).

In the contextualization stage, structurally separated units dedicated to exploration and exploitation, respectively, are formed, while some measure of integration is achieved through the senior leadership and a common vision to demonstrate how explorative and exploitative activities fit together (O'Reilly & Tushman, 2008).

Accordingly, coordination between explorative and exploitative units is the major challenge in the implementation phase. This is achieved through integration activities from the senior management, which in turn is based on their ability to think paradoxically (Smith & Lewis, 2011; Smith & Tushman, 2005). In addition, targeted lateral coordination between explorative and exploitative units complements these activities from the senior leadership (Jansen et al., 2009).

In contrast, contextual ambidexterity can also be triggered in a bottom-up way from the middle management (Zimmermann et al., 2015). For example, interdisciplinary teams that build a common identity may realize the potential in combining and exploiting their diverse competencies in order to explore new opportunities (ibid.). This also represents an internal trigger, as opposed to an external threat. However, contextual

ambidexterity can also be initiated by senior management in response to external, discontinuous change (e.g. Birkinshaw, Zimmermann & Raisch, 2016).

In the contextualization stage, developing an informal organizational context and culture that allows individual employees to both explore and exploit is the foremost organizational design element to address the paradoxical tension. Thus, middle managers again fulfill a central role, as they have large sway over the informal context in their respective business units (Birkinshaw et al., 2016).

Finally, the implementation stage is dependent on an individual's ability to combine exploration and exploitation. This is both dependent on aspects of the social network (Jansen et al., 2006; Mom et al., 2007; Rogan & Mors, 2014) and individual level capabilities (e.g. Tempelaar & Kauppila, 2016).

Sequential ambidexterity is typically initiated from the top management or even the owner (Birkinshaw et al., 2016). This is due to the fact that the reorientation of the entire organization from a focus on exploration to a focus on exploitation requires an even more invasive change process than the introduction of dedicated explorative units. Interestingly, shifts between exploration and exploitation are usually independent of external changes, but rather result from internal over-emphasis of one pole (Boumgarden et al., 2012).

Contextualization of sequential ambidexterity consequently depends on a thorough change process of "formal structures and routines, practices and procedures, styles and systems of reward and control and resource allocation" (Simsek et al., 2009, p. 882). Typically, the major change process is from a focus of centralization (i.e. exploitation) towards decentralization (i.e. exploration) and vice versa (Boumgarden et al., 2012).

In the implementation phase, leaders have to actively manage role conflicts instigated by the invasive change process (Floyd & Lane, 2000). However, if role conflicts are combined with a strong common identity in the organization, they can also be productive for switching between exploration and exploitation (Birkinshaw et al., 2016; Probst & Raisch, 2005).

All of the described ambidexterity processes exhibit strong path-dependent tendencies (Raisch & Zimmermann, 2017): The way a paradox surfaces affects the

strategy used to deal with it, which in turn affects organizational design changes and, ultimately, implementation challenges during daily activities. However, as transformational challenges in an environment change, an adaptation in the ambidexterity approach might become necessary (cf. Zimmermann & Birkinshaw, 2016). This requires path-breaking activities. A practical example for this is described in Birkinshaw and colleagues (2016) in the case of a pharmaceutical company, which shifted from a structural approach to a contextual approach towards ambidexterity.

The research by Raisch and Zimmermann (2017) demonstrates the impact of paradox theory on the ambidexterity literature. As paradoxes are persistent over time, static accounts of ambidexterity fail to account for the temporal dynamic of encountering a paradox, devising a strategy for dealing with it, and working through the tension in the daily work. In addition, paradox theory also suggests that actors can become locked in their respective approaches to dealing with paradoxical tensions (Lewis, 2000). The path-dependent logic of ambidexterity approaches and the need for path-breaking activities demonstrates this paradoxical dynamic in action.

An overview of the development of ambidexterity research and the dominant paradigms of each phase is given in figure 5:

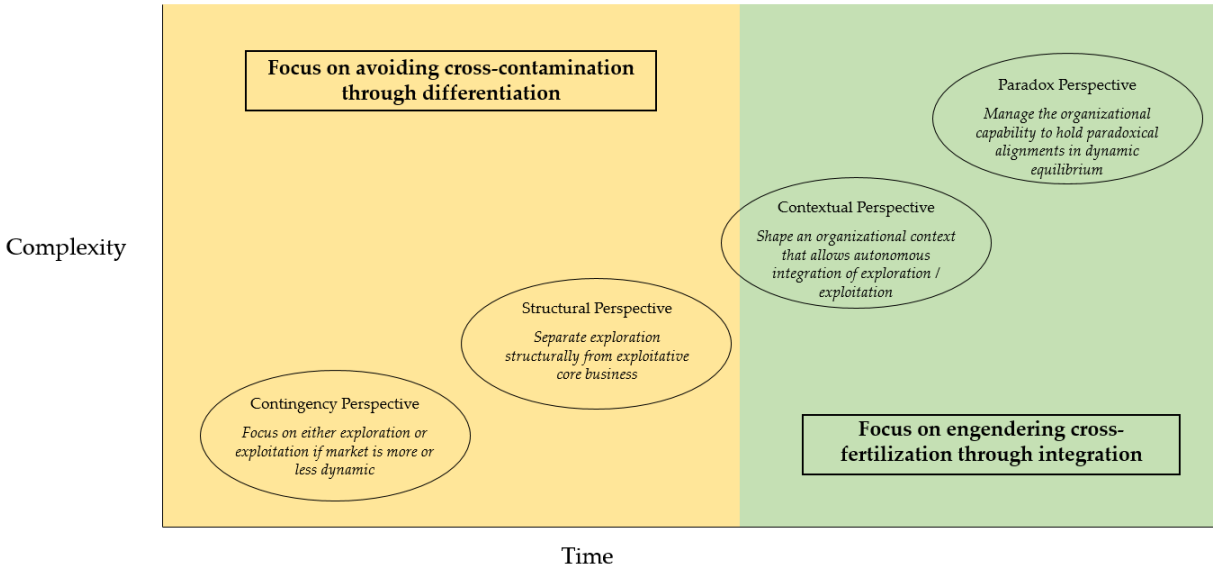


Figure 5 The four seasons of ambidexterity research. Over time, research paradigms have increased in complexity, i.e. multipolarity of strategic goals studied. Gradually research focus has shifted from avoiding cross-contamination through differentiation mechanism.

## Research Gaps and the Dissertation's Research Question

While ambidexterity research arguably has come a long way, central gaps remain in our understanding. In contextual ambidexterity, there is no structural or temporal separation between exploration and exploitation, which would shield individual employees from experiencing this tension. As outlined above, the paradox framework even implies that any attempt to ease this tension might be counterproductive. In this way, integrative approaches to ambidexterity place the burden of the ambidexterity challenge on the individual employees. Accordingly, *individual managerial capability* is to be considered a major success factor for organizational ambidexterity (Birkinshaw & Gupta, 2013): "Ambidexterity is rooted in an individual's ability to explore and exploit" (Raisch, Birkinshaw, Probst & Tushman, 2009).

In light of this central role of individual managerial capability, we have precious little insight into either the determinants of this individual level capability or the process through which it emerges as ambidexterity at higher levels of analysis.

"If we are to really make progress on how ambidexterity is achieved, we need much more insight into the nature of managerial capability (…) This is one of the areas where ambidexterity research has the most potential" (Birkinshaw & Gupta, 2013, p. 293). Even though the concept of managerial capability is central to our understanding of ambidexterity, theory about antecedents of this capability is underspecified. Tempelaar and Kauppila bemoan an "incomplete understanding of how an organization's members can deal with contradictory demands and integrate exploration and exploitation" (2016, p. 1020), Rogan and Mors claim that "our understanding of the microfoundations of ambidexterity – the individual managerial behaviors that underlie the ability to both explore and exploit – remains underdeveloped" (2014, p. 1860), and Mom, Fourné and Jansen point out that "current insights lack a thorough understanding about when managers need to act ambidextrously and how they actually may be able to do so" (2015, p. 134).

Emergence mechanisms of ambidexterity are a connected and even more central gap in our understanding of ambidexterity. As pointed out above, our current understanding of ambidexterity focuses on the central role of the capability of individual managers to integrate the paradoxical tension between exploration and exploitation (Raisch et al., 2009): "Ambidexterity (…) is best achieved not through structural, task

or temporal separation, but by building a business-unit context that encourages *individuals* [emphasis added] to make their own judgements as to how to best divide their time between the conflicting demands for alignment and adaptability" (Gibson & Birkinshaw, 2004, p. 211). This implies some hitherto not specified process of upward contribution from individual level ambidexterity to higher level ambidexterity: Ambidexterity as a characteristic of the business unit "*manifests itself* [emphasis added] in the specific actions of individuals throughout the organization" (ibid.).

We know that this process is not only crucial for ambidexterity but that it's also complex, since "organizational ambidexterity is different from the sum of its members' personal ambidexterity" (Raisch et al., 2009, p. 688). Virtually every large-scale review of the ambidexterity literature picked up on this underspecification of theory and called for cross-level research on ambidexterity (Birkinshaw & Gupta, 2013; Lavie et al., 2010; Raisch et al., 2009; Raisch & Birkinshaw, 2008) to answer critical research questions, such as, "How do individual factors affect organizational ambidexterity? What are the similarities, contradictions and interrelations between an individual's, a group's and an organization's activities that affect ambidexterity? How are efforts synchronized and managed across levels?" (Raisch, Birkinshaw, Probst & Tushman, 2009, p. 693). Still, this process of emergence has not been described in the literature (Mom, Chang, Cholakova & Jansen, 2019).

Against this background, my dissertation aims to fill the outlined research gaps and asks:

*RQ: How does individual level ambidexterity develop and emerge as ambidexterity at higher levels of analysis?*

## Theoretical Model of the Dissertation: Towards a Micro-Foundations Perspective on Ambidexterity

*The ships hung in the sky in much the same way that bricks don't.*
(D. Adams, *Hitchhiker's Guide to the Galaxy*)

In attempting to address this overarching research question, my dissertation adopts a micro-foundations perspective on ambidexterity. The micro-foundations perspective, which has gaining prevalence since the mid-2000s (Felin & Foss, 2005,

2006), adopts a position of methodological individualism to explain organizational phenomena. In order to illustrate its central propositions, consider figure 6 after the framework from James Coleman (1990).

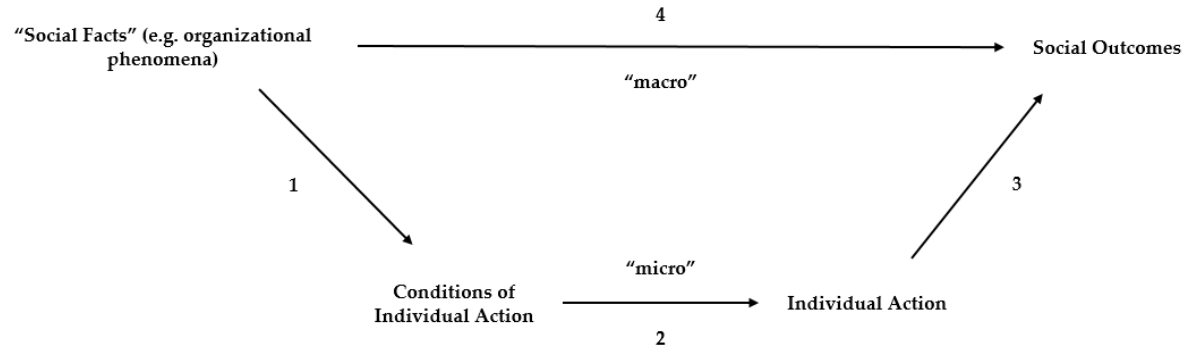


Figure 6: A general model of social science explanation after Coleman (1990).

Like most explanandums in management science, ambidexterity lies on the macro level and thus on the upper right of the figure. Early research phases typically also use explanans on the macro level, depicted on the upper left of the figure. In the most basic formulation, the explanans is directly related to the explanandum, as depicted by arrow 4: Some organizational construct, such as structural separation, leads to the organizational outcome of ambidexterity. This approach treats organizational phenomena as Durkheimian social facts to explain social facts (Durkheim, 1962). This can be valid as a shorthand explanation if the reduction to its constituent micro-level processes yield marginal additional explanatory value.

In an ontological sense, however, "there are no conceivable causal mechanisms in the social world that operate solely on a macro-level" (Abbell, Felin & Foss, 2008, p. 491). Since macro-level entities, such as organizations, possess no capability or disposition to act (Cartwright, 1989), specifying theory in terms of macro-level associations leads to an infinite regress: Without the capacity for intentional action, organizational phenomena can only be "explained" by prior organizational phenomena ad infinitum: "Firms tend to do what they have done before" (Kogut & Zander, 1995, p. 425). Individual actors, in contrast, offer intentionality, which allows for causal interpunctuation in theorizing: Since intentional action is by definition not regressive to prior conditions, it differentiates action from reaction, cause from effect, and thus escapes the ontological regress.

Besides the ontological regressiveness of methodological collectivism, the micro-foundations perspective also raises a normative challenge. After all, management science claims the identification of managerially useful theoretical insights as the raison d'être (Rumelt et al., 1991). Thus, it should be concerned with explaining purposeful rather than historic and / or evolutionary heterogeneity. In the absence of a credible agens, there is no *actionable* theoretical insight to be gained.

In contrast to this approach, the micro-foundations perspective builds on methodological individualism. The basic proposition of methodological individualism is that the explanation of organizational phenomena must be based on individual level action and interactions (cf. Ullmann-Margalit, 1977; Elster, 1989; Coleman, 1990; Boudon, 1998). As Felin and Foss put it: "Inherently, without individuals there is no collective" (2005, p. 448). If organizational phenomena are always emergent from individual behavior, theory that does not explicitly address these individual behaviors will necessarily be reifying hypothetical constructs and remain underspecified. From the perspective of methodological individualism, any apparent relationship between organizational level phenomena is in fact mediated by individual level behavior. These individual level causal antecedents of organizational level explanandums, such as ambidexterity, are termed their micro-foundations.

In order to illustrate the difference between the two perspectives, consider the example of the original formulation of contextual ambidexterity (Gibson & Birkinshaw, 2004): An organizational context characterized by a combination of performance elements and social elements leads to organizational ambidexterity. This explanation of an organizational phenomenon by temporally antecedent organizational phenomena is an example of macro-level theorizing, as depicted in arrow 4 in figure 6. This pure macro-perspective is short on theoretical details: How does organizational context produce organizational ambidexterity? From a micro-foundations perspective, organizational context does not, in fact, produce a dynamic equilibrium between the exploration of new knowledge and the exploitation of existing knowledge eo ipso. Rather, the organizational context influences individual level variables, such as trust, self-efficacy, motivation and empowerment. This represents an effect of an organizational-level phenomenon on conditions of individual action, as depicted in arrow 1 in figure 6. These variables in turn affect individual level ambidextrous behavior. This effect of the conditions of individual action on individual action

corresponds to arrow 2 in figure 6. As individual ambidextrous behavior is changed, the emergent ambidexterity of the organization consequentially adapts. In figure 6, this emergence from individual action to a new organizational phenomenon is represented by arrow 3. This more complex perspective is theoretically richer: It answers how and why organizational context influences organizational ambidexterity, which was not possible on the pure macro level. Accounting for this how and why is theoretically useful insofar as it allows us to extrapolate the identified mechanism from the concrete empirical context into related, but previously unobserved, contexts. In other words, the understanding of how and why transforms a data point into a theoretically meaningful insight.

As can be inferred from this brief profile of the micro-foundations view, it is a perfect overarching theoretical perspective from which to answer my research question. The general arguments outlined above are, in my view, valid for the phenomenon of organizational ambidexterity overall. In addition to that, the specific research gaps I've identified concern the development of individual ambidexterity as a micro-foundation of organizational ambidexterity (i.e. arrows 1 and 2), as well as the process of emergence linking the two (i.e. arrow 3). By adopting a micro-foundations perspective, my dissertation thus dives deeper into the causal mechanisms – the "cogs and wheels" (Elster, 1989, p. 3) of organizational ambidexterity development.

## Structure of the Dissertation and Research Model

The overarching research question of my dissertation will be answered in three empirical contributions in the following chapters. The final chapter will discuss the joint implications of the dissertation for research and practice, as well as provide an outlook into the further development of the field.

Chapter two looks at the first part of a micro-foundational view of ambidexterity: How does the organizational context change individual level variables, i.e. arrow 1, and how do these changed individual level variables lead to increased individual ambidexterity, i.e. arrow 2? I analyze this process building on Social Cognitive Theory (Bandura, 1989). Social Cognitive Theory is a particularly fitting lens to understand the situated psychology of ambidexterity. As a theory of self-regulated, autonomous and agentic behavior (Bandura, 2001), Social Cognitive Theory describes precisely the type

of behavior necessary for individual ambidexterity (cf. Gibson & Birkinshaw, 2004). In Social Cognitive Theory, the individual cognitive basis for agentic behavior lies in self-efficacy, which is in turn shaped and modulated by social cues from the environment. Building on Social Cognitive Theory (e.g. Lent, Brown & Hackett, 1998), I differentiate between proximal social factors, i.e. leadership from the direct supervisor, and distal social context, i.e. perceptions of organizational climate. I demonstrate how the interaction between proximal and distal social context influences the individual cognitive underpinnings of agentic behavior, which corresponds to arrow 1, and how these cognitive underpinnings, in turn, determine expressed individual ambidexterity, which corresponds to arrow 2. Building on primary data from 245 employees of a large Central European company, I find strong empirical support for my theoretical model. Through the work in chapter two, I contribute to a larger research gap in the literature on ambidexterity concerning how individual factors and social context interact to explain individual ambidexterity (Tempelaar & Rosenkranz, 2019). Together with chapter three, which has a more detailed individual level focus, I also provide a thorough account of the development of individual ambidexterity through the additional analysis of the social context.

Chapter three builds on this understanding but takes a much more detailed psychological deep dive into the development of individual ambidexterity, i.e. arrow 2. Much less is known about the individual level processes governing individual ambidexterity than about its more macro-level antecedents (Schad et al., 2016). Specifically, the proclivity and ability for paradoxical thinking is a crucial requirement for managers in order to affect their organization's ambidexterity (e.g. Smith & Tushman, 2005). Interindividual differences in this capability can be described as "paradox mindset" (Miron-Spektor et al., 2018). In chapter three, I build on an integrative analysis of paradox theory and psychological mindset theory to explain how paradox mindset can be developed in individuals. I differentiate between the meta-cognitive and affective aspects of paradox mindset and consequentially delineate informational and motivational influences on paradox mindset. In addition, I demonstrate the recursive cycles between the expression of ambidextrous behavior and ambidextrous capabilities over time (cf. Raisch et al., 2018). Building upon primary data from 199 employees from two Central European companies, I find strong support for my theoretical model. Through the article, I not only contribute to outstanding calls for research on the micro-foundations of individual paradoxical thinking (Schad et al.,

2016) but also lay an important foundation for the overarching research question of the dissertation. A thorough understanding of the psychological process of how the central capability of paradox mindset is developed in individuals is the basis for a valid description of "how individual ambidexterity develops". This description in turn is a crucial aspect for a true micro-foundational perspective on ambidexterity.

Chapter four tackles the second part of my research question. Individual ambidexterity is the most prominent micro-foundation of contextual and paradoxical formulations of ambidexterity. However, the process through which this individual ambidexterity emerges as ambidexterity at higher levels, i.e. arrow 3, has not been described. Micro-foundation scholars typically rely on "invisible hand" explanations (Ullmann-Margalit, 1977) to theorize about the process of emergence that links individual level antecedents to organizational phenomena. Invisible hand explanations attempt to explain well-structured patterns on the macro level as the unintentional emergent result of interdependent actions by individual agents. With Hayek (1952), emergent phenomena are the result of human action, but not of human design. In order to describe this process in the context of ambidexterity, I build on an integrative analysis of multilevel theory and a process perspective of ambidexterity. I propose a contingent dual process model of emergence, ranging from pure emergence based on homogeneity (composition) to pure emergence based on heterogeneity (compilation). Using primary data from 58 teams from a large Central European Company, I find strong support for the theoretical model. In describing the process of ambidexterity emergence for the first time, I respond not only to multiple calls for cross-level research in ambidexterity (e.g. Birkinshaw & Gupta, 2013; Raisch et al., 2009), but also to the overarching research question of this dissertation of how "individual ambidexterity (…) emerges as ambidexterity at higher levels of analysis".

Together, the three empirical contributions present my approach to a micro-foundations view of ambidexterity, as illustrated in figure 7:

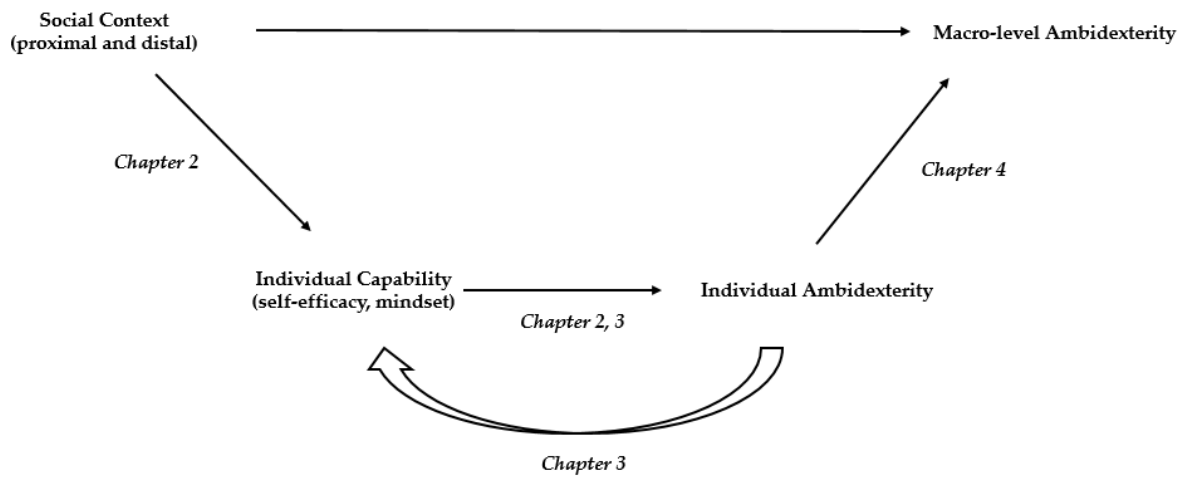


Figure 7: Research model of my dissertation

Finally, chapter five integrates the individual contributions from chapters two, three and four and outlines this thesis‘ integrated answer to the overarching research question. Based on a detailed understanding of the social-cognitive underpinnings of individual ambidexterity (chapter 2), the individual level recursive development processes between individual ambidextrous capability and individual ambidexterity (chapter 3), and the emergence process from individual ambidexterity into ambidexterity at higher levels of analysis, I can describe the lifecycle of ambidexterity development from a micro-foundations perspective. Additionally, I outline some thoughts on the further development of the field of ambidexterity research. Finally, I provide additional concrete illustrations of the managerial impact of this dissertation.

The structure of the dissertation is illustrated in figure 8.

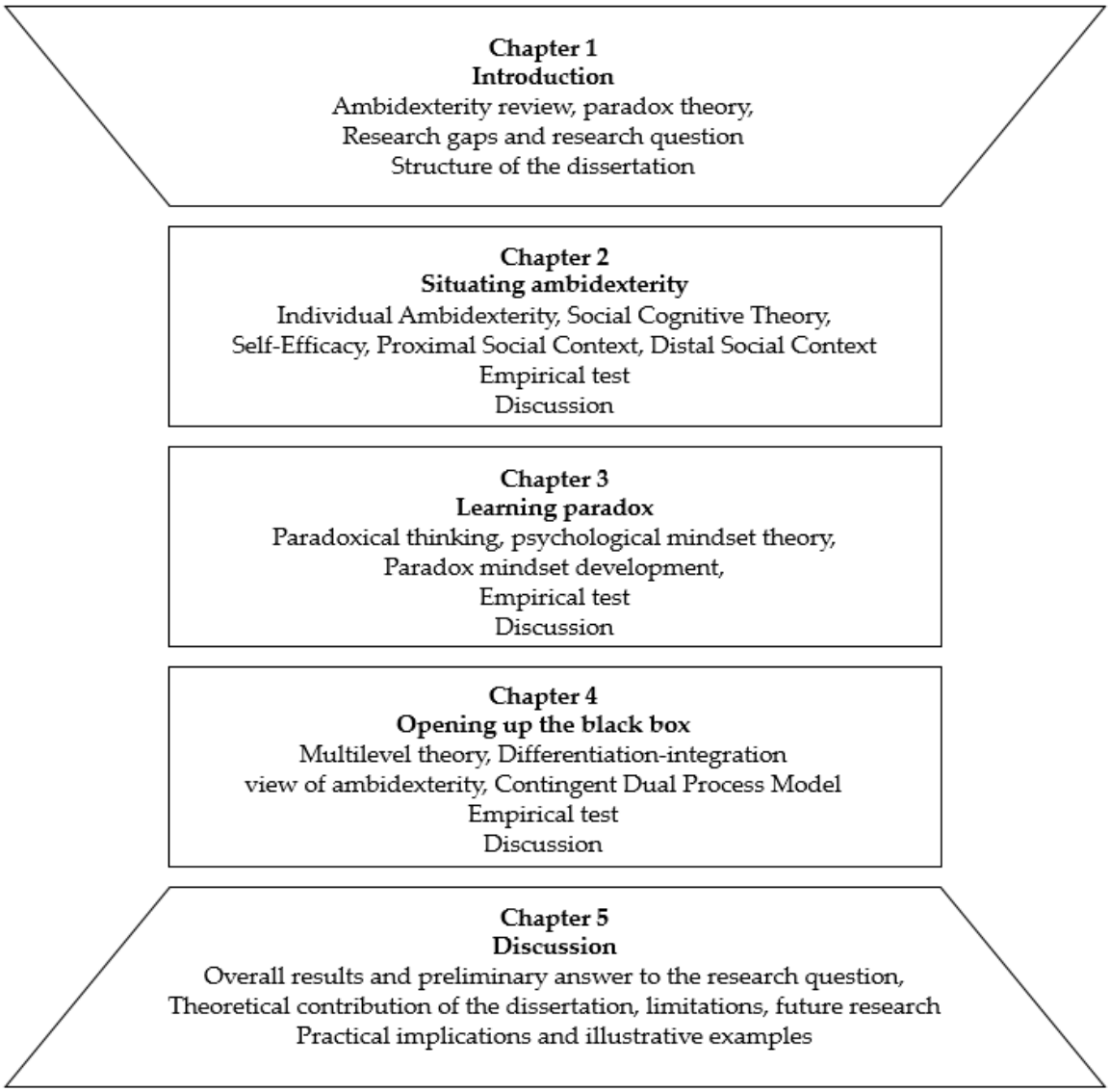


Figure 8:Structure of the dissertation

This dissertation contains material from working papers that have been presented in earlier stages at scientific conferences. Specifically, chapters two, three and four, respectively, build on the following working papers:

- Boemelburg, R. & Palmie, M. (2018). More than the sum of its parts: Bridging organizational context and individual level cognition to explain individual ambidexterity. *Presented at the Annual Meeting of the Strategic Management Society*, Paris.
- Boemelburg, R., Zimmermann, A. & Palmie, M. (2019). Learning paradox: Antecedents and mechanisms of paradox mindset development. *Presented at the Annual Meeting of the Strategic Management Society*, Minneapolis, MN.

- Boemelburg, R., Jansen, J.P. & Palmie, M. (2019). Opening up the black box: A contingent dual-process model of ambidexterity emergence. *Proceedings of the Academy of Management*, Boston, MA.

I hereby declare that most of the content of the abovementioned manuscripts has been written by myself. Of course, my co-authors contributed substantially to these manuscripts with their feedback, reviews, edits and changes. Accordingly, parts of this dissertation can bear strong resemblance or correspond literally to my own previous work.

## Methodological Approach

As outlined above, my dissertation follows a deductive, theory-driven approach. Specifically, I adopt a micro-foundations perspective and build on well-developed psychological theory in order to explicate the individual level and social processes behind the development of unit-level ambidexterity. Mechanically, my contribution to the ambidexterity literature thus rests on introducing new relationships between established constructs from the psychology literature and the ambidexterity literature. Accordingly, I adopt a quantitative approach.

The statistical core of my analyses in chapters two, three and four is in conditional process analysis (Hayes, 2018). Conditional process analysis is a well-established statistical procedure (e.g. Edwards & Lambert, 2007; Fairchild & MacKinnon, 2009; Hayes, 2015; Muller et al., 2005; Preacher et al., 2007) particularly suited to analyzing causal mechanisms and contingencies. Since it is mostly adopted in psychological and organizational behavior research, and thus might be unfamiliar to some readers with a background in macro-level research, I will quickly outline a basic description of its methodological properties.

Conditional process analysis estimates the dependent variable using ordinary least square regression (OLS). Accordingly, a linear relationship between the predictor variables and the dependent variable is fitted against the least squares criterion, thereby minimizing the squared residuals between the predicted and observed values of the dependent variable. In conditional process analysis, OLS regression is used to establish two specific types of relationships: Mediation and Moderation.

A mediation links a putative cause, i.e. the independent variable, to a presumed effect, i.e. the dependent variable, at least in part via an intermediary variable, i.e. the

mediator. In this way, the intermediary variable represents a causal mechanism that explains the effect the independent variable has on the dependent variable. Thus, mediation allows us to understand the process through which the independent variable affects the dependent variable.

Note that the mediator has to be causally located between the independent and dependent variables for the mediation analysis to be valid. This causal order cannot be established statistically in conditional process analysis (or arguably at all), but must be conceptually derived from theory or implemented in the study design and data collection.

Mediation analysis establishes OLS regression relationships between the independent variable and the mediator (a-path), the mediator and the dependent variable (the b-path), and the independent variable and the dependent variable (c-path). The regression weight of the c-path denotes the total effect of the independent variable, the product of the regression weights of the a-path and the b-path denote the indirect effect, and the difference between the total effect and the indirect effect is termed the direct effect. A mediation is established if the indirect effect, i.e. the effect from the independent variable transmitted through the mediator, significantly differs from zero.

Since the indirect effect is the product of two regression coefficients, it is not normally distributed. Thus, typical inference-statistical methods, such as the Sobel Test, are not appropriate to evaluate the significance of indirect effects. Instead conditional process analysis employs a bootstrapping procedure: The sample is randomly resampled k times (with k usually being fixed at 5000 resamples) with replacement. The distribution of the k resamples is then used as an empirical approximation of the true population distribution of the indirect effect. For a 95% confidence interval, the empirical $2.5^{th}$ and $97.5^{th}$ percentiles of the bootstrapped estimates are used. If this confidence interval does not include zero, the indirect effect is considered significant.

Note that this approach presents a significant development from the more traditional causal steps approach (Baron & Kenny, 1986). Since the causal steps approach does not directly estimate the indirect effect it has three obvious drawbacks, which conditional process analysis corrects for (Hayes, Montoya & Rockwood, 2017): (i) Causal steps assumes that if the a-path and b-path are significant, their product must also be significant. This does not follow. (ii) Causal steps cannot adapt to mediation in

the absence of a total effect. In other words, it assumes that an effect that doesn't exist cannot be mediated. This is clearly wrong, as a total effect can, for example, be obscured when the independent variable causes a negative indirect effect via one mediation and a roughly equally strong positive indirect effect via another mediation (cf. Kenny & Judd, 2014 for a more systematic discussion). (iii) Finally, the causal steps approach is virtually useless in more complex causal models. Since it doesn't quantify the indirect effects, it is not possible to compare multiple mediators or evaluate contingent causal relationships.

Moderation, on the other hand, describes a causal relationship in which the size or direction of the effect of the focal predictor on the dependent variable is contingent on a third variable, i.e. the moderator. In the OLS regression, the dependent variable is thus modeled as the linear combination of the independent variable, the moderator, and the product of the independent variable and the moderator, each with respective regression coefficients used to parametrize the model. While moderation is the more familiar concept to most management scholars, some confusion may exist regarding terminology. As soon as a moderator variable is specified in a model, terms such as "main effect" or "interaction effect" become essentially meaningless. While multiple regression allows for fitting partial effects for each predictor variable that can be meaningfully interpreted on its own, this is not true in the case of moderation. The basic logic of moderation states that the effect of the focal predictor is dependent on the moderator variable. Thus, there is no "main effect" or "independent effect" of the focal predictor in the absence of specifying the level of the moderator. The regression coefficient of the focal predictor corresponds to the predicted influence of the focal predictor with the level of the moderator fixed at zero. Depending on whether the researcher chose to mean-center the moderator, this arbitrarily indicates the effect of the focal predictor at either the sample mean of the moderator, or at the natural zero of the moderator (which might not even be a meaningful expression).

In conditional process analysis, the basic concepts of mediation and moderation can be fairly freely combined to allow for causal models, including multiple mechanisms (i.e. mediators) or contingencies (i.e. moderators). Causal mechanisms can also themselves be contingent, which is called moderated mediation. Chapter two features an example of such a contingent causal model.

In the short profile of conditional process analysis provided above, it may appear to be fairly similar to Structural Equation Modeling. While conceptually similar, much of the methodological literature concerned with the modeling of causal processes has been developed in regression-based terminology, which lends itself more easily to the analytical procedures of conditional process analysis (e.g. Edwards & Lambert, 2007; Fairchild & MacKinnon, 2009; Hayes, 2015; Muller et al., 2005; Preacher et al., 2007). One of the more consequential mathematical differences between Structural Equation Modeling and Conditional Process Analysis lies in the parametrization process. Conditional Process Analysis follows the logic of observed variable path analysis and estimates each set of OLS regressions separately, meaning that the coefficients derived in one regression do not affect the estimation of coefficients in a different regression. Conversely, Structural Equation Modeling parametrizes the entire equation system simultaneously through iterations against a maximum likelihood criterion until the gains in correspondence fail to exceed the convergence criterion. Still, in empirical settings consisting exclusively of observed variables, differences between the results of Structural Equation Modeling and Conditional Process Analysis will rarely be substantive, with some minor differences being caused by the difference in mathematical theory and distribution assumptions stemming from the use of OLS versus Maximum Likelihood estimations, respectively.

One of the areas where these differences become important, however, is in small to medium sized samples. Maximum Likelihood estimations of standard errors as used in Structural Equation Modeling tend to be biased downwards in smaller samples (e.g. Hoogland & Boomsma, 1998), which may lead to incorrect model specifications. On the other hand, Structural Equation Modeling also offers some advantages over Conditional Process Analysis. The one most often cited is that Structural Equation Modeling has more potential to address issues of measurement error. This, however, only holds true if Structural Equation Modeling is used in a fairly specific way, i.e. by comparing a structural model of latent variables with an explicit measurement model (e.g. Kline et al., 2016). For this procedure to work, a valid model of measurement error has to be specified, which, in turn, carries assumptions that are not typically met in empirical settings (Hayes, Montoya & Rockwood, 2017). In addition, as Ledgerwood and Shrout (2011) discuss, as long as measurement error is unsystematic, Conditional

Process Analysis may autocorrect for measurement error through inbuilt aggregation, as each mediation is a product of parameter estimates.

Given the size of my empirical samples, the richness of interpretative methodologies to further untangle conditional causal processes, and the fit of the methodology to the psychological constructs I employ, I consider Conditional Process Analysis to be a more suitable modeling approach for my dissertation than Structural Equation Modeling.

# Chapter 2: More than the sum of its parts-Bridging organizational context and individual-level cognition to explain individual ambidexterity.

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## Introduction

Today's fast-paced technological cycles entail an increasing pressure to innovate, which is penetrating areas outside of the traditional innovators' workplace more and more. As the digital transformation shifts the need for innovation to sectors that traditionally did not compete on innovativeness (Chae, 2012; Hipp & Grupp, 2005; Vial, 2019), these companies cannot rely on historically grown structures for innovation. Thus, the task to innovate often falls on employees from traditionally non-innovative functions (Amabile, 1988; Axtell, Holman, Unsworth, Wall, Waterson & Harrington, 2000; Bäckström & Bengtsson, 2019; Smith, Ulhøi & Kesting, 2012; De Jong & Den Hartog, 2007; Unsworth & Parker, 2003). These trends transform the innovator's workplace beyond the traditional confines of R&D departments, and place innovation as a challenge front and center, also across formerly non-innovative functions within the organization.
This development is only going to accelerate in the future: With the progress of artificial intelligence, routine-based activities will become increasingly automated (Muro, Maxim & Whiton, 2019) and employees from non-innovative functions will consequently have to engage in more and more analytical, explorative thinking. Therefore, focusing on how the ability to integrate exploration and exploitation can be managed and developed in the single employee is imperative to guaranteeing a company's viability today and in the future (cf. Levinthal & March, 1993).

Individuals who are able to successfully integrate this exploration and efficient, exploitative work in their regular jobs are termed ambidextrous (Mom, Van Den Bosch & Volberda, 2009). These individuals possess a variety of characteristics that allow them to combine exploration and exploitation (Mom, Fourné & Jansen, 2015): Complex cognitive processes allow them to fulfill both entrepreneurial and administrative tasks. They act outside the narrow confines of their own jobs, are multitaskers who are able to shift attention quickly, and thus integrate conflicting goals in creative solutions.
While ambidexterity at the individual level is especially important for employees in uncertain and interdependent work contexts (Mom et al., 2015), it is perhaps most difficult to achieve at the individual level (Gupta, Smith & Shalley, 2006). Consequently, research has focused on this puzzle and identified a wide range of antecedents: From organizational context (Gibson & Birkinshaw, 2004), structural

antecedents (e.g. Mom et al., 2009) and aspects of the social network (Rogan & Mors, 2014), to individual cognitive antecedents (Kauppila & Tempelaar, 2016).

Research on antecedents for individual ambidexterity can be segmented into two largely parallel research streams (Tempelaar & Rosenkranz, 2019):
The first stream focuses on antecedents in the social context created in the organization. Among the antecedents defined in this stream are, for example, high performance work systems (Patel, Messersmith & Lepak, 2013), cross-functional interfaces (Jansen, Tempelaar, van den Bosch & Volberda, 2009), high-involvement HR practices (Preito & Santana, 2012), group-reward structures (Jansen, George, Van den Bosch & Volberda, 2008) and climate variables, such as psychological safety (Kostopoulos & Bozionelos, 2011). We refer to these in the following as antecedents based in organizational theory (OT).
The second stream focuses on antecedents at the individual level, which explain why some individuals are able to integrate the contradictory demands of exploration and exploitation while others are not (e.g. Kao & Chen, 2016; Kauppila & Tempelaar, 2016; Laureiro-Martinez, Brusoni, Canessa & Zollo, 2015). In the following, we refer to these as organizational behavior antecedents (OB).
To date, these two research streams have only sparingly been integrated. As Tempelaar and Rosenkranz put it: "(…) A central critique to prior studies is that the context in which an individual is embedded affects the actor's behavior *alongside* [emphasis added] individual tendencies (Kauppila & Tempelaar, 2016). As such, ambidexterity is likely to be a function of both individual and organizational effects (Raisch, Birkinshaw, Probst & Tushman, 2009)" (2019, p. 1522 f.). Accordingly, for a thorough description of individual ambidexterity, an integrative perspective is needed to clarify the syntax of causal mechanisms in the social context and at the individual level. Thus, our paper asks: *How do factors in the social context and individual-level antecedents interact in order to explain individual ambidexterity?*

In order to fill this research gap, we build on Social Cognitive Theory (SCT; Bandura, 1989). SCT explains autonomous, self-regulated behavior as the product of a complex interaction of social context and individual-level cognition. More concretely, we argue that OT variables in the proximal and distal social contexts interact with each other to affect the individual cognitive underpinnings of self-regulated behavior and,

consequently, individual ambidexterity. Building on multi-source data from 245 employees of a large Central European company, we find strong support for our theoretical model.

Our research contributes to ambidexterity literature in several ways. On the one hand, to our best knowledge we present the first investigation that systematically integrates OT and OB variables within one theoretical framework. Building on SCT, we establish the syntax of causal mechanisms between OT and OB factors. This allows us to describe the processes by which the organizational context influences individual-level variables and, furthermore, how these changes in individual-level variables lead to increased individual ambidexterity. On the other hand, we also provide novel insights into the mechanisms that are relevant on each level (OB vs. OT) and their joined influence on ambidextrous performance. On the OB level, we extend current understanding by focusing on the central role of explorative self-efficacy as an antecedent of individual ambidexterity. As explorative self-efficacy is much more malleable than prior identified antecedents, it presents a suitable target for development and training. On the OT level, we introduce the differentiation between proximal and distal social contexts to the ambidexterity literature. We demonstrate that the effects of proximal and distal social contexts are contingent on each other, thus pointing to the need to align them in order to nurture ambidexterity on the individual level.

## Theoretical Background

In order to illuminate the interrelation between organizational context and individual-level antecedents of individual ambidexterity, we use Social Cognitive Theory as a vantage point. SCT is a well-established psychological theory to describe autonomous, agentic and self-regulated behavior (Bandura, 2001). As the name suggests, agentic behavior can be understood through the interplay of individual-level *cognitive* variables and the *social* context shaping these cognitive variables in SCT (Bandura, 2001). More concretely, and similar to a micro-foundations perspective (Felin & Foss, 2005), SCT posits that characteristics of the organizational setting, i.e. OT variables, influence the development of cognitive-person characteristics of organizational members, i.e. OB variables, thereby producing agentic behavior.

As the prominent psychological theory of self-regulated behavior (Bandura, 1991; 2001), we consider SCT to be a particularly fitting theoretical lens to address our research gap for two reasons.

First, individual ambidexterity is dependent on precisely the kind of autonomous, self-regulated behavior described by SCT. In their formulation of contextual ambidexterity, Gibson and Birkinshaw (2004) describe how a social context characterized by a combination of social and performance aspects empowers individual employees to autonomously switch between exploration and exploitation to increase ambidexterity. Similarly, Mom and colleagues (2009) also point out the central role of individual autonomy for successful individual ambidexterity. Since the explorative part of individual ambidexterity in particular is hard to control externally, self-regulation by the individual employees is a crucial pathway to ambidexterity.

Second, as outlined above, SCT is both social and cognitive as it explains this agentic behavior through the interplay of both the *social* context and individual *cognition*. Thus, it provides a useful theoretical perspective to answer the outlined research gap of how organizational factors, which determine the social environment, and behavioral factors, which are largely situated at the individual cognitive level, interact. The suitability of SCT for analyzing antecedents of individual ambidexterity is underscored by the fact that it has been adopted multiple times to explain dynamics of individual ambidexterity (e.g. Kauppila & Tempelaar, 2016; Jansen, Kostopoulos, Mihalache & Papalexandris, 2016).

In SCT, individual-level cognition is considered the direct antecedent of agentic behavior (Sperry, 1993; Bandura, 2001; Carlson, 1997). From the perspective of SCT, agentic behavior is founded in a person's confidence in his or her ability to perform a particular behavior (Bandura, 2001). Thus, this self-efficacy, i.e. the individual confidence in being able to perform the respective agentic behavior successfully, is the central cognitive explaining variable in SCT models (Bandura, 1993; 1997; Bandura, Barbaranelli, Caprara & Pastorelli, 1996; 2001). This self-efficacy can, in turn, mobilize motivation, resources and activities needed to successfully cope with the challenges of the agentic behavior in question. Accordingly, prior studies in the field of ambidexterity that build on SCT consistently used measures of self-efficacy as their focal explaining variables (e.g. Bandura, 1993; 1997; Bandura et al., 1996; 2001).

We extend prior research on the relation between self-efficacy and ambidexterity (Kauppila & Tempelaar, 2016; Jansen et al., 2016) by incorporating the differentiation between generic self-efficacy and specific self-efficacy. In SCT, generic self-efficacy is conceptualized as a higher-level dynamic personality trait that is relatively stable over time and, as indicated by the term, generic across situations (Schwoerer, May, Hollensbe & Mencl, 2005; Weitlauf, Cervone, Smith & Wright, 2001). Specific self-efficacy, on the other hand, reflects domain-specific efficacy expectations that can be focused on different levels of granularity on different aspects of the job. Research generally indicates a hierarchical relationship between the two: While generic self-efficacy is a broader predictor of positive outcomes across situations, specific self-efficacy has the stronger relationship with the same outcomes in the domain it is specific to, and typically mediates the relationship of generic self-efficacy to the outcome (Schutte & Malouff, 2016).

Integrating specific self-efficacy into the ambidexterity research is meaningful not only because an appropriate measure of specific self-efficacy will have a stronger and more direct relationship with individual ambidextrous performance, but also because it is more malleable, and thus more suited as a basis for systematic development. Indeed, there is a vast literature demonstrating the effectiveness of training based on systematic intervention principles guided by SCT on specific self-efficacy (Eden, 1988; Gist et al., 1989; Mathieu, Martineau & Tannenbaum, 1993). Generic self-efficacy, on the other hand, can only be influenced indirectly via increasing specific self-efficacy, ideally in several domains that will eventually generalize, but with a qualitatively weaker effect (Mencl, Tay, Schwoerer & Drasgow, 2012). As management research claims, providing managerially useful theoretical insights as the raison d'être (Rumelt et al., 1991), outlining more malleable and thus actionable antecedents seems a useful development of theory.

We take explorative self-efficacy as the most relevant form of specific self-efficacy for individual ambidextrous performance. As Kauppila and Tempelaar argue, "factors that augment exploration without lowering an existing high level of exploitation are especially relevant antecedents of ambidexterity because organizations and individuals tend to be more engaged in exploitative than explorative activities" (2016, p.1022). This is particularly true when organizations want to integrate the individual employee in the

process of innovation and are consequently faced by an exploration-exploitation dilemma. When employees from formal non-innovative functions are required to act ambidextrously, they are already familiar and experienced with the exploitative side of work. The challenge is to develop and integrate explorative activities into their work routine. In addition to the importance of exploration for individual ambidextrous performance, it also seems to be the more vulnerable part: Explorative tasks by nature exhibit higher degrees of uncertainty, which can be psychologically stressful and lead to adverse coping mechanisms. For example, the inherent ambiguity of explorative work can be managed by relying on old, exploitative routines to restore a sense of control and mastery in the face of uncertainty. This, in turn, may lead to cross-contamination of explorative efforts by implicit assumptions of said exploitative routines. Research on paradoxical demands, such as ambidexterity, has identified this problem of defensiveness that can lead to "becoming trapped within the comfort of the past" (Lewis, Andriopoulos & Smith, 2014, p. 69). The same research also suggests a possible solution: "Confidence is the antidote of defensiveness" (ibid.). Confidence in one's explorative abilities in turn, is the very same thing as explorative self-efficacy.

The SCT describes several pathways for how explorative self-efficacy as a form of specific self-efficacy can affect agentic behavior (Wood & Bandura, 1989): Since people tend to avoid situations which they fear will exceed their coping capabilities, employees who feel overwhelmed with uncertain explorative demands will disengage from these activities, which in turn limits opportunities for future growth of their innovative capabilities. A high explorative self-efficacy implies a high estimation of one's ability to master explorative challenges, and, accordingly, helps to avoid this negative cycle of withdrawal. Explorative self-efficacy also influences the level of motivation and persistence of the explorative efforts, since employees who doubt their own capabilities for exploration tend to abandon their efforts prematurely and settle for mediocre solutions (Bandura, 1988a; Bandura & Cervone, 1983, 1986). Finally, explorative self-efficacy can also influence how much stress and distracting emotional arousal employees experience when dealing with ill-defined exploration tasks, since people with low self-efficacy tend to conjure up apprehensive cognitions (Bandura, 1988a; 1988c; Ozer & Bandura, 1989). In sum, we argue that explorative success without hindering exploitation is a major source of individual ambidextrous performance, but also one that is strongly vulnerable to feelings of low explorative self-

efficacy. Accordingly, we consider explorative self-efficacy to be the central cognitive predictor of individual ambidexterity. Thus, we hypothesize:

*Hypothesis 1: Explorative self-efficacy predicts individual ambidexterity in such a way that higher levels of explorative self-efficacy are related to higher levels of individual ambidexterity.*

As outlined above, SCT is both social and cognitive. SCT states that socio-structural factors operate through cognitive mechanisms to produce agentic behavior (Bandura, 2001; Bandura 1993; Bandura et al., 1996, 2001; Elder & Ardelt 1992).
The broader network of socio-structural influences can be classified as proximal and distal factors of a multilayered environment in which the individuum is embedded (Lent, Brown & Hackett, 1994; 2000; Bronfenbrenner, 1979; Ryan & Weinstein, 2009). Together, the proximal and distal contexts affect people's functioning and determine to what extent agentic behavior can be exerted.
The distal context creates a broader climate that affects the individuum by building the more solid, invariable background that initially shapes aspirations, interests and self-cognitions (Lent et al., 1994). Thus, the distal background has a coercive, substantial influence on the individuum, either directly or by affecting the proximal layer in which the person is embedded (Ryan & Weinstein, 2009; Deci, Spiegel, Ryan, Koestner & Kaufman, 1982). Proximal influences are derived from the immediate entourage of an individuum, are more responsive and malleable, and constitute the framework within which a specific behavior can be developed and implemented. They can either boost or hamper the development of agentic behavior. People are more motivated to translate their interests into goals, and their goals into actions, when agency is promoted by their immediate entourage (Lent, Hackett & Brown, 2000). Conversely, when people perceive the proximal context as restrictive, they will be less likely to engage in agentic behavior (Lent et al., 2000).

We focus on this kind of differentiation between proximal and distal aspects to create a sound basis for the explanation of how individual perceptions of the different aspects of social context shape the cognitive antecedents of agentic behavior.
In the context of individual ambidexterity by employees, we focus on leadership as the most relevant proximal social context to influence explorative self-efficacy. Leadership

is part of the more immediate social surrounding of the individual and thus belongs squarely in the proximal social context.
SCT research has identified several sources for developing and strengthening people's beliefs about their personal efficacy (Wood & Bandura, 1989). One way to influence self-efficacy beliefs is exposure to role models (Bandura, 1997). In the organizational setting, supervisors are the most significant and immediate reference to which employees can align their behavior.

We argue that transformational leadership (TFL; Bass, 1985) is a particularly important aspect of leadership for explorative self-efficacy. Transformational leaders exhibit four tenets to create a sense of commitment and motivation in their followers: inspirational motivation, idealized influence, individualized consideration and intellectual stimulation (Avolio, Bass & Jung, 1999). Transformational leaders possess several characteristics that are suited to developing followers' self-efficacy. First, they serve as role models who are especially proactive and good at exploring new ideas (Gong, Huang & Farh, 2009). As noted above, role models are a central source of self-efficacy. In addition, transformational leaders communicate high performance expectations while simultaneously expressing confidence in their followers' ability to meet them (Eden, 1992). Thus, they act via verbal persuasion, which is another important source of self-efficacy (Bandura, 1997). We argue that they specifically target *explorative* self-efficacy because such leaders challenge the status quo by creating and exploring visionary ideas (Keller, 1992). Furthermore, they stimulate creative thinking and encourage experimentation, as well as the exploration of new ideas, which are all essential hallmarks of innovative performance (Sosik, Avolio & Kahai, 1997; Bundy, 2002). As transformational leaders authentically engage in explorative behavior, their followers can easily develop and adapt the same performance in their work roles. The particular focus on exploration, both through modeling behavior and their performance expectations of their employees, are demonstrated in several studies (Jung, Chow & Wu, 2003; Wang & Rode, 2010).

Thus, we suggest that transformational leaders can serve as proxy agents (Bandura, 2001) through whom the individual employee can achieve self-efficacy regarding his or her explorative competencies. By raising explorative self-efficacy, TFL will positively influence employees' ambidextrous performance. Therefore, we hypothesize:

*Hypothesis 2: Transformational leadership predicts individual ambidexterity, mediated by followers' explorative self-efficacy. More concretely, higher levels of transformational leadership are related to higher levels of followers' individual ambidexterity, mediated by followers' higher levels of explorative self-efficacy.*

In addition, SCT also includes explaining variables in the more distal social context. As pointed out above, leaders are significant people in the employee's immediate environment, therefore, they are part of the organization's proximal social context. An individual's perceptions of the distal social context hold the more global, background factors that build a kind of "initial social address" that determines, on the one hand, the way individuals can develop their cognitive abilities and, on the other hand, the extent to which proximal factors can boost this development (Lent and Brown, 2013; Caldwell et al., 2004).

More concretely, we focus on individual perceptions of the global climate prevailing in the organization whether exploration is supported or hampered (Scott & Bruce, 1994). Within an organization that encourages innovative change and the pursuit of new ideas, employees will feel supported in their explorative attempts (Kanter, 1983; Seigel and Kaemmerer, 1978; Scott and Bruce, 1994). The flourishing effects of perceived support on employees' performance, creativity and the incorporation of organizational values has already been shown by several investigations (Eisenberger, Fasolo & Davis-LaMastro, 1990; Amabile, Conti, Coon, Lazenby & Herron, 1996; Scott and Bruce, 1994; Sarros, Cooper & Santora, 2008). Thus, the individual perceptions of this distal social context further determine whether the individual employee will perceive a sense of "collective agency" (Bandura, 2001). Within this climate of shared beliefs in each other's explorative self-efficacy, organizational members will be encouraged to pool their skills and knowledge in order to achieve goals through collective efforts with others. Thus, the perception of collective agency can serve as a breeding ground for the philosophy of TFL and can strengthen the individual employee's confidence in their explorative abilities.

This is in line with insights from the literature on TFL. For example, Bass (1985) stated that perceptions of the organizational climate may moderate the impact of TLF on

employees' performance. To be effective, leader behavior has to match the global "social address" of the organization (Porter & McLaughlin, 2006). It has been consistently shown that the influence of transformational leaders is more fruitful in organizational units where an explorative climate is predominant, and that the influence of TFL on business-unit performance is moderated by an individual's perception of organizational support for innovation (Bass, 1985; Bass & Avolio, 1993).

Building on these insights about the interaction of perceived support for innovation and TFL, we argue that the positive effect of transformational leadership as a proximal social context is dependent on the degree to which the focal employee perceives the more distal social context to also be supportive and empowering of explorative behavior (Scott & Bruce, 1994). If individuals perceive the distal and proximal contexts to be aligned towards engendering exploration alongside exploitation, perception of inconsistency will be diminished, and employees will be motivated to engage in agentic behavior (Ryan & Weinstein, 2009; Deci, Spiegel, Ryan, Koestner & Kaufman, 1982).
If employees perceive contradictory signals from the proximal and distal contexts, they experience cognitive dissonance regarding their social expectations (Festinger, 1957). Being in a state of cognitive dissonance has been shown to entail a substantial decrease in self-efficacy (Condiotee & Lichtenstein, 1981). When the distal context is less restrictive and more supportive regarding the supervisor's leadership approach, leaders can perform in line with their goals and interests. Given the contingency between the proximal and distal social environments, employees will perceive fewer ambiguous signals and feel encouraged to act in accordance with their leaders' guidelines. With regard to TFL, the perceived innovative climate prevailing in an organization might be a particularly potential moderator of this leadership style's effectiveness (Pawar & Eastman, 1997; Shamir & Howell, 1999). Norms and practices that encourage flexibility and the expression of ideas, as well as a supply of adequate resources, will create a setting in which employees' attention is directed to the actions of transformational leadership, which in turn will facilitate the implementation of corresponding behavior (Gumusluoglu & Ilsev, 2009; Liao & Chuang, 2007; Charbonnier-Voirin, El Akremi & Vandenberghe, 2010). Within an organization that promotes explorative activities, followers will interpret the actions of transformational leaders as legitimate, supported and rewarded. Thus, we hypothesize:

*Hypothesis 3: Perceived support for innovation moderates the relationship among transformational leadership, explorative self-efficacy and individual ambidexterity. The positive impact of transformational leadership on explorative self-efficacy and individual ambidexterity is stronger when perceived support for innovation is high.*

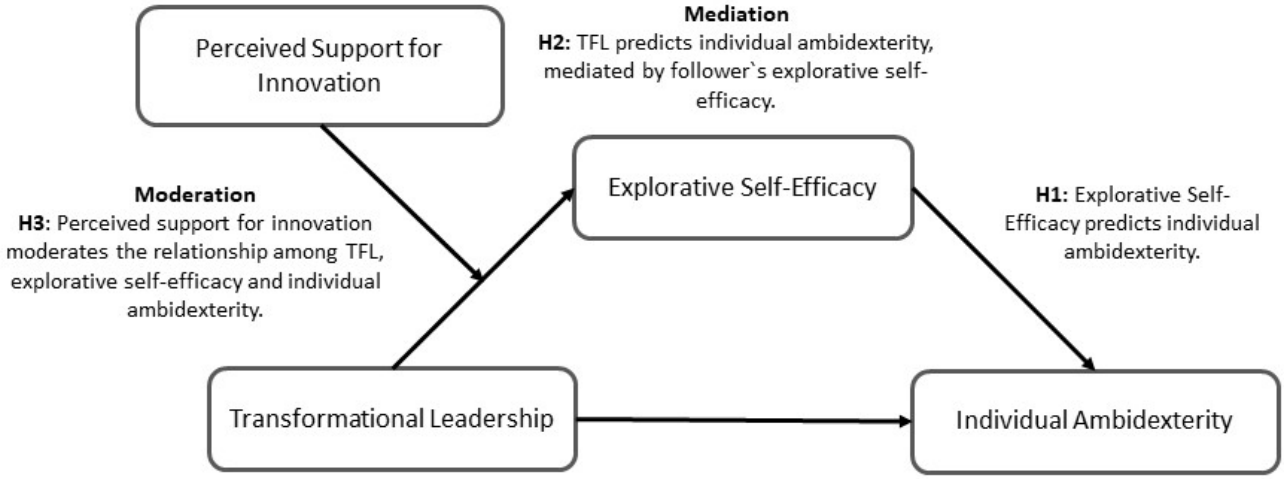


Figure 9: Research Model with Hypotheses

## Method

### *Sample*

The sample included employees and their supervisors from a broad cross-section of jobs at a Central European insurance company. A total of 245 employees participated in the current investigation. 48% of the respondents were female and the remaining 52% were male. The average age was 42 years (SD = 10.9). 38% had high school diplomas, 24% had bachelor's degrees, and 38% had university degrees. The employees had 11.17 years (SD = 8.75) of average company tenure and 7.65 years (SD = 6.54) of average job tenure in the sector. 10% of all participants worked in market range provision and indemnity insurance, 36% in the finance department, 42% in the operations and development department, and the remaining 12% of the respondents worked in the strategy and sales department, as well as in human resources and actuary. Studying the insurance sector vividly illustrates the development towards the integration of innovative performance within companies that traditionally did not compete on innovativeness and consequently cannot rely on grown structures of innovative performance. Accordingly, employees of

the company surveyed in the current study are increasingly required to integrate innovative performance in their work routine as the company undergoes increased competitive pressure, a continuously changing regulatory framework, decreasing customer loyalty and new technological innovations.

***Procedure***

Data was collected via an online survey. An email with a link to a web-based questionnaire was sent to 699 employees and the corresponding 119 supervisors for all divisions of the company.

Since the corporate division investigated in this study operated in German, all questionnaire items were provided in German. If available, German versions of the questionnaires were used. Most of the scales were originally developed and published in English. In such cases, the items were carefully translated into German and back translated to English to ensure conceptual equivalence and comparability. Employees' questionnaires included measures of transformational leadership and perceived support for innovation, and employees were asked to rate their own level of explorative self-efficacy. They were also asked for their age, gender, educational level, job tenure, and company tenure. Leaders' questionnaires included questions about individual's ambidextrous performance. The overall response rate (employees and supervisors) was 77%. Data collected from the supervisors and the employees were matched and grouped for analysis. When matching employees' questionnaires with supervisors' questionnaires ,245 pairs were obtained.

***Measures***

***Measures completed by employees***

*Explorative Self-Efficacy* was measured with a self-developed scale consisting of ten items (Cronbach's α: .85). Three of the items were adopted based on the creative self-efficacy measure developed by Tierney and Farmer (2002). The remaining seven items were created to capture efficacy beliefs related to implementation and championing of explorative ideas to represent the full life cycle of explorative value creation. The literature on self-efficacy (e.g. Bandura, 1997) and innovation (e.g. de Jong and den Hartog, 2010; Janssen, 2000; Yuan and Woodman, 2010) was analyzed to generate a set

of items. The items were optimized and validated in a focus group consisting of 11 employees working in the study organization. Answers were provided on a Likert scale from 1 (“strongly disagree”) to 5 (“strongly agree”). Based on our theorizing, explorative self-efficacy is considered as a second order construct emerging from efficacy expectations for creativity, implementation and championing. A more detailed description can be found in Dörner (2012).

*Transformational Leadership* was measured with 20 items (Cronbach’s α: .961) taken from the transformational leadership assessment of the Multifactor Leadership Questionnaire Form 5X (Bass & Avolio, 1995). Previous studies employing the German version have reported high construct validity and internal consistency of the scale (e.g. Felfe & Schyns, 2002). Employees assessed their supervisor on a Likert scale from 1 (“not at all”) to 5 (“frequently, if not always”).

*Perceived support for innovation* was measured by 13 items (Cronbach’s α: .881) adapted from Scott and Bruce’s (1994) 16-item measure of perception of support for innovation within an organization. In the current investigation, two of the original three dimensions were included. The three items covering “reward-innovation dependency” were excluded from the questionnaire as this dimension is less established to measure the construct of perceived support for innovation (Yuan and Woodmann, 2010). Consequently, perceived support for innovation was measured with items representing the two dimensions “support for creativity” and “tolerance of differences”. Employees rated the extent to which they feel that their company supports innovative attempts on a five-point scale ranging from 1 (‘‘Strongly disagree’’) to 5 (‘‘Strongly agree’’).

***Measures Completed by Supervisors***

*Individual Ambidextrous Performance* was assessed as the product of explorative and exploitative performance, following prior operationalization of individual ambidexterity in the literature (e.g. Mom et al., 2009). To measure an employee’s explorative performance, we asked their supervisor to assess the employee’s innovative work behavior on de Jong and den Hartog’s (2010) eponymous scale (Cronbach’s α: .944); to measure the employee’s exploitative performance, we asked their supervisor to assess the employee’s quality of work, their effectiveness, and the extent to which they fulfill

their roles and responsibilities on Wayne and Liden's (1995) corresponding scale (Cronbach's α: .902) as used by Bolino and Tunley (2003) and Golden, Veiga, and Dino (2008). Both variables were measured on a Likert scale ranging from 1 ("not at all", "strongly disagree") to 5 ("frequently, if not always", "strongly agree").

*Control Variable.* Gender, age, organizational tenure, as well as the level of education, were included as control variables.

We conducted a confirmatory factor analysis (CFA) with all variables (Explorative Self-Efficacy, Transformational Leadership, Perceived Support for Innovation, Exploitative Performance and Explorative Performance) using a four-factor measurement model. **Table I** provides the factor loadings of the scale items. **Table II** reports the goodness of fit indices for the factor analysis. Overall fit statistics indicated an adequate fit of the measurement model.

**Table I:** Confirmatory factor analysis

| ***Constructs*** | ***Items*** | ***SFL*** |
|---|---|---|
| **Exploitative Performance**<br>AVE = .778<br>CR = .933 | 1. This subordinate is superior (so far) to other new subordinates that I've supervised before.<br>2. Rate the overall level of performance that you observe for this subordinate.<br>3. What is your personal view of your subordinate in terms of his or her overall effectiveness?<br>4. Overall, to what extent do you feel your subordinate has been effectively fulfilling his or her roles and responsibilities? | .854<br>.915<br>.867<br>.891 |
| **Explorative Performance**<br>AVE = .682<br>CR = .954 | How often does this employee…<br>1. … pay attention to issues that are not part of his/her daily work?<br>2. …. wonder how things can be improved?<br>3. … search out new working methods, techniques or instruments?<br>4. … generate original solutions for problems?<br>5. … find new approaches to execute tasks? | .389<br>.857<br>.891<br>.858<br>.869<br>.826 |

| | | |
|---|---|---|
| | 6. … make important organizational members enthusiastic about innovative ideas? | .867<br>.871 |
| | 7. … attempt to convince people to support an innovative idea? | .839 |
| | 8. … systematically introduce innovative ideas into work practices? | .864 |
| | 9. … contribute to the implementation of new ideas? | |
| | 10. … put effort into the development of new things? | |
| **Explorative Self-Efficacy**<br>AVE = .433<br>CR = .884 | 1. I feel that I am good at generating novel ideas. | .685 |
| | 2. I have confidence in my ability to solve problems creatively. | .651 |
| | 3. I have a knack for further developing the ideas of others. | .666 |
| | 4. I have a knack for making others enthusiastic about new ideas. | .680 |
| | 5. I have confidence in my ability to convince others of the benefit of new ideas. | .680<br>.680 |
| | 6. I have the social contacts needed to find backers for realizing new ideas. | .514<br>.637 |
| | 7. I have confidence in my ability to implement new methods at work. | .648<br>.697 |
| | 8. I have confidence in my ability to implement new products at work. | .705 |
| | 9. I feel that I am good at adopting new methods at work. | |
| | 10. I feel that I am good at adopting new products at work. | |
| **Transformational Leadership**<br>AVE = .577<br>CR = .965 | Employee | |
| | 1. … re-examines critical assumptions to question whether they are appropriate | .705<br>.771 |
| | 2. … seeks differing perspectives when solving problems | .747 |
| | 3. … gets me to look at problems from many different angles | .750 |
| | 4. … suggests new ways of Iooking at how to complete assignments | .731 |
| | 5. … talks optimistically about the future | .757 |
| | 6. … talks enthusiastically about what needs to be accomplished | .816 |
| | 7. … articulates a compelling vision of the future | .742 |
| | 8. … expresses confidence that goals will be achieved | .743 |
| | 9. … spends time teaching and coaching | .760<br>.764 |

| | | |
|---|---|---|
| | 10. … treats me as an individual rather than just as a member of a group | .779 .724 |
| | 11. … considers me as having different needs, abilities, and aspirations from others | .690 .741 |
| | 12. … helps me to develop my strengths | .747 |
| | 13. … talks about his/her most important values and beliefs | .797 |
| | 14. … specifies the importance of having a strong sense of purpose | .712 |
| | 15. … considers the moral and ethical consequences of decisions | .850 |
| | 16. … emphasizes the importance of having a collective sense of mission | .842 |
| | 17. … instills pride in me for being associated with him/her | |
| | 18. … goes beyond self-interest for the good of the group | |
| | 19. … acts in ways that builds my respect | |
| | 20. … displays a sense of power and confidence | |
| **Perceived Support for Innovation** AVE = .417 CR = .902 | 1. Creativity is encouraged here. | .658 |
| | 2. Our ability to function creatively is respected by the leadership. | .704 |
| | 3. Around here, people are allowed to try to solve the same problems in different ways. | .658 .556 |
| | 4. The main function of members in this organization is to follow orders, which come down through channels. | .678 |
| | 5. Around here, a person can get in a lot of trouble for being different. | .547 .535 |
| | 6. This organization can be described as flexible and continually adapting to change. | .771 .734 |
| | 7. A person can't do things that are too different around here without provoking anger. | .647 .650 |
| | 8. The best way to get along in this organization is to think the way the rest of the group does. | .496 .697 |
| | 9. People around here are expected to deal with problems in the same way. | |
| | 10. This organization is open and responsive to change. | |
| | 11. The people in charge around here usually get credit for other people's ideas. | |

12. In this organization, we tend to stick to tried and true ways.
13. This place seems to be more concerned with the status quo than with change.

*Notes:* SFL, standardized factor loading; AVE, average variance extracted; CR, composite reliability.

**Table II:** Goodness of Fit Index

| $\chi^2$ | DF | $\chi^2$/ DF | CFI | RMSEA | IFI |
|---|---|---|---|---|---|
| 2522.208 | 1500 | 1.68 | .899 | .053 | .900 |

## Results

Means, standard deviations, minimum and maximum values and correlations among study variables are presented in **Table III**.

**Table III**: Descriptive Statistics

| Variable | N | Mean | S.D. | Min. | Max. | 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1. Explorative Self-Efficacy** | 245 | 3.936 | .497 | 2.23 | 5.00 | 1 | | | | | | | |
| **2. Perceived Support for** | 245 | 3.261 | .647 | 1.14 | 4.75 | .169** | 1 | | | | | | |
| **3. Individual Ambidexterity** | 245 | 13.464 | 5.216 | 1.00 | 25.00 | .320** | .005 | 1 | | | | | |
| **4. Transformational Leadership** | 245 | 1.555 | 5.006 | 3.726 | .773 | .202** | .573** | .161* | 1 | | | | |
| **5. Gender** | 245 | 1.485 | 0.501 | 1 | 2 | -.152 | -.036 | -.113 | -.062 | 1 | | | |
| **6. Age** | 245 | 41.92 | 10.906 | 20 | 64 | -.136 | .075 | -.060 | -.181 | -.203 | 1 | | |
| **7. Education** | 245 | 1.995 | .875 | 1 | 3 | .179** | -.115 | .165** | -.003 | -.024 | -.215 | 1 | |
| **8. Organizational Tenure** | 245 | 11.173 | 8.746 | 43.00 | .25 | -.153* | .078 | -.145 | -.072 | -.002 | .627** | -.294 | 1 |

* p<0.05; ** p<0.01.

We predicted a positive relationship between explorative self-efficacy and individual ambidexterity, and we proposed that explorative self-efficacy mediates the relationship between TFL and individual employees' ambidextrous performance. Furthermore, we hypothesized that the relationship between TLF and explorative self-efficacy on individual ambidexterity is moderated by perceived support for innovation in such a way that individual ambidextrous performance will be pronounced at higher levels of perceived support for innovation. We tested for these hypnotized effects by means of a multiple regression analysis using Hayes (2013) PROCESS macro Model 7 for IBM SPSS Statistics. A bootstrapping technique was used to quantify and build confidence intervals for the indirect effects (Preacher and Hayes, 2008). The results of the multiple regression analysis are presented in **Table IV. Figure II** depicts the direct and indirect effects on individual ambidexterity as regression coefficients. Controlling for TFL, explorative self-efficacy had a significant effect on individual ambidexterity ($\beta = 2.64$, $p < 0.001$), conforming Hypothesis 1. Controlling for explorative self-efficacy, the direct effect of TFL on individual ambidexterity did not reach significance ($\beta = 0.655$, $p = 0.12$). **Table V** provides an overview of the conditional effects of TFL on individual ambidexterity at different values of perceived support for innovation. After controlling for organizational tenure, age, gender and education, the interaction term of TFL x perceived support for innovation was significantly associated with the mediator ($\beta = 0.159$, $p < 0.01$). The change in the $R^2$ also reached a significant effect ($\Delta R^2 = 0.03$, $p < .01$). As can be seen, there was only an indirect relationship between TFL and individual

ambidexterity for medium and higher levels of perceived support for innovation. For lower levels of the mediator, the 95% confidence intervals contained zero, confirming that the conditional indirect effect was not significantly different from zero for these conditions. To further interpret the moderating effect of perceived support for innovation on the TFL – explorative self-efficacy relationship, the conditional indirect effects (simple slopes) were plotted for low and high levels of the moderator variable "perceived support for innovation" (see **Figure III**). The index of moderated mediation indicated that with each one-unit increase in perceived support for innovation, the indirect effect of TFL increased by .42 units. Overall, the signs of the path coefficients and the conditional indirect effect were consistent with the interpretation that TFL was associated with increases in explorative self-efficacy, and explorative self-efficacy was associated with pronounced individual ambidextrous performance, but that this effect was only significant at high levels of perceived support for innovation.

**Table IV:** Results of the multiple regression analysis

| | **Explorative Self-Efficacy** | | |
|---|---|---|---|
| | ***Coefficient*** | ***S.D.*** | ***t - value*** |
| **Intercept** | 5.398*** | .629 | 8.58 |
| **Transformational Leadership** | -.425* | .167 | 8.570 |
| **Perceived Support for Innovation** | -.470 | .194 | -2.539 |
| **Gender** | -.170** | .062 | -2.747 |
| **Age** | -.006 | .004 | -1.581 |
| **Education** | .090 | .036 | 2.521 |
| **Organizational Tenure** | -.0008 | .005 | -.172 |
| | **$R^2$** = .153; ***F*** (7,237) = 6.093; ***p*** < .001 | | |
| | **Ambidexterity** | | |

| | | *Coefficient* | *S.D.* | *t - value* |
|---|---|---|---|---|
| **Intercept** | | 4.052 | 3.675 | 1.102 |
| **Transformational Leadership** | | .655 | .414 | 1.582 |
| **Explorative Self-Efficacy** | | 2.64*** | .665 | 3.972 |
| **Gender** | | -1.03 | .657 | -1.569 |
| **Age** | | -0.75 | .038 | -1.965 |
| **Education** | | .547 | .378 | 1.448 |
| **Organizational Tenure** | | .015 | .048 | .320 |
| | | $\mathbf{R^2}$ = .147; $\boldsymbol{F}$ (6,238) = 6.85; $\boldsymbol{p}$ < .001 | | |
| | | **Moderation** | | |
| | | *Coefficient* | *S.D.* | *t - value* |
| **TFL x Perceived Support for Innovation** | | .159** | .052 | 3.086 |

* p<0.05; ** p<0.01, *** p<0.001.

**Table V:** Conditional indirect effect(s) of TFL on Individual Ambidexterity at values of Perceived Support for Innovation

| | **Conditional indirect effects of TFL** | | | |
|---|---|---|---|---|
| | **Perceived Support for Innovation** | **Effect** | **t-value** | **LLCI95%*** | **ULCI95%*** |
| low (-1 SD) | 2.687 | .003 (.051) | .056 | -.098 | .104 |
| medium (0 SD) | 3.262 | .094* (.047) | 2.018 | .002 | .187 |
| high (+1 SD) | 3.857 | .189** (.06) | 3.159 | .071 | .307 |

* p<0.05; ** p<0.01; Bootstrapping standard errors in parentheses. *95% confidence intervals presented.

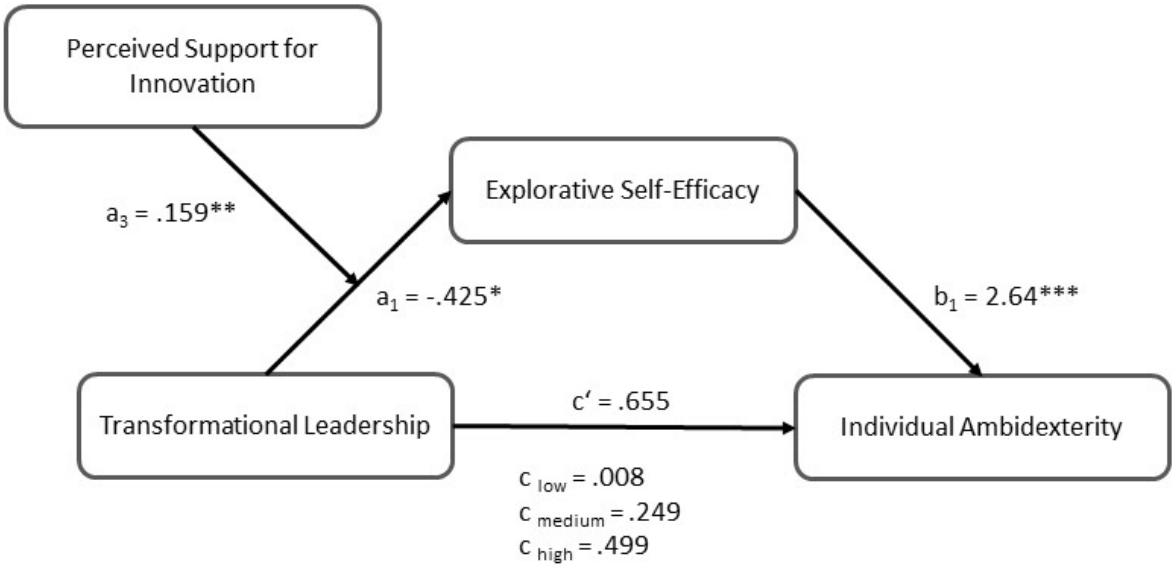


Figure 10: Regression coefficients for direct and indirect effects on individual ambidextrous performance.

* p<0.05; ** p<0.01, *** p<0.001; Note: the regression coefficients for the direct effects are indicated by $a_1$, $b_1$ and c'; $a_3$ indicates the interaction term of TFL x perceived support for innovation; the conditional indirect effects of TFL on individual ambidexterity are indicated by $c_{low}$, $c_{medium}$ and $c_{high}$; organizational tenure, age, gender and education are included as controls.

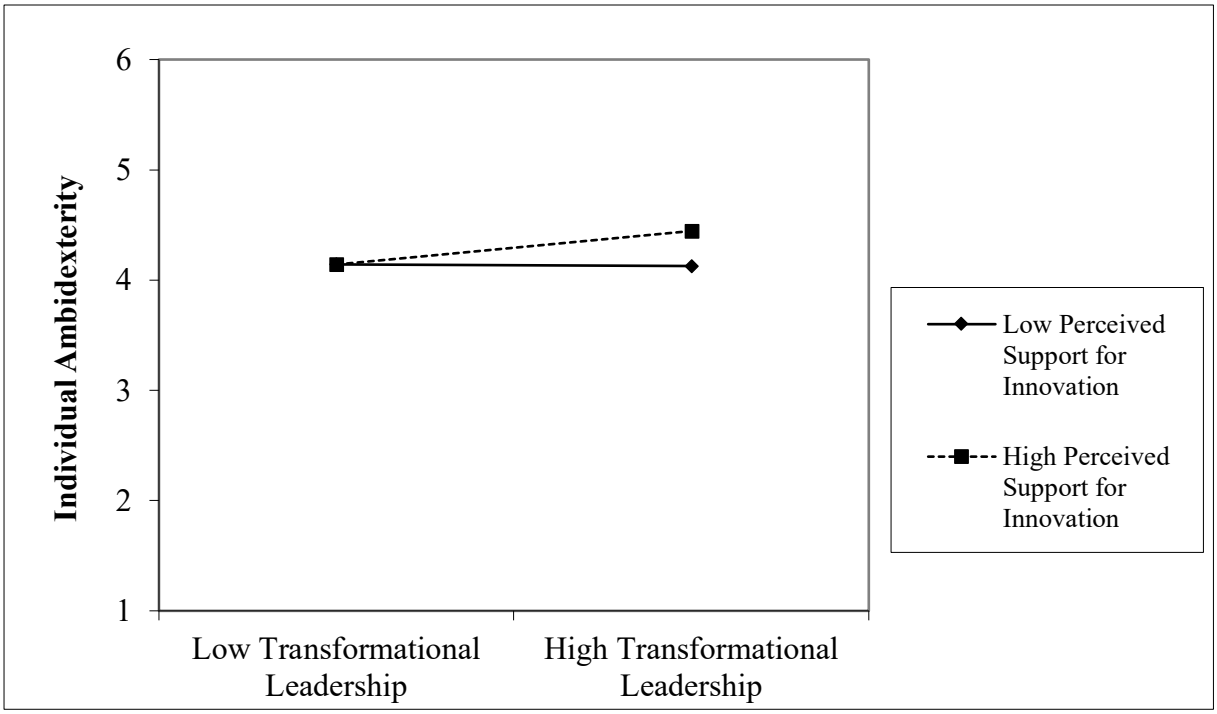


Figure 11: Interaction of Transformational Leadership with high (vs. low) perceived support for innovation

## Discussion

As companies face faster cycles of technology-driven, discontinuous change, innovation increasingly becomes imperative. To this end, companies might integrate individual employees from traditionally non-innovative workplaces into the process of innovation. As this constitutes a challenge for these employees to contribute to explorative innovation and still perform exploitatively in their regular tasks, it is essential to analyze how ambidexterity can be managed and developed on the level of individual employees.

The present study adopted a socio-psychological perspective on individual ambidexterity by building on SCT. As an integrative framework of agentic, autonomous behavior, it allows us to describe how characteristics of the organizational context (OT variables) help shape cognitive traits of organizational members (OB variables) to develop individual ambidexterity. Specifically, we focused on how the interplay of TFL as a proximal factor and perceived support for innovation as a distal aspect of the organizational setting affect employees' explorative self-efficacy, which in turn influences ambidextrous performance.

Our results indicated that TFL leads to increased explorative self-efficacy, which, in turn, had a positive influence on individual ambidexterity. This effect, however, is contingent on employees having the perception that there is a high level of support for innovation. Taken together, the integrative perspective on the development of individual ambidexterity adopted in the current investigation provides valuable implications for the human side of innovation management.

### *Theoretical Implications*

The findings of the present investigation are highly relevant to the current changes and challenges mangers face in the field of innovation. By adopting an overarching theoretical framework, we contribute to the question of how managers can lead and organize to facilitate the human side of innovation.

First, our findings contribute to and extend the existing understanding of individual ambidexterity. To the best of our knowledge, this is the first investigation that systematically integrates OT and OB variables within one theoretical framework. So far, aspects of the organizational context and characteristics of the individuum that lead to the development of ambidexterity were mostly considered and analyzed independently of each other (e.g. Gibson & Birkinshaw, 2004; Jansen, George, Van den Bosch, & Volberda 2008; Kauppila and Tempelaar, 2016). Building on SCT, we establish the syntax of causal mechanisms between OT and OB factors. This allows us to describe the processes by which the organizational context influences individual-level variables and, furthermore, how these changes in individual-level variables lead to increased individual ambidexterity.

Our approach is thus in line with a micro-foundations perspective (Felin & Foss, 2005, 2006) on the development of ambidexterity. This contrasts with the commonly adopted macro-foundations perspective on ambidexterity (e.g. Gibson & Birkinshaw, 2004), which treats the mediating mechanisms on the individual level between macro-level relationships as black boxes. In contrast, the micro-foundations perspective creates a more detailed image of the underlying processes, as it provides information on how and why the organizational context influences the development of ambidextrous performance through their effects on conditions of individual action and, consequently, individual behavior. The current findings support this intertwined process and establish

a full micro-foundations perspective on ambidexterity: Factors in the proximal social context and distal social context interact with each other to create the individual cognitive underpinnings of self-regulated behavior. More concretely, TFL and perceived support for innovation as characteristics of the organizational context influence employees' explorative self-efficacy, which in turn affects individual-level ambidextrous behavior. This theoretical approach focuses on the interplay between OT and OB factors but assumes a clear direction of action: We causally place the social context (OT factors) before individual cognition (OB variables) to foster the manifestation of a specific behavioral outcome.

We have provided novel insights into the mechanisms that are relevant on each level (OB vs. OT) and their joined influence on ambidextrous performance.

First, on the OB level, we identified self-regulation as an important antecedent of individual ambidexterity. Specifically, we drew on self-efficacy as the source of agentic behavior, such as individual ambidextrous performance. Although, at first glance, considering self-efficacy in the context of ambidexterity is not new (Mom et al., 2015; Kauppila & Tempelaar, 2016; Jansen et al., 2008), we have added to the current literature by differentiating between generic and specific self-efficacy. While generic self-efficacy is a broader predictor of positive outcomes across situations, specific self-efficacy has the stronger relationship with the same outcomes in the domain it is specific to, and typically mediates the relationship of generic self-efficacy to the outcome (Schutte & Malouff, 2016). So far in the literature, cognitive antecedents of ambidexterity on the individual level have been fairly broad, deeply seated and formed early, and, consequently, not suitable for actionable recommendations for organizational practice. Domain specific self-efficacy is a very suitable basis for systematic development in the organizational context. On the one hand, it is more directly connected to the desired behavioral outcomes and, on the other hand – as a major advantage – it is responsive to organizational interventions. We have identified explorative self-efficacy as a directed antecedent of individual ambidexterity, thereby demonstrating for the first time an individual-level variable that is malleable within the organizational setting. Explorative self-efficacy is at the heart of our theoretical model as it constitutes the *psychological mechanism* by which employees' individual ambidexterity can be shaped. The belief in one's explorative abilities is especially important when employees from formal non-innovative workplace have to engage in

ambidextrous tasks: They are already familiar with exploitative performance from their previous work routine, but they must develop explorative skills.

Second, we aimed to investigate in more detail the relevant mechanisms on the OT level. To further analyze how antecedents on the individual level interact with the social context in order to explain individual ambidexterity, we differentiated between proximal and distal aspects on the OT level. To date, proximal and distal aspects of the organizational context have mostly been considered independently of each other. The current findings point to the importance of alignment between proximal and distal environmental aspects for the manifestation of individual ambidexterity. Only the joint force of proximal and distal organizational characteristics can sustainably influence employees' behavior. In fact, Johnson-Neyman analyses indicated that the positive impact of the proximal social context on explorative self-efficacy was only significant for about half the empirical sample, with 48% of employees perceiving too low distal support for innovation to benefit from TFL. This is particularly interesting for the emerging literature on the role of leadership as an ambidexterity antecedent (Jansen, Vera & Crossan, 2009; Nemanich & Vera, 2009; Kauppila & Tempelaar, 2016), as it indicates the need to contextualize leadership with perceptions of the more distal organizational context.

### *Practical Implications*

Our results also carry important implications for practice. We identify a mechanism for individual ambidexterity that is dependent on a complex interaction between different aspects of the social context and individual-level cognition. Thus, it is imperative for managers to consider the whole picture in order to create efficient and sustainable change. Of particular interest to practice is our result concerning the need for alignment between the proximal and distal social contexts. This suggest that insular initiatives to build explorative self-efficacy and, consequently, more individual ambidexterity, might not succeed if they are not accompanied by perceivable support from the more distal social context. We also point managers towards the crucial role of explorative self-efficacy as a cognitive antecedent of individual ambidexterity. Both through leadership and shaping of the more distal social context, managers should strive to nurture their followers to believe that they possess the capability to successfully explore, especially if the followers come from traditionally non-innovative functions.

### *Limitations and Future Research*

As in all empirical research, our study is not without limitations. Our data is based on a cross-sectional survey design. Even though we strived to minimize common method variance by collecting data for the dependent variables from the supervisors and for the independent variables from the focal employees, interpretations of causality have to be viewed with caution. While the direction of our hypotheses is based on theory, we cannot empirically rule out reverse causality. Furthermore, our data is all collected from one organization with an exploitative background. While the majority of the empirical work in ambidexterity research has been conducted in established companies with strong traditions of exploitation, this puts in question the generalizability of our results for companies moving from an explorative approach towards more ambidexterity. Finally, while our argument about the interaction structure of distal social context, proximal social context and cognitive underpinnings is generic, we focused empirically only on specific variables. Although we consider our rational for the variables we chose to include to be sound, these variables are by no means exhaustive.

Future research might be able to address these shortcomings and collect longitudinal data from several companies on multiple variables in the proximal and distal social contexts, as well as individual-level antecedents.

Another interesting idea might be to analyze more "ambidextrous" antecedents: For much of the empirical research on individual ambidexterity, the antecedents studied are usually a combination of those antecedents considered useful for exploration and other antecedents considered useful for exploitation. For example, factors for exploration, such as opening leadership (Rosing, Frese & Bausch, 2011), weak informal ties (Rogan & Mors, 2014) or social support (Gibson & Birkinshaw, 2004), are combined with factors for exploitation, such as closing leadership (Rosing et al., 2011), strong formal ties (Rogan & Mors, 2014) and performance context (Gibson & Birkinshaw, 2004). This leaves open the question of how antecedents that are not related to either exploration or exploitation, but rather to the integration of conflicting demands, affect ambidexterity. For example, does paradoxical leadership (Zhang, Waldman, Han, Li, 2015) as the proximal social context level, and paradox mindset (Miron-Spektor, Ingram, Keller, Smith, & Lewis, 2018) on the individual cognitive level, explain to what degree exploration and exploitation are synergistic versus how they compete for resources?

Finally, a lot of the empirical work on ambidexterity has been done in the context of established companies with a strong exploitative focus that move towards ambidexterity by integrating more exploration. From our perspective, it would be very interesting to compare the patterns described in this literature with new research on how start-ups with a strong imprinted focus on exploration move towards more ambidexterity by building more exploitative routines as they grow and mature.

Driven by forces of technological disruption, ambidexterity is very much a central challenge for many organizations. As change is the only constant for an ever-increasing number of companies, it becomes imperative to integrate employees into the legacy business as well as new, emerging opportunities. Through our research, we hope to provide some stimulating ideas of how managers and researchers can think about potential solutions to this problem in a systematic way.

# Chapter 3: Learning paradox- Antecedents and mechanisms of paradox mindset development

## Introduction

Organizations face multiple conflicting requirements, such as exploration versus exploitation (March, 1991), profit versus social responsibility (Margolis & Walsh, 2003) or collaboration versus control (Sundaramurthy & Lewis, 2003). As complexity and global competition increase, and fast-paced technological cycles gain prevalence, these tensions are becoming increasingly salient (Lewis, 2000). Following the insight that "leaders' responses to these tensions may be a fundamental determinant of an organization's fate", paradox theory has developed a rich description of such tensions (Smith & Lewis, 2011, p. 381), which are characterized by "persistent contradictions between interdependent elements" (Schad et al., 2016, p.6).

The ability of individual employees (e.g. Gibson & Birkinshaw, 2004), managers (e.g. Mom, van den Bosch & Volberda, 2009) and executives (e.g. Smith & Tushman, 2005) to manage such paradoxical demands is an important micro-foundation of the organizational capability to do so. Still, research on the individual level remains scarce (Schad et al., 2016). Recent paradox research found enduring differences in individuals' proclivity and ability to manage paradoxes (Miron-Spektor et al., 2018). This antecedent of paradoxical cognition was framed as *paradox mindset* and the authors provided evidence for its moderating role on the performance effects of paradoxical tensions (Miron-Spektor et al., 2018). Paradox mindset is thus an important antecedent for paradoxical cognition and the management of paradoxical tensions. However, we know little about the antecedents or evolution of paradox mindset itself: Can it be developed, and if so, how? "If paradoxical thinking can be taught, we need to clarify what might be some of the best ways to do so" (Schad et al., 2016, p. 41).

To address this research gap, in this study we build upon psychological mindset theory (Dweck, 2006). Based on this literature, we argue that paradox mindset can indeed be developed, and we differentiate between informational (e.g. Blackwell, Trzesniewski & Dweck, 2007) and motivational (e.g. Muller & Dweck, 1998) antecedents of paradox mindset development. Informational approaches refer to changes

in someone's explicit, meta-cognitive assumptions about the world: Are my surroundings characterized by lasting tensions between interdependent elements or can the world be described in terms of simple trade-offs?

These assumptions may be developed, for example, through a paradoxical leader modelling paradoxical behavior at a high level in the organization. A leader can achieve this if they manage to surface paradoxical tensions and demonstrate the value of balancing the two poles in a dynamic equilibrium. Motivational approaches, on the other hand, refer to shaping the more implicit, associative aspects of mindset through feedback and reward processes, which are again executed by the leaders in an organization. Accordingly, we propose that paradoxical leadership is a particularly suitable way to develop paradox mindset since it works through both approaches (cf. Anderson, Boaler & Dieckmann, 2018).

We draw on primary data from 199 employees from two Central European companies to empirically test our hypotheses. We find strong empirical support for our prediction that paradoxical leadership leads to paradox mindset. However, this effect is fully mediated by the individuals' experiences with engaging in paradoxical tasks (i.e. individual ambidextrous behavior). This suggests that paradoxical management, paradoxical behavior and paradox mindset are inherently linked to one another in a recursive, self-reinforcing feedback loop.

Our results have important implications for both theory and practice. For theory, we develop the first model explicating how paradox mindset, and thus the capability for individual paradoxical thinking, could be developed. We identify the relevant antecedents in informational and motivational angles, and describe the recursive process of mindset, behavioral response and social outcomes, which stabilizes mindsets over time. Second, we extend current thinking about the relationship between paradoxical capabilities and paradoxical management. More concretely, we demonstrate that paradoxical capability not only leads to more paradoxical management, but that paradoxical management, in turn, leads to the development of more paradoxical capability. This puts in question linear conceptualizations of capability and management in the context of paradox, and introduces the notion of recursive, causal loops between the two. Finally, we contribute to an emerging conversation about how paradoxical tensions across different categories interact with each other. Our research documents

how learning across different paradox categories takes place through the development of paradox mindset.

In terms of implications for practice, we identify practical ways that leaders can use to increase the paradoxical capabilities of their followers.

## Theorethical background

Mindset Theory (Dweck, 2006; 2008) is based on the observation that individuals have to use simplifying mental processes to make sense of a world filled with complex, ambiguous and contradictory information (Taylor & Crocker, 1981). A mindset is defined as a "mental frame or lens that selectively organizes and encodes information, thereby orienting an individual toward a unique way of understanding an experience and guiding one towards corresponding actions and responses" (Crum et al., 2013). In psychological research, such mindsets have been demonstrated to be highly consequential for dealing with ambiguous or ambivalent stimuli. For example, mindsets about aging not only determine physiological reactions (Levy, Hausdorff, Hencke & Wei, 2000) but also longevity (Levy et al., 2002), and mindsets about intelligence determine educational outcomes (Blackwell et al., 2007).

Mindset theory has recently been linked to paradoxical thinking (Miron-Spektor et al., 2018). Paradox mindset is conceptualized as a general proclivity for accepting, valuing and proactively integrating paradoxical tensions irrespective of the particular tension type (cf. Miron-Spektor et al., 2018). Past research has shown paradox mindset shapes the way people perceive and make sense of paradoxical tensions. Instead of perceiving these tensions as dilemmas, a paradox mindset "shifts expectations from rationality and linearity to accepting paradoxes as persistent and unsolvable puzzles" (Smith & Lewis, 2011, p. 385). Furthermore, paradox mindset has been shown to moderate the effects of paradoxical tensions, such as exploration and exploitation on performance: While high paradoxical tensions were found to have a positive impact on the performance of employees with a high paradox mindset, they appeared to have a negative effect for those with a low paradox mindset (Miron-Spektor et al., 2018).

Given these important insights on the characteristics and effects of paradox mindset, we know surprisingly little about its antecedents and evolution. We therefore

build on a second tenet from mindset theory, i.e. the fact that mindsets can be learned and developed. In psychological research, there is ample evidence of the possibility to change mindsets (Aronson et al., 2002; Chiu, Hong & Dweck, 1997; Crum & Langer, 2007; Crum et al., 2013; Dweck, 2008). Since paradox mindset is a central antecedent to adaptive individual management of paradoxical tensions, insights into how paradoxical mindset can be developed would substantially advance the literature. In order to develop these insights, we build on a detailed account of the psychological dynamics of mindsets (Dweck, 2006; 2008).

### *Psychological mindset theory*

The first part of the definition of a mindset refers to its basis, which lies in meta-cognitive, ontological assumptions or "lay theories" (Chiu et al., 1997). Is intelligence fixed at birth or something that is developed with practice over time, like a muscle (Dweck, 2006; 2008)? Is stress an adaptive reaction that focuses additional resources or does it debilitate one's health and resources (Crum et al., 2013)? In the context of paradox mindset, the relevant ontological assumption may relate to whether an individual perceives paradoxes as both contradictory and interdependent tensions that can be worked through in both / and solutions, or if they are perceived as trade-offs that preclude each other (Miron-Spektor et al., 2018). Mindsets are sometimes also referred to as implicit theories, referring to the fact that they are seldom conscious or articulated (Dweck & Leggett, 1988).

The second part of this definition refers to the emotional and motivational tendency that is instigated by and interacts with these meta-cognitive assumptions, as stimuli relevant to the mindset are confronted. For example, people with a fixed mindset of intelligence rather coherently interpret challenging tests as being diagnostic of their inherent ability (Dweck & Leggett, 1988). Consequently, mistakes and negative feedback are perceived by these people as psychologically threatening and cause them emotional reactions, such as feelings of helplessness (Blackwell et al., 2007). People with a "stress-is-debilitating" mindset experience more negative emotions than those with a "stress-is-enhancing" mindset when faced with stressful situations, which is also reflected in their physiological reactions (Crum et al., 2017). In the context of our study, paradoxical tensions can lead to frustration and defensiveness (Lewis, 2000) or to an

emotional experience characterized by "valuing, accepting and feeling comfortable with tensions" (Miron-Spektor et al., p. 27), depending on the paradox mindset.

In this way, a mindset can be understood as a dynamic interplay between meta-cognitive assumptions and coherent emotional responses when an individual is confronted with the subject of the mindset.

Importantly, this integrated mindset response reliably motivates individuals to behave correspondingly (Crum et al., 2013; Dweck, 2008). These corresponding behaviors can be broadly classified into two archetypical behavioral responses: Engagement or avoidance. In the aforementioned example of fixed mindset of intelligence in a challenging test situation, avoidant behaviors, such as cheating or withdrawal, occur (Blackwell et al., 2007; Mueller & Dweck, 1998) in order to preserve the individual's positive self-evaluation. In contrast, a growth mindset of intelligence in a challenging test situation leads to engagement, such as more preparation in the future and mastery-oriented learning (Aronson et al., 2002; Blackwell et al., 2007; Good et al., 2003). Similarly, stress mindset predicts either engagement with a stressor to "meet the demand, value or goal underlying the stressful situation" (Crum et al., 2013, p. 718) or avoidance of the source of stress. In the context of our study, we propose a similar mechanism for paradox mindset. In paradox literature, a variety of avoidant reactions to paradoxical tensions have been documented (Lewis, 2000; Smith & Berg, 1987; Vince & Broussine; 1996), most prominently splitting, projection, repression, regression, reaction formation and ambivalence. On the other hand, engagement strategies, such as acceptance (Schneider, 1990), confrontation (Smith & Berg, 1987) and transcendence (Watzlawick et al., 1974), are also possible. Individuals with a paradox mindset "see tensions as opportunities, *confront* [emphasis added] them, and search for both/and strategies" (Miron-Spektor et al., 2018, p. 27). In this way, paradox mindset may determine an individual's behavioral tendency to engage with or avoid paradoxical tensions.

The behavioral tendency for engagement or avoidance instigated by the particular mindset in turn predicts the likely outcomes for the individual in the situation that triggers the mindset. This outcome can generally be classified as either adaptation or decline. For example, increased persistence in the face of challenging tests inspired by a growth mindset of intelligence leads to increased learning (Mueller & Dweck, 1998). Similarly, adaptive engagement behaviors under stress, such as increased desire for

constructive feedback, are reflected in better work performance (Crum et al., 2013). In the context of our study, we propose that the active engagement of tensions promoted by a paradox mindset similarly leads to adaptive outcomes (Miron-Spektor et al., 2018).

Importantly, the expected outcomes are consistent with the espoused mindset: As we have seen, a growth mindset of intelligence promotes successful learning through engagement, which further reinforces the validity of the growth mindset. Conversely, a fixed mindset of intelligence hinders learning because of avoidance behaviors, which further reinforces the perception of the immutability of intelligence. Similarly, a stress-is-enhancing mindset promotes adaptive outcomes in stressful situations through engagement, which further reinforces the notion that stress indeed activates additional resources. Conversely, a stress-is-debilitating mindset hinders adaptive outcomes in stressful situations, thereby further reinforcing the conviction that stress is threatening. In psychology, this dynamic is described as recursive processes (Yeager & Walton, 2011). Individuals' mindsets are situated in a social tension field (Lewin, 1952), and the behaviors consistent with the mindset trigger social outcomes that recursively affect and reinforce the mindset. In this way, mindsets are continuously stabilized over time. This stabilizing through recursive processes explains the rather long-term effects mindsets can have several years into the future (e.g. Blackwell et al., 2007).

In the context of our study, the notion of self-reinforcing cycles is familiar to the paradox literature (e.g. Smith & Lewis, 2011). Engaging with paradoxical tension by working through it (Lüscher & Lewis, 2008) spurs adaptive outcomes and further learning of a paradoxical mindset (cf. Raisch et al., 2018). Conversely, avoidance of the paradoxical tension by "choosing" or overemphasizing one pole leads to vicious self-reinforcing cycles (Tsoukas & Cunha, 2017) and ultimately decline (Sundaramurthy & Lewis, 2003). Thus, we propose a similar stabilizing mechanism for paradox mindset via the recursive process between mindset, behavior and outcomes. This process is illustrated in figure 12:

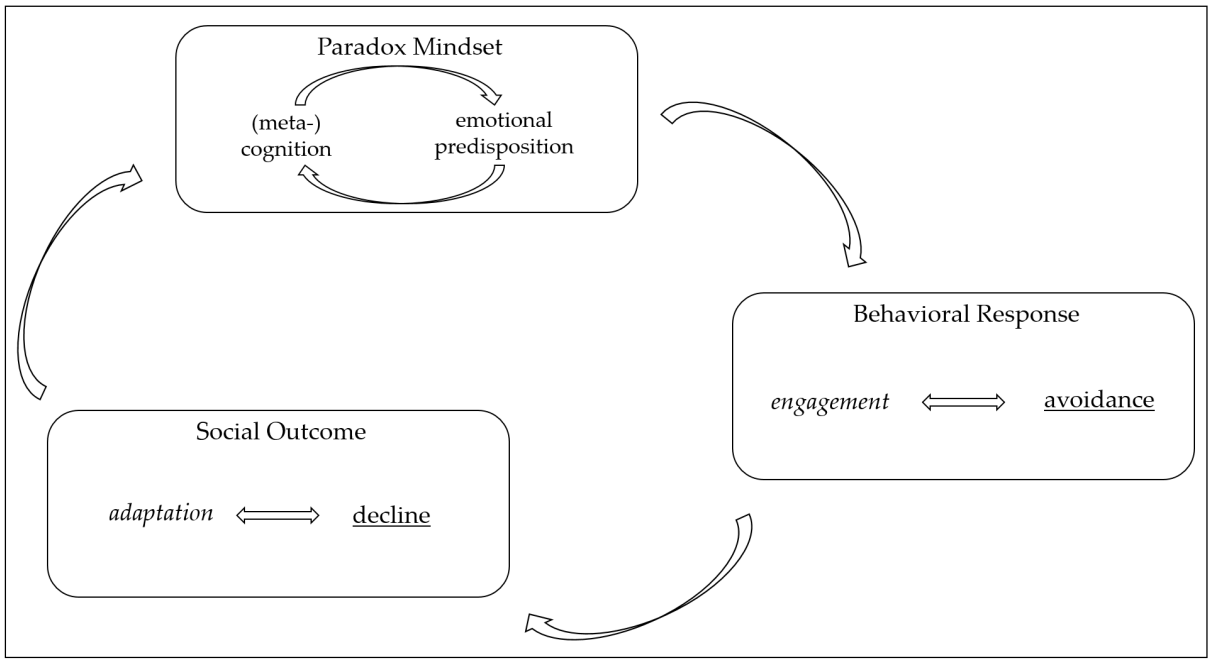


Figure 12: A socio-psychological model of paradox mindset. A dynamical interaction of meta-cognition and emotional predisposition primes a behavioral response to paradoxical tensions, which can broadly be characterized as ranging from engagement to avoidance. The behavioral response leads to a social outcome ranging from adaptation to decline, which further reinforces the individual mindset about paradoxes in recursive, self-reinforcing cycles.

Based on this understanding of the psychological dynamics of mindsets and its application to paradox mindset specifically, we can analyze how mindsets can be developed in individuals. Specifically, any influence on a mindset has to target at least one of its two building blocks. Depending on this target, we can differentiate between informational and motivational influences. *Informational* influences on mindsets target the meta-cognitive, ontological assumptions through rational information presented in a persuasive way. For example, Blackwell and colleagues (2007) changed the mindset of students about intelligence in an 8-week course, which explained mechanisms of neural plasticity, whereas Chiu and colleagues (1997) appealed to authority by presenting students with a "scientific article" that argued compellingly for either a fixed or a malleable view of intelligence in order to change mindsets. In contrast, *motivational* influences target the emotional predisposition by establishing new, implicit associations. For example, Muller and Dweck (1998) demonstrated that feedback can be used to change mindsets, whereas O'Rourke and colleagues (2014) changed reward structures in an online learning environment to develop mindsets.

In the context of our study, we argue that paradoxical leadership is a uniquely suited influence factor for the development of paradoxical mindset in followers. Paradoxical leadership is a multi-dimensional construct, which describes leadership behaviors that meet paradoxical demands in different kinds of paradoxical tensions (Zhang et al., 2015). We propose that paradoxical leadership is particularly suited to developing paradoxical mindset, because it can affect both meta-cognitive assumptions and the emotional predisposition behind paradox mindset. Rather than providing information in the format of a scientific statement (Chiu et al., 1997) or by explaining logical mechanisms (Blackwell et al., 2007), paradoxical leaders can provide a concrete and personal example that it is possible to integrate paradoxical tensions. Such personal experiences, especially when coming from an authority figure such as a leader, can be even more persuasive than scientific statements (e.g. De Wit, Das & Vet, 2008), which are often used in the informational approach to changing mindsets (Chiu et al., 1997). In addition, paradoxical leaders also embody the motivational influence, as leaders are natural sources of both feedback and rewards in an organization. Moreover, the notion that leadership can be an important way to develop mindsets in organizations is consistent with the empirical observation that teachers have been shown to develop the mindsets of their students (Anderson et al., 2018). Thus, we hypothesize:

*H1: Paradoxical leadership predicts followers' paradox mindset in such a way that higher levels of paradoxical leadership are related to higher levels of followers' paradox mindset.*

As discussed above, mindsets are situated in a social tension field of self-reinforcing cycles between mindset, behavior and individual outcomes. Influences intended to develop a particular mindset achieve this by changing the behavioral response to the subject of the mindset in such a way that more adaptive outcomes are achieved, which reinforce the new mindset until it stabilizes (Yeager & Walton, 2011). As followers adopt a more paradoxical mindset, their propensity for perceiving their environment as paradoxical and engaging in paradoxical tasks increases (Leung, Liou, Miron-Spektor, Koh & Chan, 2018; Miron-Spektor & Beenen, 2015). In line with existing literature on paradoxical management, this in turn triggers self-reinforcing cycles of adaptation (Tsoukas & Cunha, 2017) or decline (Sundaramurthy & Lewis, 2003), which reinforce and stabilize the paradoxical mindset: As followers start to engage with their environment as characterized by persistent contradictions, they

experience the potential of synergies between opposites, which rewards their engagement and stabilizes the new mindset. Although our argument about the importance of behavioral changes in explaining changes in paradoxical mindset is generic, we follow the existing literature on paradoxical cognition, which has mostly focused on the effect of paradoxical cognition in the empirical setting of learning tensions (Leung et al., 2018; Miron-Spektor & Beenen, 2015; Miron-Spektor, Gino & Argote, 2011). Learning tensions between exploration and exploitation are addressed at the individual level in the form of individual ambidexterity (Mom et al., 2009). Thus, we hypothesize:

*H2: The effect of paradoxical leadership on paradox mindset is mediated through the followers' level of engagement in paradoxical tasks (i.e. individual ambidextrous behavior).*

## Methods and results

### Procedure and sample

We collected primary data from two companies. Company A is in the service industry, Company B is in the manufacturing industry. Both companies are located in Central Europe. Company A has 6,600 employees and had an annual turnover of 8.64 bn CHF in 2017. Company B has 9,500 employees and had an annual turnover of 1.63 bn CHF in 2017. Cooperation by the companies was secured after explaining the purpose of the study to the director of HR at Company A and to the CEO at Company B. After ensuring employees that their data would be treated confidentially, a link to the survey was sent to a random subsample of each company's employees. After excluding employees with incomplete survey data, a total of 199 responses were included in the analysis (108 from Company A with a response rate of 53%, and 91 from Company B with a response rate of 86%). The sample included participants from different work areas (13% worked in research & development, 25% in services and production, 20% in sales and marketing, 10% in logistics and support, 8% in internal services, 4% in controlling, 2% in procurement, 9% in HR, 7% in IT, and 4% in communications). The average tenure was 13 years (standard deviation 11.3 years).

**Measurement**

*Paradoxical Leadership*: We measured paradoxical leadership by relying on a 5-point scale developed by Zhang and colleagues (2015, example item: *To what degree did your direct supervisor, last year, engage in behaviors that can be characterized as follows: Manage subordinates uniformly, but considers their individual needs?*, Cronbach's $\alpha$: .91). In order to support our interpretation of causal order, the items were anchored on leadership behavior in the past 12 months in a pseudo-longitudinal design. We focused on the subscale relating to belonging tensions, which describes the degree to which the leader is able to treat his subordinates uniformly while respecting their individuality. We use paradoxical leadership in belonging tensions in conjunction with followers' paradoxical behavior in learning tensions to empirically demonstrate a learning transfer across the particular tension categories. This is intended to capture learning of generalized paradoxical cognitive schemata and weaken the alternative explanation of the followers simply mimicking the leader.

*Individual engagement in paradoxical tasks*: In line with prior research (Leung et al., 2018; Miron-Spektor & Beenen, 2015; Miron-Spektor, Gino & Argote, 2011), and to support our theoretical mechanism of learning across paradoxical tensions, we focused on individual engagement in learning tensions or individual ambidexterity as a measure of individual engagement in paradoxical tasks. In order to assess this, we build on the eponymous 5-point scale developed by Mom and colleagues (2009). This scale separately assesses exploration (example item: *To what extent did you, last year, engage in work related activities that can be characterized as activities requiring you to learn new skills or knowledge?*, Cronbach's $\alpha$: .87) and exploitation (example item: *To what extent did you, last year, engage in work related activities that can be characterized as activities that you can carry out as if it were routine?*, Cronbach's $\alpha$: .77). In line with established literature (e.g. Kauppilla & Tempelaar, 2016), we conceptualized individual ambidexterity as the product of individual exploration and individual exploitation. In order to support our interpretation of causal order, the items were anchored in ambidextrous behavior in the past 12 months in a pseudo-longitudinal design.

*Paradox Mindset*: We assessed paradox mindset based on the corresponding 5-point scale developed by Miron-Spektor and colleagues (2018, example item: *I am*

*comfortable working on tasks that contradict each other*, Cronbach's $\alpha$: .87). In order to support our interpretation of causal order, the items were anchored in the individual's current assessment of their mindset.

*Control variables*: In line with existing research on paradoxical cognition (Miron-Spektor et al., 2018), we included gender, education and organizational tenure as control variables. In addition, we included a dummy variable for the company as a control to rule out the possibility that effects were caused by systematic differences between the two companies in the sample.

## Measurement Validation

We conducted a confirmatory factor analysis (CFA) with all variables (Exploration, Exploitation, Paradoxical Mindset, Paradoxical Leadership) using a four-factor measurement model. **Table VI** provides the factor loadings of the scale items. **Table VII** reports the goodness of fit indices for the factor analysis. Overall fit statistics indicated an adequate fit for the measurement model.

**Table VI:** Confirmatory factor analysis

| ***Constructs*** | ***Items*** | ***SFL*** |
|---|---|---|
| **Exploitation** | To what extent did you, last year, engage in work related activities that | .444 |
| AVE = .435 | can be | .775 |
| CR = .838 | characterized as follows: | .465 |
| | 1. Activities for which you've accumulated a lot of experience | |
| | 2. Activities that you can carry out as if they were routine | .755 |
| | 3. Activities that serve existing (internal) customers with existing serv | .600 |
| | Products | .787 |
| | 4. Activities that it is clear you how to conduct | .694 |
| | 5. Activities primarily focused on achieving short-term goals | |
| | 6. Activities that you can properly conduct by using your present kno | |
| | 7. Activities that clearly fit into existing company policy | |
| **Exploration** | To what extent did you, last year, engage in work related activities that can be | |

| | | |
|---|---|---|
| AVE = .567 | characterized as follows: | |
| CR = .901 | 1. Searching for new possibilities with respect to products / services, processes or Markets | .810 |
| | 2. Evaluating diverse options with respect to products / services, processes or markets | .858 |
| | 3. Focusing on strong renewal of products / services or processes | .805 |
| | 4. Activities for which the associated yields or costs are currently unclear | .788 |
| | 5. Activities requiring quite some adaptability on your part | .683 |
| | 6. Activities requiring you to learn new skills or knowledge | .642 |
| | 7. Activities that are not (yet) clearly existing company policy | .679 |
| **Paradoxical Mindset** | 1. When I consider conflicting perspectives, I gain a better understanding of an Issue | .466 |
| AVE = .498 | 2. I am comfortable dealing with conflicting demands at the same time | .767 |
| CR = .897 | 3. Accepting contradictions is essential for my success | .678 |
| | 4. Tension between ideas energizes me | .591 |
| | 5. I enjoy it when I manage to pursue contradicting goals | .753 |
| | 6. I often simultaneously embrace conflicting demands | .789 |
| | 7. I am comfortable working on tasks that contradict each other | .755 |
| | 8. I feel uplifted when I realize two opposites can be true | .797 |
| | 9. I feel energized when I manage to address contradictory issues | .687 |
| **Paradoxical Leadership** | To what degree did your direct supervisor, last year, engage in behaviors that can be characterized as follows: | |
| AVE = .745 | 1. Use a fair approach to treat all subordinates uniformly, but also treat them as individuals | .884 |
| CR = .936 | 2. Put all subordinates on an equal footing, but consider their individual traits or personalities | .904 |
| | 3. Communicate with subordinates uniformly without discrimination, but vary his or her communication style depending on the individual's characteristics or needs | .867 |
| | 4. Manage subordinates uniformly, but consider their individualized needs | .868 |

5. Assign equal workloads, but consider individual strengths and capabilities for handling different tasks .789

**Table VII:** Goodness of Fit Indices

| $\chi^2$ | DF | $\chi^2$/ DF | CFI | RMSEA | IFI |
|---|---|---|---|---|---|
| 583.873 | 333 | 1.753 | .908 | . 909 | .062 |

**Results**

**Table XIII** presents descriptive statistics and correlations of the study variables. In order to test for hypothesis 1, we conducted a linear regression of paradox mindset, with results depicted in **Table IX.**

Table VIII: Descriptive statistics and correlations of study variables

| Variable | Mean | S.D. | 1. | 2. | 3. | 4. | 5. | 6. | 7. |
|---|---|---|---|---|---|---|---|---|---|
| **9. Paradoxical Leadership** | 3.82 | 0.86 | | .17* | .21** | -.11 | .09 | -.02 | -.03 |
| **10. Paradox Mindset** | 3.31 | 0.69 | .17* | | .38** | -.01 | .22** | .17* | -.13 |
| **11. Engagement in paradoxical tasks** | 12.47 | 3.62 | .21** | .38** | | .04 | .08 | .01 | -.01 |
| **12. Tenure** | 13.06 | 11.28 | -.11 | -.01 | .04 | | -.27** | .09 | -.25** |
| **13. Education** | 2.52 | 1.09 | .09 | .22** | .08 | -.27** | | .18** | -.15* |
| **14. Gender** | 1.70 | 0.49 | -.02 | .17* | .01 | .09 | .18** | | -.42** |
| **15. Company** | 0.54 | 0.50 | -.03 | -.13 | -.01 | -.25** | -.15* | -.42** | |

Significance at p<.05, .01, .001 indicated as *,**,***, respectively

**Table IX:** Regression

Model of Engagement in Paradoxical Tasks and Paradox Mindset

| *Variable* | **Engagement in Paradoxical Tasks** | | |
|---|---|---|---|
| | ***Coefficient*** | ***S.D.*** | ***t - value*** |
| **Intercept** | 7.708*** | 1.825 | 4.224 |
| **Paradoxical Leadership** | 0.893** | 0.297 | 3.011 |
| **Gender** | 0.011 | 0.573 | 0.018 |
| **Education** | 0.306 | 0.252 | 1.215 |
| **Company** | 0.269 | 0.582 | 0.461 |
| **Tenure** | 0.031 | 0.025 | 1.272 |
| | $R^2$ = 0.055; $F$ (5,193) = 2.266; $p$ < .05 | | |
| | **Paradox Mindset** | | |
| | ***Coefficient*** | ***S.D.*** | ***t - value*** |
| **Intercept** | 1.703*** | 0.331 | 5.14 |
| **Paradoxical Leadership** | 0.07 | 0.053 | 1.325 |
| **Engagement in Paradoxical Tasks** | 0.067*** | 0.013 | 5.316 |
| **Gender** | 0.172 | 0.099 | 1.725 |
| **Education** | 0.101* | 0.044 | 2.302 |
| **Company** | -0.067 | 0.101 | -0.658 |
| **Tenure** | 0.0004 | 0.004 | 0.097 |
| | $R^2$ = .213; $F$ (6,192) = 8.642; $p$ < .001 | | |

Significance at p<.05, .01, .001 indicated as *,**,***, respectively

In order to test for hypothesis 13, we used the process macro in SPSS to test our mediation model. Path coefficients are depicted in figure 13, and bootstrapping indicates a significant indirect effect (b =.06, BootSE = .02[.02,.11]).

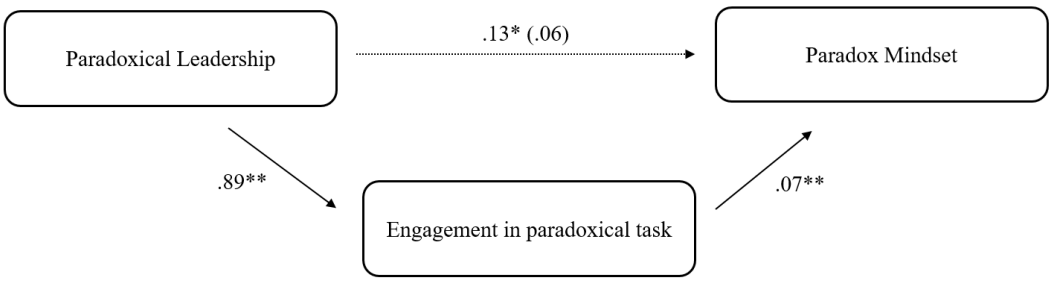


Figure 13: Mediation model with total, direct and indirect effects as indicated by unstandardized regression coefficients. The same control variables are included as in the regression model for hypothesis 1

## Discussion

Building on psychological mindset theory, our study identifies paradoxical leadership as a key antecedent for developing paradox mindset. Furthermore, we build on paradox theory and argue that this positive effect is mediated through a virtuous cycle engendered by individuals' engagement in paradoxical tasks. Building on primary data from 199 employees, we find strong empirical support for our predictions: Paradoxical leadership in the past 12 months predicts increased paradox mindset, and this effect is fully mediated through more engagement in paradoxical tasks in the past 12 months. These insights have important implications for both theory and practice.

For theory, we present the first results suggesting that paradox mindset is a malleable characteristic that can be shaped and developed. Paradox mindset has recently received research attention (Keller, Loewenstein & Yan, 2017; Miron-Spektor et al., 2018) given its central role in explaining interindividual variability in the management of paradoxical tensions. In line with a micro-foundations perspective (Felin, Foss & Ployhart, 2015) and paradox theory (Smith & Tushman, 2005), individual managerial ability to manage paradoxical tensions can be considered a crucial basis for the organizational ability to thrive in a paradoxical world (cf. Lewis, 2000; Smith & Lewis, 2011). We identify paradoxical leadership as an actionable angle to develop paradox mindset in a viable way in an organizational setting.

Furthermore, we theoretically derive two central pathways through which paradox mindset can be developed, thus providing guidance for future research to dive deeper into practical ways that paradox mindset can be shaped. As outlined in the introduction, this answers an important research gap in the literature: "If paradoxical

thinking can be taught, we need to clarify what might be some of the best ways to do so" (Schad et al., 2016, p. 41). Based on our reasoning, we suggest that paradoxical thinking can be taught through developing paradox mindset. In order to develop paradox mindset, the informational pathway or the motivational pathway can be used. The informational pathway targets the basic ontological assumptions or lay theories (Chiu et al., 1997) about the prevalence and usefulness of paradoxes by presenting new information in a persuasive way. The motivational pathway targets the emotional reactions towards paradoxes through building new implicit associations, for example, through the use of feedback or rewards structures (e.g. Muller & Dweck, 1998).

In addition, we clarify the recursive process through which paradox mindset is stabilized or changed over time: As individuals are confronted with paradoxical tensions, paradox mindset reliably motivates a behavioral response of engagement versus avoidance, which probabilistically leads to respective social outcomes of adaptation versus decline. As these outcomes are in line with the initial mindset priming the behavioral tendency, the mindset gets reinforced over time. Thus, any attempt to change paradox mindset has to consider this self-reinforcing dynamic. It is not enough to influence mindset through the two pathways, but the individual manager needs to be able to change their behavior towards the engagement of paradoxical tensions and reap the adaptive outcomes from this approach in order for sustainable change to occur.

Understanding these two pathways and the self-reinforcing dynamic between mindset, behavior and social outcomes allows researchers to theorize about the effects of various organizational design elements, such as structure, HR practices, or climate on paradox mindset and paradoxical thinking: To what degree does the design element affect individual meta-cognition about paradoxes in a persuasive way? Does it change implicit associations towards paradoxical tensions, either via social feedback or material rewards? Does the organizational context allow individuals to change their behavior in favor of more engagement of paradoxical tensions? And are there any substantive obstacles preventing the individual from reaping adaptive outcomes from their engagement of paradoxical tensions? We suggest that our model of paradox mindset development presents the first systematic understanding of the antecedents of paradox mindset or paradoxical thinking that would allow this sort of extrapolation.

Second, we contribute novel insights to emerging research, taking a more process-oriented perspective on paradox and paradox management (Schad et al., 2016).

Extant literature has mostly used paradoxical capabilities, such as paradoxical cognition or paradox mindset, as antecedents to explain the management of paradoxical tensions (Keller et al., 2017; Miron-Spektor et al., 2018; Smith & Tushman, 2005). Thus, as conditions of scarcity, plurality and change surface paradoxical tensions, paradoxical capabilities are considered to determine how well organizations are able to deal with these tensions (Smith & Lewis, 2011). In contrast, our study turns this relationship around and demonstrates how the way individuals deal with paradoxical tensions in a given time frame predicts their paradoxical capability in the form of paradox mindset afterwards. This presents the "dark side of the moon" of the relationship between paradox management and paradoxical capabilities, as we suggest this relationship to be reciprocal instead of linear, as has previously been assumed.

This insight is well aligned with recent conceptual ideas regarding learning spirals that explain the development of paradoxical capabilities (Raisch, Hargrave & Van de Ven, 2018). In their recent paper, Raisch and colleagues (2018) suggest a dialectical reading of paradox management. In this Hegelian reading, a paradoxical tension between thesis (such as exploration) and antithesis (such as exploitation) produces a temporary synthesis (ambidexterity), only to be challenged again by a new antithesis (social orientation vs. ambidextrous profit orientation). Importantly, their analysis indicates a learning spiral of paradox management, in which each new synthesis of paradoxical tensions builds on the prior syntheses that have already been achieved. Thus, it is suggested that as organizations engage in paradoxical management, some form of generalizable learning takes place. However, the current literature lacks any systematic insight into the mechanism determining how this learning could take place. In line with a micro-foundations perspective on paradox management (Felin, Foss & Ployhart, 2015; Smith & Tushman, 2005), the individual managerial capability to think paradoxically would be a reasonable candidate for this learning mechanism. Our research demonstrates this type of learning of paradox mindset from engagement in paradoxical management and is therefore the first to suggest individual development of paradox mindset as a viable candidate to explain the mechanism behind this organizational level learning spiral.

Third, our research contributes to an emerging conversation about how different paradoxical tensions are related. Extant research has mostly focused on the duality inherent in one particular paradoxical tension, which has resulted in few insights about

the multiplicity inherent in the relationship between different kinds of paradoxical tensions (Lewis et al., 2016). In a recent review, Schad and colleagues (2016) pointed out the need for more integrative approaches to answer research questions, diving deeper into these relations, such as "How do nested paradoxes interact with one another? And *how do approaches to one paradox affect dealings with another, related paradox* [emphasis added]? How would our management theories shift if they embedded insights about holism across various oppositional forces?" (p. 38).

We consider extending the notion of dynamism and self-reinforcing cycles to our understanding of paradoxical cognition and paradox mindset to be our central contribution to this research gap. Extant research has considered paradoxical dynamics as self-reinforcing through external effects of more or less paradoxical management: If managers deviated too much from a dynamic equilibrium, the interdependency of the opposing forces would lead to vicious cycles and eventual decline (Tsoukas & Cunha, 2017). In contrast, maintaining a dynamic equilibrium through mechanisms of differentiation and integration would ensure long-term viability (Smith & Lewis, 2011). In this understanding, paradoxical cognition is external to this dynamic and is a viable angle to steer the organizational approach towards more paradoxical management (Smith & Tushman, 2005). In contrast, our findings position paradoxical mindsets front and center *within* this self-reinforcing dynamic, as the degree of learning experiences with paradoxical tensions can shape paradox mindset and thus determine future paradox management. Furthermore, this psychological self-reinforcing cycle even goes beyond the external cycle, since the psychological effect of paradoxical management, or the lack thereof, even generalizes across different types of paradoxical tension. This insight challenges assumptions implicit in our current understanding of paradox theory, namely that it can be meaningful to analyze self-reinforcing cycles in isolated paradoxical dualities rather than accounting for the overall capability to manage paradox (Smith & Lewis, 2011).

For practitioners, our study is the first to point towards actionable angles for how the individual ability to manage paradoxical tensions can be developed through leadership. As pointed out above, this ability can increasingly be considered an important micro-foundation of the organizational ability to flourish under paradoxical tensions (Smith & Tushman, 2005; Miron-Spektor et al., 2018). Actionable suggestions for developing paradox mindset and, thus, paradoxical thinking in employees, include

leaders modelling paradoxical behavior and adapting feedback and reward structures within an organization. In addition, the malleability of paradox mindset might also serve as an inspiration to include specific mindset interventions, based on the principles outlined in this paper, in corporate training materials. Furthermore, our results suggest that investment in paradoxical management strategies not only offers benefits in itself, but also contributes to the subsequent building of paradoxical capability in the form of paradox mindset. This might affect cost-benefit analyses for corporate development programs, since the effects of paradox mindset development generalize beyond any specific individual paradoxical tension.

Like all empirical research, our study is not without limitations. In terms of the sample, ours only included employees from two companies. While we controlled for that, the relationships we observed could be influenced by specific contextual factors in these two companies. Although we theoretically identify two angles for how paradoxical leadership might influence paradox mindset, our data did not allow us to mathematically untangle the two processes. Finally, while respondents rated the predictor variables anchored on the last 12 months, all data was measured at a single point in time. While we consider the theoretical rational for the direction of causality in our model to be convincing, this still introduces the possibility of reverse causality.

Future research should address these shortcomings with a truly longitudinal research design, thereby not only controlling for common method variance, but also introducing a stronger claim of causality. Sampling more than two companies and explicitly measuring process variables, such as the motivational and informational influence of paradoxical leadership, would lend further credibility to the proposed relationship.

An experimental set up with an explicitly designed intervention to increase paradox mindset is also an interesting possibility for future research. The experimental method lends itself to the strongest claims available for available. In addition, the more controlled environment of an experimental manipulation would also offer a greater possibility to empirically disentangle motivational and informational influences. For example, an informational intervention in the form of a scientific report or video could be compared with a motivational intervention, for example, in the form of feedback processes in a task under paradoxical tension (e.g. Laureiro-Martinez et al., 2015). The effect of pure informational, pure motivational or combined interventions could be

compared with more process variables included in the study set up. In this way, the two constitutional elements of paradox mindset could be disentangled as well, i.e. as meta-cognitive assumptions and implicit associations. For example, the experimental paradigm of the implicit association test (Greenwald, McGhee & Schwartz, 1998) might capture the implicit associations primed by paradoxical tensions, while explicit categorization patterns might serve as an indicator of meta-cognitive ontological assumptions (cf. Keller et al., 2017).

With regards to our contribution of a possible micro-foundations process behind cross-tension learning, future research could untangle this process of organizational learning of paradoxical capability in greater detail. Through the use of qualitative, process-oriented research much more insight could be gained about how exactly cross-tension learning takes place. How does individual capability development, such as paradox mindset, interact with organizational-level constructs, such as structure, strategy, strategy-process or climate? At what point does paradox mindset stop residing primarily in the individual managers and become encoded in constructs of greater stability, such as dominant logics, corporate values or culture? Is the learning of paradoxical mindset also transmitted to employees in roles that face more limited paradoxical tensions? This sort of multi-level process dynamics are important to understand in order to be able to fully explain the conditions under which and how cross-tension learning takes place in organizations.

With our research, we hope to provide a first step towards a more in-depth understanding of the learning dynamics between paradox capability and paradox mindset, and we hope that our findings will be instructive for further research diving deeper into this fascinating novel area.

# Chapter 4: Opening up the black box: A contingent dual-process model of ambidexterity emergence

**Abstract.** While research on contextual ambidexterity has primarily focused on the role of individuals to host exploration-exploitation tensions, the emergence process linking ambidexterity at the individual level and at higher levels of analysis, such as the team or organization, has not been described. Integrating multilevel theory and the differentiation-integration view of ambidexterity, we suggest a contingent dual process model of ambidexterity emergence. In the case of composition, both integration and differentiation are taking place at the individual level, followed by convergence-based aggregation. In the case of compilation, differentiation takes place at the individual level, followed by divergence-based aggregation and integration at the group level. We further argue that the relative success of composition and compilation emergence is moderated by the degree of integration mechanisms at the group level. Drawing on multi-informant survey data from 58 teams in a large Swiss insurance company, we find strong support for our theoretical arguments.

**Keywords.** Ambidexterity, contextual ambidexterity, multilevel, emergence, differentiation-integration, composition, compilation.

## Introduction

Research into how companies combine the exploration of novel opportunities and the exploitation of their existing capabilities, dubbed ambidexterity (March, 1991), has demonstrated how this combination is important for organizational prosperity and survival (Junni, Sarala, Taras & Tarba, 2013). The literature has moved from a focus on solutions built on structural separation between exploration and exploitation to an interest in synthesis solutions (Smith & Lewis, 2011), which allow organizations to host both exploration and exploitation within the same unit in so-called contextual ambidexterity (Gibson & Birkinshaw, 2004).

The literature stream on contextual ambidexterity places focal attention on the role of the individual in achieving ambidexterity at higher levels of analysis: "Ambidexterity (…) is best achieved not through structural, task or temporal separation,

but by building a business-unit context that encourages *individuals* (emphasis added) to make their own judgements as to how best to divide their time between the conflicting demands for alignment and adaptability" (Gibson & Birkinshaw, 2004, p.211). This implies some hitherto not specified process of upward contribution from individual-level ambidexterity to higher-level ambidexterity: Ambidexterity as a characteristic of the business unit "*manifests itself* (emphasis added) in the specific actions of individuals throughout the organization" (ibid.). However, while there is a proliferating research stream on antecedents of this individual-level ambidexterity (e.g. Mom et al., 2009), there is still an urgent need for a theoretically rich and empirically validated description of this process of upward contribution from individual-level ambidexterity to higher-level ambidexterity (Birkinshaw & Gupta, 2013; Raisch et al., 2009).

To our knowledge there is only one paper that has measured ambidexterity at multiple levels and thus can draw empirical inferences to this process found a contingent relationship between ambidexterity at different levels. This paper found that the impact of individual-level ambidexterity on higher-level ambidexterity is contingent on opportunity-enhancing HR practices (Mom et al., 2019). This points to a complex process of upward contribution: "(…) While a key assumption in ambidexterity research is that organizational ambidexterity is rooted in ambidextrous behaviors of frontline employees, our study underscores that it is more than the sum of ambidextrous behaviors (…)" (ibid., p. 32). While the findings from Mom and colleagues point both to the complexity of the process of upward contribution and to the fact that the contribution is contingent on contextual factors, we are not aware of any paper that offers a model of the *process* of upward contribution. The fact that the literature on ambidexterity has developed no theoretical description of this process, which is considered a "key assumption" (ibid., p. 32), leaves our understanding of ambidexterity considerably underspecified.

In order to address this research gap, we draw on multilevel theory (Kozlowski et al., 2013; Kozlowski & Klein, 2000; Ployhart & Moliterno, 2011) and differentiate between a composition process and a compilation process. We combine this theoretical lens with the differentiation-integration view of ambidexterity (Smith & Tushman, 2005) to formulate an account of how these processes take place in the context of ambidexterity emergence. We postulate a contingent dual process model of emergence,

in which the relative success of composition emergence and compilation is dependent on integration mechanisms at the higher level.

To empirically test our model, we focus on the upward contribution from the individual level to the team level. We choose this empirical setting for two reasons: On the one hand, team ambidexterity has recently started to become a focus of attention in the ambidexterity literature (Jansen et al., 2016; Li, Li, Lin & Liu, 2018; Wang, Van de Vrande & Jansen, 2017). A central point of contention in this literature stream is the role of team configuration for team ambidexterity, which has been outlined in recent calls (Jansen et al., 2016; Li et al., 2016): What is the influence of the constituent team members on the resulting team-level ambidexterity? This naturally fits to our research question as this individual influence can directly be described with a model of emergence from the individual-level ambidexterity to team-level ambidexterity. Accordingly, analyzing ambidexterity emergence in the empirical setting of team ambidexterity not only focuses on an established and meaningful outcome in the ambidexterity literature, but also answers a prominent research question in this specific literature stream. On the other hand, the team level is also a focal point of multilevel theory: Teams are considered "the crucible of emergent phenomena in organizations" (Kozlowski & Chao, 2012, pp. 341–342), and an "ideal focal point for research on emergent phenomena" (Kozlowski, Chao, Grand, Braun & Kuljanin, 2013, p. 583). The closer causal distance between the individual and the team level and the central role of team outcomes in explaining emergent organizational phenomena, such as ambidexterity, thus make it an ideal empirical setting to test our model.

A central prediction of our model is that the relative success of compilation and composition emergence is moderated by the degree of integration mechanisms at the team level. Drawing on a multi-informant survey data from 58 teams in a large Swiss insurance company, we find strong support for our theoretical argument.

We contribute to the ambidexterity literature by proposing a contingent dual process model of ambidexterity emergence, which is a key assumption in the literature but has thus far not been conceptually described. With our framework, we call for a development of our research paradigm in contextual ambidexterity: Away from understanding organizational contexts that optimize for individual ambidexterity and towards understanding organizational contexts that optimize for ambidexterity emergence. In addition, we contribute to the team ambidexterity literature by answering

calls for analyzing the role of team configuration as an antecedent of team-level ambidexterity (Jansen et al., 2016; Li et al, 2016). Finally, we contribute to multilevel theory by demonstrating how the process leading to a construct, i.e. differentiation and integration in the context of ambidexterity, and the process of the emergence of said construct, i.e. compilation, can directly interact and influence each other, a dynamic that has, to our knowledge, not been described before.

## Theory and Hipothesis

Multilevel theory describes upward contributions from the individual level to the group level, a process called emergence (Kozlowski et al., 2013; Kozlowski & Klein, 2000). Emergence in multilevel theory is defined as the process by which phenomena that have their theoretical foundation in the cognition, affect, behavior, and characteristics of individuals, manifest themselves at higher levels through social interaction, exchange and amplification (Kozlowski & Klein, 2000).

Importantly, multilevel theory has demonstrated that ignoring the complex and dynamic nature of emergence and implying a direct transmission from one level to the other can lead to erroneous theorizing in three ways, as summarized by Ployhart & Moliterno (2011, p. 129) : "(1) misattributing the level of theory for a construct (e.g. assessing employee competencies at the firm level; Gerhart, 2005), (2) ignoring the effects of context (e.g. not realizing that the value of KSAOs [individual-level human capital, consisting of knowledge, skills, abilities and other characteristics; *added*] is affected by the firm's strategy; Barney, 1991), and / or (3) assuming that the findings from one level apply to other levels (e.g. believing that hiring better employees always contributes to firm effectiveness; Ployhart, 2004)". These issues have also been documented in the ambidexterity literature. For example, Mom, Fourné and Jansen (2015) found that the ambidexterity hypothesis from the organizational level is only valid at the individual level in specific task environments, whereas Mom and colleagues (2019) documented the importance of context in the form of HR practices for the emergence of ambidexterity from one level to the other.

In order to describe this process of emergence, multilevel theory broadly differentiates between two types of processes: Emergence based on composition, and emergence based on compilation (Kozlowski & Klein, 2000).

Composition denotes an emergence process based on the convergent attributes of the constituent individuals of the group. In this type of process, homogeneous inputs from the constituent team members are amplified to coalesce into a nomologically largely isomorphic higher-level output. A generic example of this kind of process is a relay race, in which the performance of the running team is the sum of the individual performances of the running team's members. Input and output, i.e. the respective definitions of performance at the individual and team levels, are, in this example, completely isomorphic: distance run per time unit.

Compilation, in contrast, denotes an emergence process based on the divergent attributes of the constituent individuals of the group. In this type of process, heterogeneous inputs from constituent team members are amplified to coalesce into nomologically partially anisomorphic higher-level output. A generic example of this kind of process is the emergence of the group-level construct of cognitive diversity from the individual-level construct of cognitive style (Miron-Spektor, Erez & Naveh, 2011). Input and output in this example are nomologically anisomorphic, i.e. have divergent antecedents and outcomes at their respective levels of construct.

Importantly, composition and compilation are not mutually exclusive, and a given phenomenon can emerge in different ways or forms (Kozlowski & Klein, 2000). Since composition and compilation can be equifinal, "factors that account for why emergence unfolds in different ways under different conditions become an important theoretical focus" (Kozlowski & Klein, 2000). While research on emergence is scarce due to complexity issues (Kozlowski et al., 2013), prominent models of emergence in related fields, such as organizational learning (Kozlowski, Chao & Jaclyn, 2010) or innovation (Shipton, Sparrow, Budhwar & Brown, 2017), have generally started by differentiating between composition and compilation emergence processes of their respective constructs. While we consider this the right approach to start describing a process model of emergence for a given construct, the aforementioned studies remain on a conceptual level, while we strive for an empirical validation. We argue that in order to empirically differentiate between composition and compilation emergence processes, we should focus on the convergence versus divergence of the construct at the individual level: Since composition is "created through the *homogeneity* of the lower-level phenomena" (Ployhart & Moliterno, 2011, p. 128) and compilation is "created through the *heterogeneity* of lower-level phenomena" (ibid., p.129), the homogeneity

(heterogeneity) of the lower-level construct may serve as a single indicator for an emergence process ranging from purely compositional to purely compilational. This single indicator, ranging from compositional to compilational emergence, is true to the dimensional structure of emergence processes ranging from pure composition to pure compilation, which is proposed in multilevel theory (Kozlowski & Klein, 2000)[2].

In order to develop a grounded process model of emergence for the construct of ambidexterity, we integrate these insights from multilevel theory with a process perspective of ambidexterity. Specifically, we adopt the differentiation-integration view of ambidexterity (Smith & Tushman, 2005), which has been used in prior research on team-level ambidexterity (García-Granero, Fernández-Mesa, Jansen & Vega-Jurado, 2018; Heavey & Simsek, 2017). Indeed, Li and colleagues (2018) even point out that "team ambidexterity is a function of a team's cognitive differentiation and cognitive integration" (p. 1036).

From the perspective of the differentiation-integration view of ambidexterity, successful ambidexterity is dependent on the dual processes of differentiation and integration. Differentiation refers to the process of avoiding cross-contamination between exploration and exploitation through clear distinctions between the two activities. The paradoxical tension between exploration and exploitation is managed through well-established boundaries, which assure that the logic of both activities is internally consistent despite the activities being fundamentally different from each other (Tushman & O'Reilly, 1997). Integration refers to the process of engendering cross-fertilization between exploration and exploitation through finding synergies at higher conceptual levels, sometimes referred to as synthesis (Smith & Lewis, 2011). This potential for cross-fertilization can be located, for example, on the level of learning (Andriopoulos & Lewis, 2009): Exploration is necessary to create new knowledge to exploit. However, without exploration, groups do not have the necessary foundational knowledge to build absorptive capacity in order to integrate novel knowledge and guide experimentation. In this way, integration connects the differentiated exploration and

[2] We see this approach as complementary to the approach of modeling two separate indicators (e.g. Ployhart, Weekley & Baughman, 2006), one for composition (usually a mean-based aggregation) and one for compilation (usually a variance-based aggregation). A dual indicator modeling is appropriate when the construct of interest is only measured at the level of the individual, and the different aggregation formulas are contrasted in terms of outcomes. However, the dual indicator approach is less suited to drawing inferences about the relationship between the two emergence processes than a single indicator approach, which measures the relative dominance of composition emergence (based on homogeneity) vis-à-vis compilation emergence (based on heterogeneity).

exploitation activities into a consistent whole. Differentiation is considered a "necessary but, by itself, insufficient process" (Smith & Tushman, 2005, p. 529), which enables integration to occur by building on the distinctions uncovered in the process of differentiation (cf. Suedfeld, Tetlock & Streufert; 1992). This is consequential for understanding the process of ambidexterity: While there is no implication of a temporal order between differentiation and integration, and groups are considered to cycle through both activities in a dynamic equilibrium, there is a clear implication of a causal order between differentiation and integration, in which differentiation is a necessary precondition for successful integration (cf. Smith & Tushman, 2005).

We integrate this process perspective of ambidexterity with the insights from multilevel theory to build a grounded understanding of composition and compilation emergence, respectively, in the context of ambidexterity.

Composition describes an emergence process based on homogeneous inputs from individual-level constituents, which coalesce into a largely isomorphic group-level output. Ambidexterity is dependent on a causally sequential process of differentiation between exploration and exploitation, followed by integration into a consistent synthesis of the two. It follows, that a successful composition emergence of ambidexterity is dependent on both differentiation and integration already taking place at the individual level. If differentiation took place at the individual level but integration did not, then the differentiated input in the emergence process was by definition not homogeneous and could thus not be subject to composition emergence. Due to the causal order of differentiation and integration, it is not possible for integration to take place at the individual level and differentiation to take place at the team level. If neither differentiation nor integration took place at the individual level, the input from the individual could not even be partially isomorphic to the output at the group level. Accordingly, the only basis for composition emergence of ambidexterity is an input of differentiated and integrated exploration and exploitation from the individual level: Homogeneously ambidextrous individual input is combined in a linear fashion, much like individual performance in a relay race[3]. In this way, the requirements of

[3] Note that this is purely a description of the process of emergence, i.e. the mathematical form in which individual-level contributions are part of the formula for emergent ambidexterity – in this case a linear combination of the individual-level inputs. This is not the same as the "simple sum" emergence Mom and colleagues (in press) speak of: While ruling out functional differences, composition allows for weights in the

homogeneity and isomorphism lead to a sequential order between the process of ambidexterity and the process of emergence, in which the two processes do not fundamentally interact.

The opposite is true for compilation, which describes an emergence process based on heterogeneous inputs from individual-level constituents, inputs that coalesce into a partially anisomorphic group-level output. Again, we understand ambidexterity as the result of a causally sequential process of differentiation between exploration and exploitation, followed by integration into a consistent synthesis of the two. It follows, that a successful compilation emergence is dependent on differentiation taking place at the individual level and integration taking place at the team level. The divergence of lower-level input necessary for compilation is achieved through differentiation of exploration and exploitation across the individual-level team members. Integration into a consistent balance at the individual level, however, is not consistent with the requirement for anisomorphism between individual-level input and group-level output. Accordingly, diverse individual-level inputs coalesce into well-differentiated group-level ambidexterity. However, this still leaves the requirement for integration, which has to occur at the team level via an additional process. In this way, *the process of emergence and the process of ambidexterity are directly intertwined*: The first step of the ambidexterity process, differentiation, takes place at the individual level. This intermediate output of the ambidexterity process is then the input for the compilation emergence process to the group level. This compilation is then the input for the final step of the ambidexterity process, integration into a consistent whole again.

This dual process model of ambidexterity emergence is depicted in figure 14:

linear combinations and contextual factors or "emergence enabling states" (Plohart & Moliterno, 2011) which can also hinder or enable composition emergence.

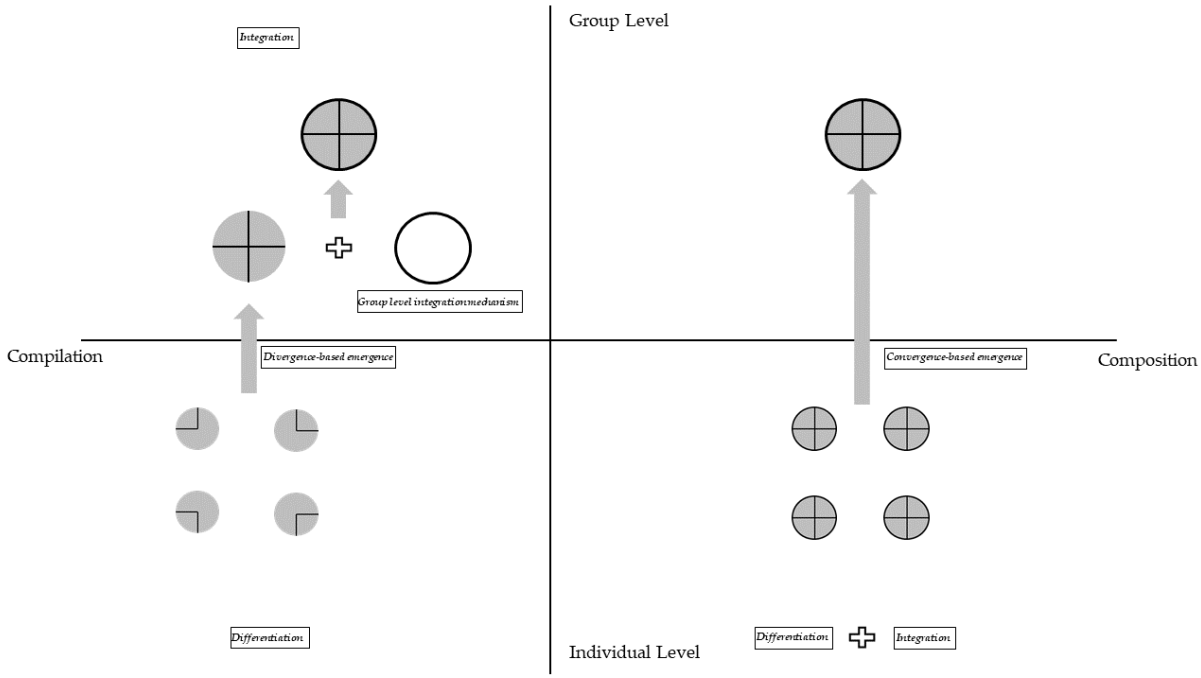


Figure 14: Dual Process Model of ambidexterity emergence.

Emergence of ambidexterity ranges from pure composition to pure compilation. Composition emergence is characterized by a sequential progression of the ambidexterity process and the emergence process: Differentiation and integration take place at the individual level and emerge in a process of linear combination on the group level. Compilation emergence is characterized by intertwined ambidexterity and emergence processes: Differentiation is achieved at the individual level and emerges in a non-linear, divergence-based form on the group level. This well-differentiated group-level compilation serves then as the input for the second step of the ambidexterity process, integration.

The notion that compilation emergence of ambidexterity requires some process of integration or convergence at the group level is consistent with established multilevel emergence models of related outcomes, such as innovation (Shipton et al., 2017).

Integration at the team level constitutes a challenge, since greater differentiation through divergent individual-level input corresponds to a greater proportion of non-overlapping knowledge, information and expertise across group members. These resources are only beneficial to the degree that the group is able to access them and integrate them into coordinated group-level behavior (Richter et al., 2012), which becomes harder as the proportion of non-overlap increases (Strasser & Titus, 1985).

The most comprehensive framework for team outcomes from such diverse inputs is the Categorization-Elaboration model (CEM; van Knippenberg et al., 2004). Crucially, the potential benefits of diverse inputs can only be realized if elaboration takes place, which consists of range, depth and integration of diverse resources (Dahlin, Weingart & Hinds, 2005). The main factor determining whether elaboration takes place is social categorization, i.e. the perception of having a shared social identity (cf. Hoever, van Knippenberg, van Ginkel & Barkema, 2012; Li et al., 2018). In this way, the CEM builds on Social Identity Theory (Tajfel, 1982), which has been used in team ambidexterity research before (García-Granero, Fernández-Mesa, Jansen & Vega-Jurado, 2018; Jansen et al., 2016).

In sum, we propose that the emergence of ambidexterity from the individual level to the group level can be described in a contingent dual process model. On one end of the spectrum, there is a pure composition process, characterized by homogeneous individual-level inputs consisting of differentiated and integrated ambidextrous behavior, which emerge in a linear combination into group-level ambidexterity. On the other end of the spectrum, there is a pure compilation process, characterized by heterogeneous individual-level inputs, well-differentiated between exploration and exploitation, which emerge in a non-linear, divergence-based combination on the group level. In the case of compilation, the successful emergence of ambidexterity at the group level is dependent on an additional, group-level integration mechanism. Based on the CEM, shared social identity across group members seems to be particularly suited for this role. Thus, we hypothesize:

*H1: The relative success of compositional versus compilational ambidexterity emergence is superior (weaker) when shared social identity is low (high).*

## Methods

### Procedure and Sample

We collected primary data from a large insurance company in Switzerland. Increasing competitive pressure, changes in the regulatory framework, decreasing customer loyalty and technological innovations, such as e-health smartphone apps, exert pressure on companies in the insurance industry to explore new opportunities and capabilities. At the same time, customers are price-sensitive and failures in the

processing of client data and their respective claims can have a large financial impact, forcing insurance companies to exploit and refine their existing capabilities. This simultaneous pressure on exploration and exploitation makes the insurance industry particularly suited for research on ambidexterity. In line with our research goal of studying ambidexterity emergence from the individual level to the team level, we opted to collect data from one company to limit external variance. Participation in the study was solicited through the director of HR. The participating company chose to cooperate in order to better understand how it could foster innovation.

In order to measure exploration and exploitation at both the individual and team levels, the study targeted matched employees and their direct supervisors in a dyadic one-to-many design (Kenny, Kashy & Cook, 2006). All variables were assessed based on previously developed and validated scales. If German versions were available, they were used. In the other cases, we first translated the scales into German and then two bilingual researchers translated the scales back into English. A third bilingual researcher compared the back-translation with the original items.

After ensuring supervisors and employees of the confidentiality of their data, 119 teams were asked to participate in the study. After excluding teams with incomplete supervisor data and complete data from fewer than three team members (cf. Jansen et al., 2016), the final sample consisted of 231 employees nested in 58 teams. Team size ranged from four to 17 members (mean: 7.95; standard deviation: 2.97). The sample included participants from a broad cross-section of jobs. Of all the respondents, 47% worked in market range provision and indemnity insurance, 15% in the finance department, 9% in operations, and the remaining 29% worked in strategy. The average age was 41.5 years (standard deviation: 11.5), and average tenure in their position at the time was 7.28 years (standard deviation: 6.52). We used multiple informants to minimize common method variance.

**Measurement**

*Compilation emergence (versus composition):* Based on our reasoning above, we use a single indicator based on homogeneity versus heterogeneity of ambidexterity at the individual level to measure emergence, ranging from composition (emergence based on homogeneity) to compilation (emergence based on heterogeneity). Homogeneity versus heterogeneity is conceptualized as the standard deviation of

individual-level ambidexterity. A high standard deviation (S.D.) indicates compilation, and a low standard deviation indicates composition (cf. Ployhart & Moliterno, 2011).

*Individual-level ambidexterity*: In line with prior research, we conceptualize individual-level ambidexterity as a composite measure of individual-level exploration and individual-level exploitation. Both individual-level exploration and individual-level exploitation was assessed for each individual team member by their respective direct supervisor. To measure an employee's exploration, we asked their supervisor to assess the employee's innovative work behavior on de Jong and den Hartog's (2010) eponymous 5-point scale (example item: *How often does employee X search out new working methods, techniques or instruments?*; Cronbach's $\alpha$: .94); to measure the employee's exploitation, we asked their supervisor to assess the employee's quality of work, their effectiveness, and the extent to which they fulfill their roles and responsibilities on Wayne and Liden's (1995) corresponding 5-point scale (example item: *This employee is highly effective*; Cronbach's $\alpha$:.92), as used by Bolino and Tunley (2003) and Golden, Veiga and Dino (2008). We use the difference between exploration and exploitation as a single indicator ranging from pure exploration over balanced exploration / exploitation to pure exploitation, following He and Wong (2004) and Rogan and Mors (2014)[4].

*Team-level ambidexterity*: In line with prior research, we conceptualize team-level ambidexterity as a composite measure of team-level exploration and team-level exploitation. Both team-level exploration and team-level exploitation were assessed by the team's direct supervisor in a separate scale focused explicitly on team-level outcomes. To measure a team's exploration, we asked the supervisor to assess the team's innovative work behavior on de Jong and den Hartog's (2010) eponymous 5-point scale (example item: *How often does your team find new approaches to execute a task?*; Cronbach's $\alpha$: .94); to measure the team's exploitation, we asked the supervisor to assess

[4] The alternative approach of building multiplicative indicators for ambidexterity would not be suitable as a basis for a homogeneity indicator based on standard deviations, since it would result in a low standard deviation for teams consisting, for example, of two members high in exploration and low in exploitation and two members high in exploitation and low in exploration. This is clearly a heterogeneous team in terms of individual-level exploration / exploitation, and our theory would predict that this is a case for compilation emergence with a high need for additional integration mechanisms at the team level. In contrast, the difference indicator of ambidexterity is robust for these cases and differentiates well between individuals with higher relative exploration versus exploitation. Research generally shows that alternative methods of computing ambidexterity as a composite measure lead to the same results (He & Wong, 2004; Jansen et al., 2016; Lubatkin et al. 2006).

the team's quality of work, effectiveness, and the extent to which roles and responsibilities of the team are fulfilled on Wayne and Liden's (1995) corresponding 5-point scale (example item: *This team is highly effective*; $\alpha$:.83). We used the multiplication of team-level exploration and team-level exploitation as our indicator of team-level ambidexterity.

*Shared social identification*: We assessed shared social identification as the team-level aggregation of organizational identification of the constituent team members, rated by the team members, based on the 5-point scale developed by Mael and Ashforth (1992; example item: *When I talk about company X, I usually say we rather than they*; $\alpha$:.86).

*Control variables*: We include team size and team tenure as control variables. In addition, we include the mean-based aggregation of individual-level ambidexterity in our model to control for possible differences in base-rates of individual-level ambidexterity between teams with high heterogeneity and high homogeneity. The reason for this additional control is that high heterogeneity implies that either exploration or exploitation has to be lower than possible, while high homogeneity can be achieved by having both exploration and exploitation high. Therefore, there might be an inherent bias such that homogeneous teams have overall higher individual-level ambidexterity, which could systematically influence team ambidexterity results irrespective of emergence processes.

**Measurement Validation**

We conducted a confirmatory factor analysis (CFA) with all variables (Individual-Level Exploitative Performance, Individual-Level Explorative, Team-Level Exploitative Performance, Team-Level Explorative Performance, and Shared Social Identification) using a five-factor measurement model. **Table X** provides the factor loadings of the scale items. **Table XI** reports the goodness of fit indices for the factor analysis. Overall fit statistics indicated an adequate fit of the measurement model.

**Table X:** Confirmatory factor analysis

| *Constructs* | *Items* | *SFL* |
|---|---|---|
| **Individual-Level Exploitative Performance** AVE = .749 CR = **.**922 | 5. This subordinate is superior (so far) to other new subordinates that I've supervised before. | .794 |
| | 6. Rate the overall level of performance that you observe for this subordinate. | .903 .882 |
| | 7. What is your personal view of your subordinate in terms of his or her overall effectiveness? | .878 |
| | 8. Overall, to what extent do you feel your subordinate has been effectively fulfilling his or her roles and responsibilities? | |
| **Individual-Level Explorative Performance** AVE = .698 CR = .956 | How often does this employee… | |
| | 11. … pay attention to issues that are not part of their daily work? | .188 |
| | 12. …. wonder how things can be improved? | .866 |
| | 13. … search out new working methods, techniques or instruments? | .920 |
| | 14. … generate original solutions for problems? | .898 |
| | 15. … find new approaches to execute tasks? | .889 |
| | 16. … make important organizational members enthusiastic about innovative ideas? | .864 |
| | 17. … attempt to convince people to support an innovative idea? | .885 |
| | 18. … systematically introduce innovative ideas into work practices? | .907 .812 |
| | 19. … contribute to the implementation of new ideas? | .862 |
| | 20. … put effort into the development of new things? | |
| **Team-level Exploitative Performance** AVE = .668 CR = .889 | 1. This team is superior (so far) to other teams that I've supervised before. | .695 |
| | 2. Rate the overall level of performance that you observe for this team. | .894 .866 |
| | 3. What is your personal view of your team in terms of their overall effectiveness? | .801 |
| | 4. Overall, to what extent do you feel your team has been effectively fulfilling their roles and responsibilities? | |

| | | |
|---|---|---|
| **Team-level Explorative Performance** AVE = .655 CR = .949 | How often does this team… | |
| | 1. … pay attention to issues that are not part of their daily work? | .525 |
| | 2. …. wonder how things can be improved? | .800 |
| | 3. … search out new working methods, techniques or instruments? | .839 |
| | 4. … generate original solutions for problems? | .872 |
| | 5. … find new approaches to execute tasks? | .874 |
| | 6. … make important organizational members enthusiastic about innovative ideas? | .803 |
| | 7. … attempt to convince people to support an innovative idea? | .781 |
| | 8. … systematically introduce innovative ideas into work practices? | .818 |
| | 9. … contribute to the implementation of new ideas? | .859 |
| | 10. … put effort into the development of new things? | .862 |
| **Shared Social Identification** AVE = .655 CR = .918 | 1. When someone criticizes (organization), it feels like a personal insult | .622 |
| | 2. I am very interested in what others think about (organization) | .890 |
| | 3. When I talk about (organization), I usually say “we” rather than “they” | .823 |
| | 4. (organization’s) successes are my successes | .822 |
| | 5. When someone praises (organization) it feels like a personal compliment | .904 |
| | 6. If a story in the media criticized (organization), I would feel embarrassed | .763 |

**Table XI:** Goodness of Fit Indices

| $\chi^2$ | DF | $\chi^2$/ DF | CFI | RMSEA |
|---|---|---|---|---|
| 252.036 | 198 | 1.273 | .934 | . 069 |

## RESULTS

Table XII presents descriptive statistics and correlations of the study variables at the team level.

**Table XII:** Descriptive statistics and correlations at the team level

| Variable | Mean | S.D. | 1. | 2. | 3. | 4. | 5. | 6. |
|---|---|---|---|---|---|---|---|---|
| **1. Team Ambidexterity** | 14.89 | 4.25 | | .063 | -.230† | .225† | -.185 | .115 |
| **2. Shared Social Identification** | 3.59 | 0.51 | .063 | | -.205 | .142 | -.005 | -.195 |
| **3. Compilation Emergence** | 0.44 | 0.28 | -.230† | -.205 | | -.134 | .125 | -.253† |
| **4. Average Individual-Level Ambidexterity** | -0.45 | 0.47 | .225† | .142 | -.134 | | -.068 | .157 |
| **5. Team Size** | 7.95 | 2.97 | -.185 | -.005 | .125 | -.068 | | -.126 |
| **6. Team Tenure** | 1.72 | 1.51 | .115 | -.195 | -.253† | .157 | -.126 | |

† $p<0.10$.

We use regression-based conditional process analysis to model the contingent influence of the emergence process, ranging from composition to compilation on team-level ambidexterity (Hayes, Montoya & Rockwood; 2017), using PROCESS developed by Hayes (2013; SPSS macro). As shown in table XIII and figure 15, we find a significant disordinal moderation of the effect of the composition process on team ambidexterity by shared social identification ($b$=13.05, $t$= 3.17, $p$ = .003).

**Table XIII:** Conditional Process Model

| | *Team Ambidexterity* | | | |
|---|---|---|---|---|
| ***Variable*** | ***Coefficient*** | ***S.D.*** | ***t-value*** | ***p-value*** |
| **Intercept** | 42.65*** | 9.01 | 4.73 | <.001 |
| **Compilation Emergence** | -50.32** | 15.12 | -3.33 | .002 |
| **Shared Social Identification** | -6.11** | 2.21 | -2.76 | .008 |
| **Average Individual-Level Ambidexterity** | 1.41 | 1.14 | 1.24 | .22 |
| **Team Size** | -.31† | .18 | -1.74 | .09 |
| **Team Tenure** | -.49 | .41 | -1.19 | .24 |
| **Compilation Emergence X Shared Social Identification** | 13.05** | 4.11 | 3.17 | .003 |

† p<0.10; ** p<0.01, *** p<0.001.

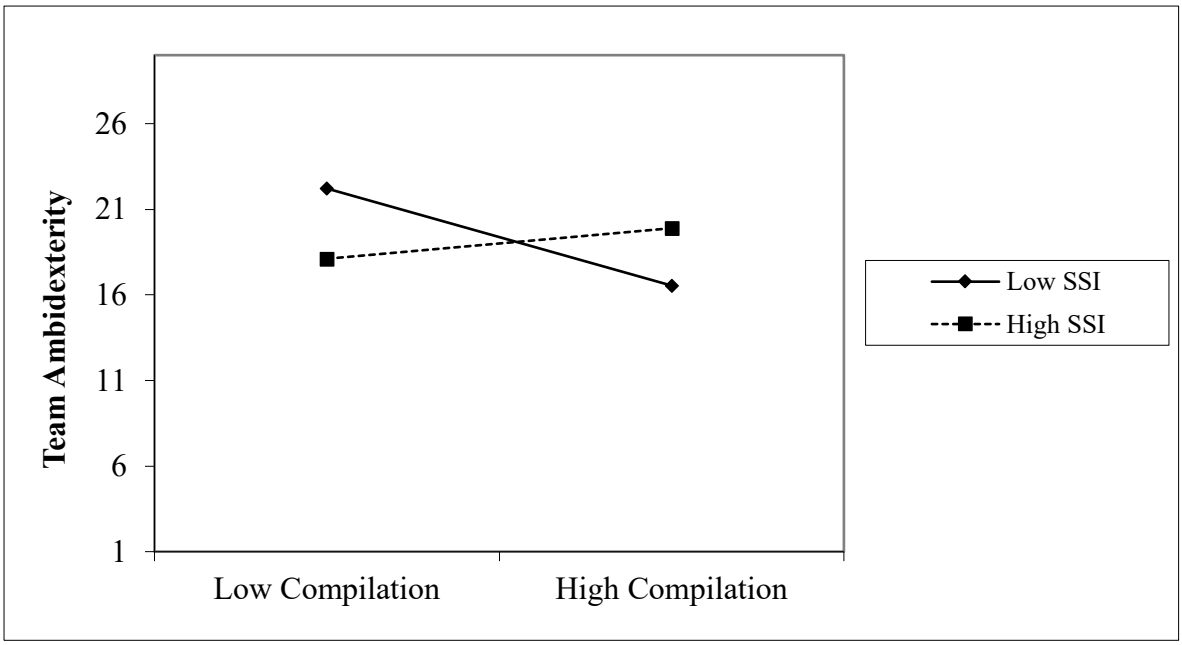


Figure 15: Interaction of compilation (vs. composition) with high (vs. low) shared social identification (SSI)

## Discussion

Integrating multilevel theory (Kozlowski et al., 2013; Kozlowski & Klein, 2000; Ployhart & Moliterno, 2011) and the differentiation-integration view of ambidexterity (Smith & Tushman, 2005), we posited a contingent dual process model of ambidexterity emergence. In our model, emergence ranges from pure composition to pure compilation. In the case of pure composition, the ambidexterity process consists of both differentiation and integration of exploration and exploitation, and takes place at the level of the individual, followed by the process of composition, which describes a linear aggregation of homogeneous individual-level ambidexterity into group-level ambidexterity. In the case of pure compilation, both processes are intertwined: Differentiation between exploration and exploitation takes place at the individual level, which then coalesces in a non-linear way on the group level based on this heterogeneity. This well-differentiated exploration and exploitation is eventually integrated on the group level.

Drawing on primary, multi-informant and multilevel data from 58 teams in a large Swiss insurance company, we found strong empirical support for a central prediction of our model: The relative success of compilation versus composition emergence is dependent on team-level integration mechanisms. Building upon the Categorization-Elaboration Model (van Knippenberg et al., 2004), we specifically tested shared social identification as an integration mechanism.

## Contribution

We hope that our study – which is built upon the considerable theoretical progress made in the area of human capital since the introduction of explicit emergence models (Ployhart & Moliterno; 2011) – will have a comparable impact on the ambidexterity literature. As pointed out in the introduction (cf. Birkinshaw & Gupta, 2013; Gibson & Birkinshaw, 2004; Raisch et al., 2009), ambidexterity research has, so far, been remarkably silent about the process of ambidexterity emergence, which is considered a "key assumption" (Mom et al., 2019, p. 32) implied in our understanding of contextual ambidexterity. Relying on overly simplistic cross-level assumptions may lead our theorizing on ambidexterity to fall victim to one of the several multilevel and misspecification fallacies described in multilevel theory (Klein, Dansereau & Hall,

1994; Rousseau, 1985; Simon, 1973). In the absence of a theoretical description of the process of ambidexterity emergence, the literature had little conceptual basis to theorize on mechanisms of emergence. This, in turn, offered no viable ground from which to speculate on contingency mechanisms and understand boundary conditions of the validity of our recommendations on contextual ambidexterity given to the practitioner community. Instead, prior research had to rely on a "more is better" approach (cf. Schmidt & Hunter, 1998). In contrast, our study demonstrates that under conditions of very high integration mechanisms, finalizing the ambidexterity process completely on the individual level can even lead to inferior team-level ambidexterity.

Conceptually, our study advances our understanding based on a contingent dual process model of ambidexterity emergence. Following our model, we predict that different and, in some cases, even contrary context constellations are useful for higher-level ambidexterity, depending on the respective emergence process. One example of this is factors that optimize for integration at either the individual or team level, such as autonomy (Langfred, 2000). Another example of this is factors that optimize for homogeneity versus heterogeneity at the team level, such as shared mental models (Mathieu et al., 2000) versus transactive memory systems (Wegner, 1987). Accordingly, we suggest a process of reformulating our understanding of contextual ambidexterity from favoring factors that optimize for individual-level ambidexterity towards factors that optimize for the ambidexterity emergence process.

Analytically, we hope to demonstrate both the value and necessity of measuring ambidexterity at multiple levels in future studies. Specifically, we suggest that studies focused both on micro-level and macro-level ambidexterity should include a measurement of the meso level of the group wherever viable. The closer respective causal distance and focal role of the group in multilevel theory would allow for using the group as a focal point to understand both micro-meso-level and meso-macro-level emergence processes. In line with multilevel models, which suggest that the emergence from micro to macro level is generally mediated via the meso level (Kozlowski, Chao & Jaclyn, 2010), the group level could serve as an integration mechanism to connect both processes.

In the end, we hope to be able to connect our rich understanding of individual-level ambidexterity (e.g. Jansen, Tempelaar, van den Bosch & Volberda, 2009) and

organizational-level ambidexterity (e.g. Andriopoulos & Lewis, 2009) into a single and thorough process model of ambidexterity.

In addition, we also make a contribution to the more narrow literature stream on team-level ambidexterity by answering recent calls to understand the role of team configuration for team-level ambidexterity (Jansen et al., 2016; Li et al., 2016). The impact of the configuration of one of the most important individual-level antecedents, i.e. individual-level ambidexterity, is contingent on team-level integration in such a way that high heterogeneity is dependent on high-level team integration mechanisms.

The present study also carries some implications for multilevel theory. Our model highlights the interrelation of the ambidexterity process and the emergence process in the case of compilation. We are not aware of a specific multilevel model of a construct that interacts with its own emergence process in such a way. This bears interesting potential implications for temporal dynamics between the construct of interest and the emergence process: Recent calls in multilevel theory have highlighted the need for understanding temporal dynamics and change in multilevel emergence (Kozlowski et al., 2013) and some papers have demonstrated substantial variability over time in emergence processes (e.g. Lapointe & Rivard, 2005). In a dynamic such as compilation emergence of ambidexterity, this could be particularly interesting because of the potential for self-reinforcing cycles: The better the ambidexterity process works, the more differentiation at the individual level, which in turn leads to higher heterogeneity and more compilation. If ambidexterity is not a unique case, and other phenomena might display similar emergence dynamics when analyzed from a process perspective, this could be the basis of an interesting addition to our understanding of multilevel theory.

## Managerial Implication

Our study also carries managerial implications. In order to create high group-level ambidexterity, managers should focus on understanding how the individual contributions of their employees contribute to the group-level ambidexterity. Depending on the process leading to group ambidexterity in their context, managers should adjust their leadership for integration at the individual level or at the team level. This could be achieved, for example, by changing the locus of autonomy from individual autonomy

within the team, which would optimize for individual-level integration, to team-level autonomy, which would optimize for team-level integration.

## Limitations and future research

As with all empirical research, the current study is not without limitations. Although our theoretical argument is not specific to a given industry or geography, our empirical setting is. Our analysis is based on data from a single company, so external validity might be in question. Longitudinal data would lend itself more easily to causal interpretation than our data. We didn't directly assess differentiation and integration. To date, there seems to be no validated scale to directly measure these processes, and further analyses could benefit from a more direct assessment. Our study also restricts itself to emergence from the individual level to the team level, and future studies could strive to include emergence on the organizational level. Finally, we only assessed one integration mechanism at the team level, and other integration mechanisms, such as behavioral integration (e.g. Lubatkin et al., 2006), might also play a role. Future studies could test the predictions of our model while going beyond these limitations of our empirical setting.

In conclusion, research in contextual ambidexterity has come a long way in identifying antecedents of individual-level ambidexterity. In combination with emerging research on processes and contingencies for the emergence of ambidexterity from the individual level to higher levels of analysis, we can develop our theorizing towards a full description of how, why and when contextual ambidexterity leads to organizational-level ambidexterity. We hope that our contingent dual process model of this emergence paves the way for a great deal of instructive future research in this endeavor.

# Chapter 5: Discussion Summary of dissertation and results

*An intellectual is a man who says a simple thing in a difficult way; an artist is a man who says a difficult thing in a simple way.*
(C. Bukowski, *Notes of a Dirty Old Man*)

My dissertation set out to answer the following research question: How does individual ambidexterity develop and emerge into ambidexterity at higher levels of analysis? In order to fulfill this ambition, I segmented this question into three more narrowly defined problems and addressed each of them with a targeted empirical design.

In chapter 2, I analyzed the first part of this question, i.e. the development of individual ambidexterity. This analysis was based on SCT as an overarching psychological framework to describe the development of autonomous, self-regulated behavior, such as individual ambidexterity. From this theoretical vantage point, I argued for the central role of explorative self-efficacy as an individual cognitive antecedent. Furthermore, I identified the corresponding proximal social context, i.e. transformational leadership, and distal social context, i.e. perceived support for innovation. I proposed a syntax of these causal mechanisms, characterized by an interaction of proximal and distal social contexts, which jointly influence the individual cognitive antecedents of individual ambidexterity. Based on primary, multi-source data from 245 employees of a large Central European company, I found strong support for my theoretical model.

Chapter 3 contextualizes this understanding of the development of individual ambidexterity developed in chapter 2. However, it follows recent developments in ambidexterity literature and more fully accounts for paradox theory and its substantial contribution than chapter 2 did. I do this in chapter 3 in two ways. On the one hand, my theorizing develops from the fairly linear approach in chapter 2 to account for recursive cycles linking individual antecedents, behavioral tendencies and social outcomes in a causal loop over time. On the other hand, I contextualize ambidexterity within the larger field of paradoxes by focusing on learning across categories of paradoxical tension. Consequently, I use the recently introduced construct of paradox mindset as a focal individual-level cognitive antecedent. However, I analyze its role not as a determinant of individual ambidexterity, but as a consequence, thus establishing the proposed recursive relationship between the two variables. Based on primary data from 199

employees from two large Central European companies, I find strong support for my theoretical model.

Finally, chapter 4 builds on this understanding of the development of individual ambidexterity and focuses on the second part of the research question, i.e. the emergence to higher levels of analysis. In order to do this, I build on an integrative view of established multi-level theory and ambidexterity theory to develop a contingent dual-process model of ambidexterity emergence. Based on primary data from 239 employees nested in 58 teams, I find strong support for my theoretical model.

Taken together, my dissertation adopts a micro-foundations perspective towards ambidexterity, as depicted in figure 16:

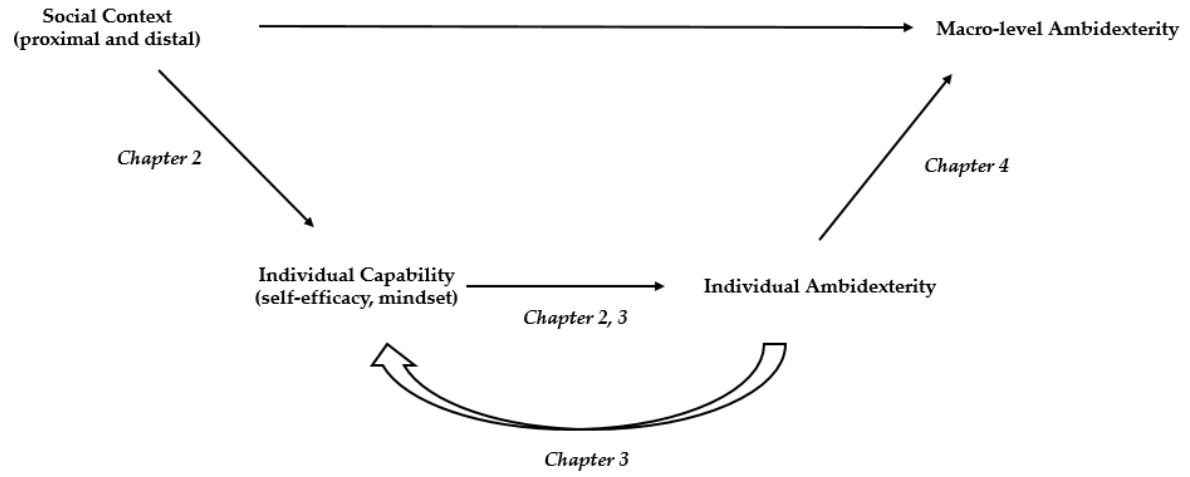


Figure 16: Research model of my dissertation

So, in order to avoid the worrying sensation that Mr. Bukowski would have thought of me as an intellectual, what does a reasonably simple answer to my research question look like: How does individual ambidexterity develop and emerge into ambidexterity at higher levels of analysis?

Based on my research, I suggest that individual ambidexterity cannot be developed directly from the outside. It is based on the volition and self-regulation of individual employees going beyond the narrow confines of their job descriptions. However, leaders can nurture individual ambidexterity through developing the necessary resources for individual ambidexterity in their employees. They may do so through aligning the overarching organizational context with the more proximal, immediate leadership employees are subject to. It is particularly important to develop two resources: Giving

employees the confidence to be able to explore and go beyond their current capabilities, and nurturing the mindset that integrating contradictory demands is beneficial both for themselves and for the company. Furthermore, it is important to understand that these resources develop over time with ambidextrous practice.

If managers are successful in nurturing ambidextrous behavior, there are two possible ways that this individual ambidexterity contributes to ambidexterity for the team, unit or company. On the one hand, employees might independently produce ambidextrous results and work together like a team in a relay race. This puts a premium on managing the average ambidexterity. On the other hand, employees might also interdependently produce ambidextrous results by working together like an orchestra. Most typically, this will mean that while exploration and exploitation are differentiated at the individual level, potential synergies and cross-fertilization between exploration and exploitation are only realized at the team level. This puts a premium on managing the orchestration and integration of individual exploration and exploitation.

## So what? Analysis of the theoretical contributions of my research

If one is to take the requirements of premier journals as the requirements for premier research seriously, the need for a strong contribution to theory is the crucial evaluation criterion after accounting for the quality of formal presentation (scientific methodology, coherence of argumentation, etc.). As an outsider to the field of management research, this focus on theory development is somewhat curious to me, since management science is not defined by specific theoretical paradigms but rather by a phenomenon of interest: Organizational performance. Consequently, management science is eclectic in the adoption of theories from various fields, including psychology, sociology and economics. This has led to regular rather foundational debates around the notion of theory in management science, for example around questions of what defines theory (Wetten, 1989), what defines what theory is *not* (Sutton & Staw, 1995), the provenience of theory (Weick, 1989), the assessment of theory (Bacharach, 1989), criteria of quality in theory (Oxley, Rivkin & Ryall, 2010), and what constitutes a need for theory (Ashkanasy, 2016). If one was to anthropomorphize a research discipline, the combination of ascribing high value to certain traits and existential angst around these traits with regards to oneself would not appear unfamiliar to the trained psychologist.

However, my research is intended to contribute to the field of management science. As such, it has to be evaluated against the criterion of theory contribution.

In order to analyze the theory contribution of my research, I use a framework for theory contributions from Jay Barney (Makadok, Burton & Barney, 2018). The framework mentioned is depicted in greater detail in figure 17.

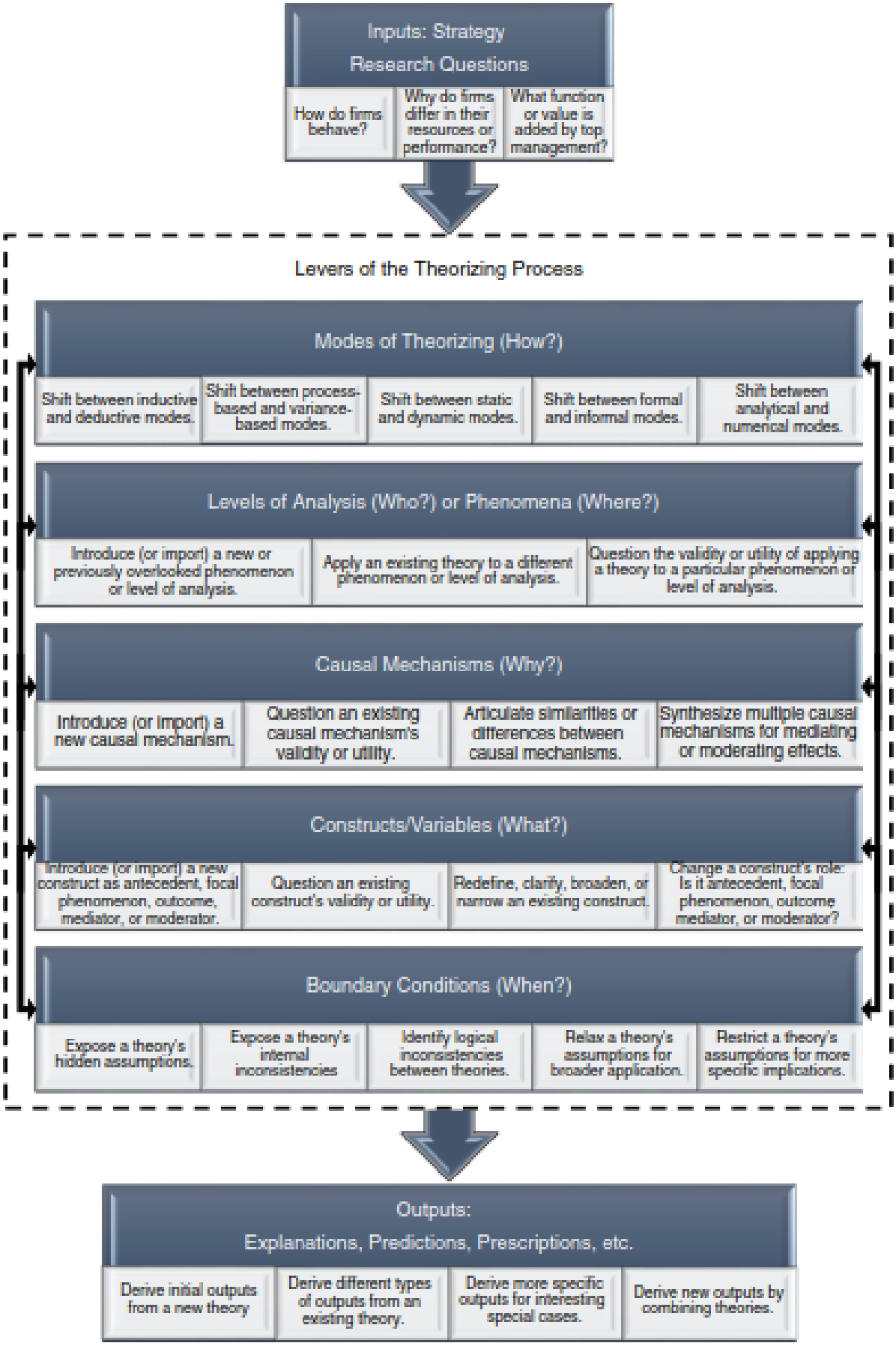
Inputs: Strategy Research Questions
How do firms behave?
Why do firms differ in their resources or performance?
What function or value is added by top management?
Levers of the Theorizing Process
Modes of Theorizing (How?)
Shift between inductive and deductive modes.
Shift between process-based and variance-based modes.
Shift between static and dynamic modes.
Shift between formal and informal modes.
Shift between analytical and numerical modes.
Levels of Analysis (Who?) or Phenomena (Where?)
Introduce (or import) a new or previously overlooked phenomenon or level of analysis.
Apply an existing theory to a different phenomenon or level of analysis.
Question the validity or utility of applying a theory to a particular phenomenon or level of analysis.
Causal Mechanisms (Why?)
Introduce (or import) a new causal mechanism.
Question an existing causal mechanism's validity or utility.
Articulate similarities or differences between causal mechanisms.
Synthesize multiple causal mechanisms for mediating or moderating effects.
Constructs/Variables (What?)
Introduce (or import) a new construct as antecedent, focal phenomenon, outcome, mediator, or moderator.
Question an existing construct's validity or utility.
Redefine, clarify, broaden, or narrow an existing construct.
Change a construct's role: Is it antecedent, focal phenomenon, outcome mediator, or moderator?
Boundary Conditions (When?)
Expose a theory's hidden assumptions.
Expose a theory's internal inconsistencies
Identify logical inconsistencies between theories.
Relax a theory's assumptions for broader application.
Restrict a theory's assumptions for more specific implications.
Outputs: Explanations, Predictions, Prescriptions, etc.
Derive initial outputs from a new theory
Derive different types of outputs from an existing theory.
Derive more specific outputs for interesting special cases.
Derive new outputs by combining theories.

Figure 17: Taxonomy of ways to make a contribution to theory after Makadok, Burton & Barney, 2018.

In their framework, the authors compartmentalize management theory into eight building blocks and derive corresponding angles for theory contribution.

The first building block of management theory in this framework is the research question and thus the input into the theorizing process. Valuable research questions strike a balance of being broad enough to be interesting to a large audience and narrow enough to be answerable in a meaningful way. Thus, the first and most obvious way to make a theory contribution is to change the research question. The authors give an example of early research phases in strategic management: As the initial question "what strategy should a company pursue" was too broad as to be answerable in a meaningful way, Michael Porter substantially advanced the field by introducing the more focused question: "What makes an industry attractive". In a similar way, ambidexterity research moved from a focus on "under which conditions is explorative orientation preferable to exploitative orientation" to a focus on "how can we combine exploration and exploitation".

The second building block of management theory in this framework is the mode of theorizing. Illustratively, the authors differentiate between: inductive and deductive theorizing; process-based theorizing, which aims to explain change over time in an entity, vs. variance-based theorizing, which aims to explain heterogeneity between entities; static theorizing, which aims to explain how systems behave in equilibrium vs. dynamic theorizing, which aims to explain how systems respond to shocks; formal theorizing vs. informal theorizing; and finally, analytical theorizing vs. numerical theorizing. Accordingly, the second way to make a theory contribution is to change the mode of theorizing in any of these dimensions. For example, the research by Raisch and Zimmermann (2017) discussed earlier shifted the ambidexterity conversation from a variance-based theorizing of ambidexterity modes to a process-based theorizing.

The third building block concerns the level of analysis. While phenomena are often related across different levels of analysis, naïve extrapolation most often doesn't work. For example, while competitive dynamics between firms and competitive dynamics between nations are related, numerous adjustments have to be made when changing the level of analysis (Porter, 1990). Similarly, contributions to ambidexterity theory have

been made by changing the level of analysis to the individual (e.g. Mom et al., 2007, 2009) or to the alliance (Lavie & Rosenkopf, 2006).

The fourth building block is the phenomenon that defines the context in which a theory is valid. As new phenomena emerge, questions arise about how theories apply and to what degree they must adapted to the new context. For example, open innovation (Gassmann, 2006) denotes exploration activities that are at least partly located outside the boundaries of the focal firm. This phenomenon might have interesting implications for how classical ambidexterity approaches need to be adopted: For example, differentiation between exploration and exploitation might be much less of a problem, as external innovation input is less likely to be contaminated by dominant logics (Bettis & Prahalad, 1995) from exploitation activities. At the same time, integration might prove more difficult due to being more vulnerable to the "not invented here" syndrome (Katz & Allen, 1982). Thus, open innovation might be a suitable combination with a contextual approach to ambidexterity, as it compensates for its relative weakness by producing more transformative innovations and is supported by its relative strengths in facilitating adoption and transfer throughout the organization.

The fifth block relates to causal mechanism and thus the explanation of why a proposed relationship occurs. The authors mention several ways to contribute to theory through causal mechanisms. The most obvious way may be to introduce new causal mechanisms. For example, the explanation of the displacement of strong incumbents by weak upstarts has moved from economic mechanisms (e.g. Gelman & Salop, 1983) to sociological mechanisms (e.g. Levitt & March, 1988) and psychological mechanisms (e.g. Christensen, 1997). Additionally, a synthesis of different causal mechanisms and the analysis of their interactions in the form of moderation or mediation, for example, is also listed by the authors as a way to contribute to theory. In the field of ambidexterity, research by Rogan and Mors (2014) introduced the first social network explanation for individual ambidexterity, thereby extending established theories mostly on the level of structural (e.g. Mom et al., 2009) and psychological (e.g. Kauppila & Tempelaar, 2016) antecedents.

The sixth block of theory relates to constructs and variables, i.e. the boxes in any conceptual theoretical framework. Contributions to theory can be made through the introduction of new constructs, insofar as they have additional explanatory power. For example, Miron-Spektor and colleagues (2018) introduced the new construct of Paradox

Mindset, which I analyzed in greater detail in chapter three. In addition, contributions to theory can also be based on changing the role of a construct, most typically by shifting a newly identified antecedent to the role of focal outcome and thus building the preceding parts of the logical chain. For example, ambidexterity has been looked at both as a predictor (e.g. He & Wong, 2004) to explain organizational performance and also as an outcome to be explained (e.g. Tushman & O'Reilly, 1997).

The seventh block of theory relates to boundary conditions, or the context in which the propositions of a theory is valid. By restricting or relaxing boundary conditions, different versions of a theory can be created, which are valid for different contexts. Typically, more precise predictions can be inferred through the restriction of boundary conditions, which sacrifices generalizability in the process. The authors cite the example of research by Hennart (1998), who reformulated transaction cost economics for the more narrowly defined context of equity joint ventures. In the field of ambidexterity, paradox theory can be considered a relaxed formulation of ambidexterity theory, as the context is generalized from learning tensions to any kind of paradoxical tension (cf. Smith & Lewis, 2011).

Finally, the eighth building block of theory is outputs. Typical theory outputs are explanations, predictions or prescriptions. A contribution to theory in this block usually rests on the introduction of new or new kinds of outputs. For example, ambidexterity theory has moved from an explanation of why companies perish (March, 1991) to the prediction that ambidexterity can increase performance (e.g. He & Wong, 2004), and to prescriptions of how organizations might achieve ambidexterity (e.g. Tushman & O'Reilly, 1997).

In the following I will analyze my empirical contributions and discuss how and on what levels they contribute to existing theory.

Chapter two built on SCT to explain how antecedents of individual ambidexterity in the social context and individual-level antecedents of individual ambidexterity interact. In order to illustrate the substance of this contribution to ambidexterity theory, consider figure 18, which visualizes ambidexterity theory in the form of causal maps.

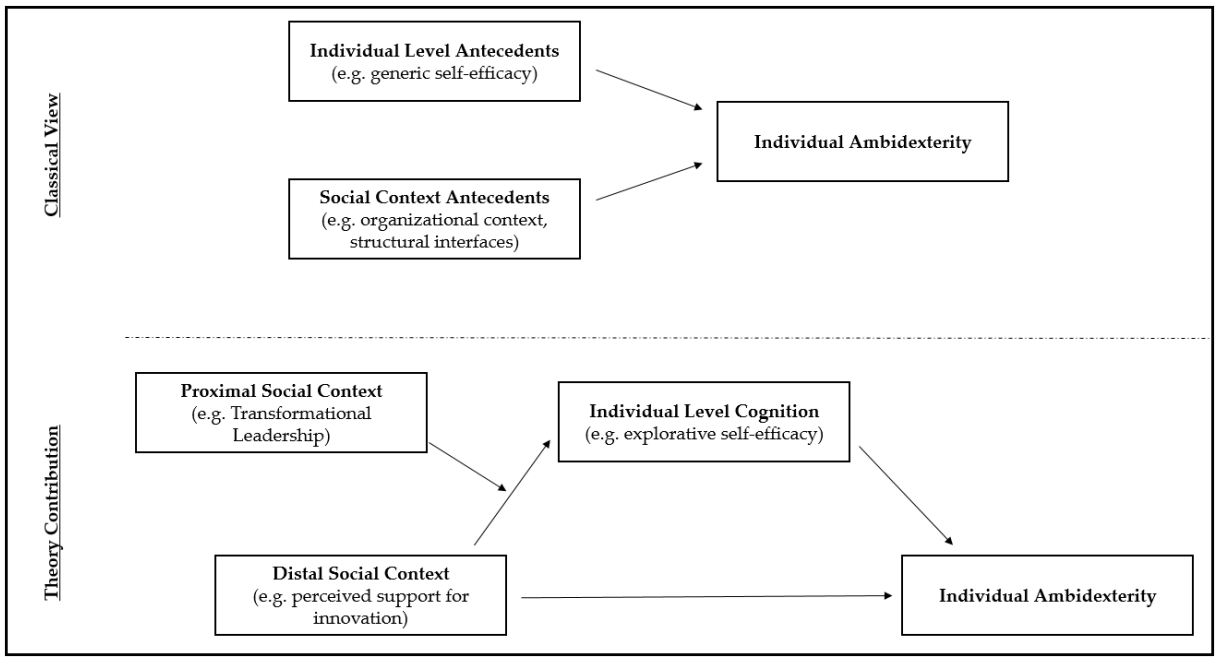


Figure 18: Causal Maps chapter two.

As depicted in figure 18, while a lot of antecedents of individual ambidexterity were known, there was no existing description of how individual-level antecedents and antecedents in the social context interact. Against this background, chapter two segmented the social context into proximal and distal social contexts, which interact with each other to produce individual-level cognitive antecedents of ambidexterity. Only when proximal and distal social contexts are aligned, can self-efficacy as the central cognitive antecedent of agentic behavior, such as ambidexterity, be formed. In other words, chapter two established the syntax of how previously known causal mechanisms interact with each other.

To systematically asses the theoretical contribution of the paper, I consider the framework for theory contributions described above. While my research question (antecedents of individual ambidexterity), mode of theorizing (variance-based), level of analysis (individual), and output (description) are in line with existing theorizing, I make theory contributions in the areas of causal mechanisms, constructs and boundary conditions.

At the level of constructs, my research introduces the new construct of explorative self-efficacy. Based on SCT, we argue that specific self-efficacy is a much more relevant antecedent of individual ambidexterity than generic self-efficacy, as specific self-efficacy is both more directly related to individual ambidexterity and more malleable.

We suggest explorative self-efficacy as the form of specific self-efficacy most relevant to individual ambidexterity. This is a meaningful development from generic self-efficacy, as explorative self-efficacy is both more closely related to individual ambidexterity and more malleable in the organizational context than generic self-efficacy, which makes it a suitable candidate for targeted development. In addition, we build on SCT to differentiate between proximal and distal social contexts, which provides a novel segmentation to understand the effects of different aspects of social context on individual ambidexterity.

At the level of causal mechanisms, my research also makes several contributions. I establish a new mechanism for the literature about how and why factors in the social context, such as transformational leadership and perceived support for innovation, affect individual ambidexterity, i.e. through their effect on explorative self-efficacy. More generally speaking, I build on SCT to show how factors in the social context affect individual ambidexterity through their effect on the cognitive underpinnings of individual agentic behavior. Both the mediation of the effect of social context on individual ambidexterity through these cognitive factors and the moderation of the effect of proximal social context by the effect of distal social context correspond to a synthesis of several causal mechanisms in the language of Barney and colleagues (Makadok, Burton & Barney, 2018). In other words, my research establishes the syntax of how causal mechanisms at different levels of analysis interact.

Finally, my research also contributes on the level of boundary conditions. Johnson-Neymann analyses indicated that the positive effect of transformational leadership is significant for the half of employees with high perceived support for innovation in the empirical sample – for the other half, transformational leadership has no relationship to explorative self-efficacy. In other words, my research suggests that the theorized positive effects of the proximal social context are contingent on the more distal social context, thus providing a boundary condition for the validity of prior theorizing, e.g. about the value of leadership for individual ambidexterity.

Chapter three built on psychological mindset theory in order to explicate the process of how paradox mindset is shaped and stabilized over time. In order to illustrate the substance of its contribution to management theory, consider figure 19, which illustrates the contribution in the form of causal maps.

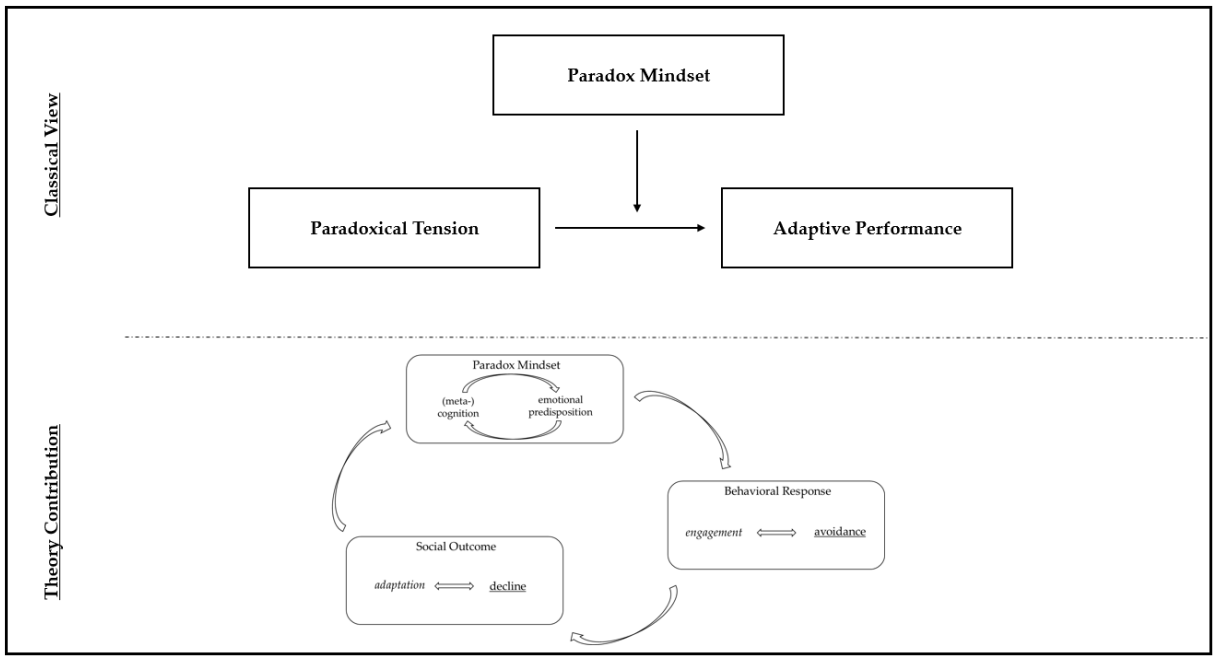


Figure 19: Causal maps diagram of chapter 3.

As depicted in figure 19, paradox mindset has so far mostly been conceptualized as a moderator that differentiates between individuals who thrive under paradoxical tensions and individuals who don't. Against this background, chapter 3 lays out a socio-psychological model that describes how paradox mindset is formed, interacts with the social tension field, and finally stabilizes over time in recursive processes.

With regards to the adopted framework for theory contributions, chapter three develops current understanding in several of the eight building blocks. While the empirical analysis is variance-based, the framework I develop deductively is very much process-based, as it explains how paradox mindset is developed and stabilized over time in recursive processes. I also contribute on the level of analysis: As Schad and colleagues (2016) point out, paradox theory has been under-researched on the level of the individual. Thus, my research contributes to an emerging conversation about how individuals experience, deal with and learn from paradoxical tensions. Furthermore, my research also contributes new causal mechanisms, more specifically the relationship between leadership, individual engagement in paradoxical tasks, and paradox mindset, which have not been documented before. In this way, my research also targets the layer of constructs, as I present the first research, to the best of my knowledge, to treat paradox mindset as a dependent variable to be explained. Finally, my research also hints at some boundary conditions for the effectiveness of paradoxical leadership in nurturing paradox mindset in followers: As the effect is fully mediated through individual engagement in

paradoxical tasks, it suggests that attempts to nurture paradox mindset without providing a suitable context for paradoxical behavior may prove futile.

Finally, chapter four builds on an integrative perspective of multi-level theory and ambidexterity theory to formulate a contingent dual-process model of ambidexterity emergence. In order to illustrate its theoretical contribution, consider figure 20:

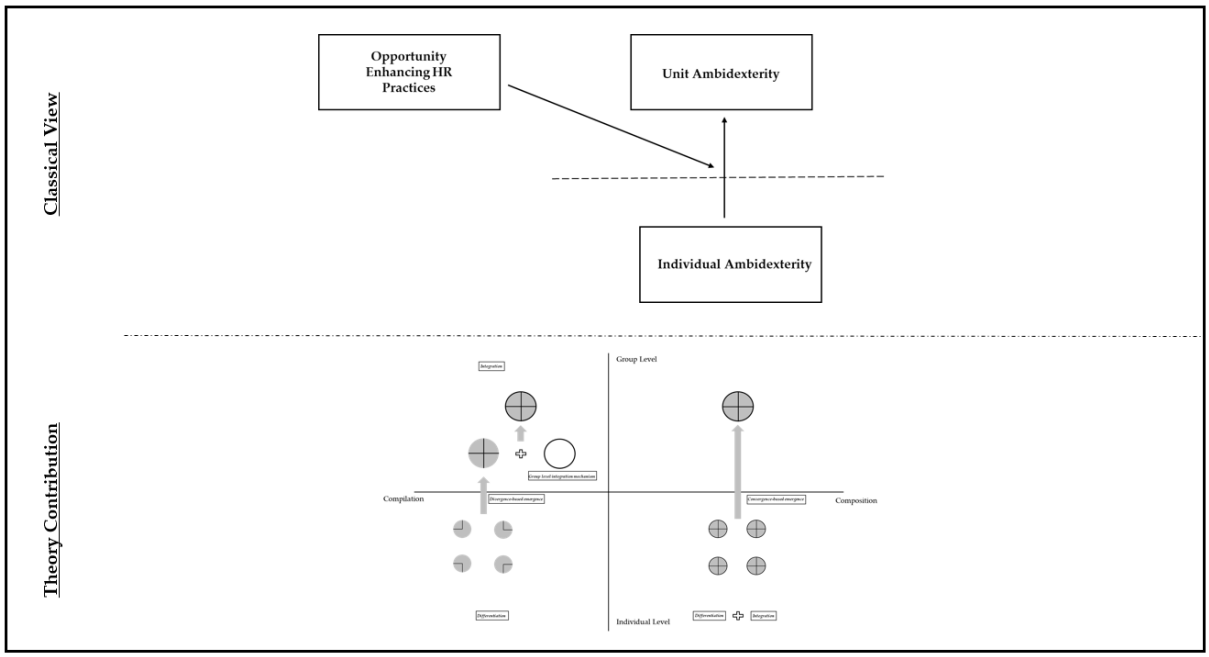


Figure 20: Causal maps diagram chapter four

As can be seen in figure 20, emergence problems have largely been overlooked in ambidexterity research, with the only paper tackling the problem (Mom et al., 2018) noting that opportunity-enhancing HR practices support the relationship between individual-level and unit-level ambidexterity without describing this relationship much further. Against this background, chapter 4 describes the process of ambidexterity emergence in a fair amount of detail, laying out how composition and compilation emergence take place, as well as the contingencies of these emergence processes in the social context.

With regards to the framework for theory contributions adopted in this discussion, the chapter contributes on several levels. On the level of input, the chapter introduces an overlooked research question, i.e. how does ambidexterity emerge from the individual level to higher levels of analysis. Accordingly, my research also contributes at the level of analysis, as cross-level dynamics are an under-researched topic and the relationship between individual-level and team-level ambidexterity has, to the best of my knowledge,

never been studied before. This is all the more puzzling, as the team level inhabits such a central nomological position in multi-level theory. In addition, my research also introduces novel causal mechanisms to the field of ambidexterity, namely a detailed analysis of how the mechanisms of composition and compilation, respectively, play out in the context of ambidexterity. Finally, my research also introduces new boundary conditions with the notion of dominant emergence processes: Depending on the level of social integration processes, greater individual ambidexterity might not be conducive to greater team-level ambidexterity.

Taken together, my dissertation presents the first full micro-foundations view of ambidexterity. As such, it answers questions of how and why organizational design elements (proximal and distal) affect unit-level ambidexterity.

## Limitations

As with all empirical research, the present dissertation has limitations. While the limitations of the particular empirical studies have been discussed in the respective chapters, there are also some notable limitations to the dissertation as a whole and its ability to answer the focal research question in aggregate.

While my dissertation is interested in describing a full micro-foundations view of ambidexterity, my empirical analysis of emergence is limited to the team level. Teams are considered "the crucible of emergent phenomena in organizations" (Kozlowski & Chao, 2012, p. 341 f.) and an "ideal focal point for research on emergent phenomena" (Kozlowski et al., 2013). The closer causal distance between the individual level and the team level, and the central role for team outcomes in explaining emergent organizational phenomena, such as ambidexterity, make it an ideal unit of analysis for my research, well in line with established multi-level theory. Moreover, teams are omnipresent in organizational settings today (Devine, Clayton, Philips, Dunford & Melner, 1999, pp. 678–679; Haas, 2010, p. 991) and are especially vital for knowledge-intensive work in organizations (Haas, 2010, p. 989). However, although team work absolutely has benefits for organizations, like higher employee satisfaction or productivity (Banker, Field, Schroeder & Sinha, 1996, p. 867; Cohen & Ledford, 1994, p. 13), it may also lead to inefficiencies (Steiner, 1972). Despite the importance of teams in organizational settings, there is little known about how individual contributions emerge into team-level constructs. For these reasons, I emphatically stand by the decision to focus on emergence

to the team level as a first step. However, this puts in question to what degree the findings of my dissertation can be interpreted to describe emergence at all levels up to the organizational level. After all, emergence processes at the team level are governed by more direct social interactions between people familiar with each other, working on comparable tasks. Emergence to the organizational level brings a whole new set of complexities with it that my model doesn't currently account for. These include, for example, allocation of financial resources to exploration and exploitation activities at the executive level; specific strategies, such as exploration through acquisitions; the degree to which the strategy process is bottom-up vs. top-down; and even the role of different departments and individuals for exploration and exploitation. While creative exploration might be quite desirable for organizational ambidexterity in functions such as new product development, it is rather less advisable in functions such as controlling and auditing. Similarly, ambidexterity might be more important at the level of the middle management (Zimmermann et al., 2015) than at the level of individual front-line employees for many organizations. Currently, my theoretical model doesn't account for these complexities. While it is certainly very challenging to collect data that allows researchers to address these complexities empirically, future research might be able to shed some more light on these emergence processes at higher levels.

A second, related empirical limitation concerns the generalizability of the syntax of causal mechanisms that I put together in my micro-foundations view on ambidexterity. For example: Is the influence of proximal and distal social contexts on individual-level antecedents of ambidexterity really always contingent on each other, or is this dynamic specific to the particular constructs studied in my paper? On the one hand, I believe I've chosen empirical constructs that are quite central to the ambidexterity literature. Accordingly, even if some other constructs exhibit a different syntax of causal mechanisms, the present dissertation describes a useful, if not exhaustive, micro-foundations view of ambidexterity. On the other hand, I consider my rationale for how to relate the different causal mechanisms to be deductively convincing beyond the particular constructs I've studied empirically. The general thrust of the theoretical model is well in line with established micro-foundations literature (125 cf. figure 6, Felin & Foss, 2005, 2006). However, I also extend this classical understanding of micro-foundations a fair bit in my dissertation. First, the differentiation of organizational

context in proximal and distal social contexts and the argumentation of a contingent relationship between them in chapter 2 is presented solely in terms of social antecedents of self-regulated behavior and then substantiated with more specific argumentation for the particular constructs studied. Second, the notion of a recursive relationship between individual ambidexterity and its antecedents is, in my view, similarly valid based on a generic analysis of paradox theory beyond paradox mindset in particular. For example, self-efficacy should also grow with personal experiences of mastery. Finally, the differentiation between composition and compilation emergence also extends the classical micro-foundations view and the contingent dual-process model is developed fairly specifically for the constructs analyzed. Alas, these constructs are individual-level and team-level ambidexterity, so I would argue these are the central constructs to analyze in this part of the micro-foundations view (limitations to generalization beyond the level of the team have been discussed above). In sum, I argue that the particular constructs are highly relevant, the theoretical model is based on an established literature, and where I extend the literature the argumentation is generalizable beyond the particular constructs. Still, I have to acknowledge that such a full, integrative model of the syntax of different causal mechanisms would usually be the result of a review of a large body of empirical literature and not three singular studies. Since most of the studies are "first of its kind", however, it is not possible to review a large body of literature at this point in time. Thus, interpretation of my results should be critical until confirmed by a larger body of independent research that adopts different methodologies and constructs.

Finally, a more conceptual limitation concerns my treatise of causality in the dissertation. It might even appear a little ironic to write a full section about paradox theory and how paradoxical tensions transcend Aristotelian formal logic and then proceed to *deductively* develop a micro-foundations perspective of the ability to deal with such tensions. Notions of differentiated cause and effect at different levels of analysis, and causal directionality in general, are deeply ingrained in the theoretical model of my dissertation. While I do address the notion of causal loops, self-referential causation, and circularity to some degree in chapter 3, I do so from a decidedly deductive point of view and acknowledge this dynamic with a feedback arrow in the theoretical framework. For a pure-blooded paradox scholar, this would amount to paradoxical sugar coating instead of addressing the more fundamental critique raised by paradox theory

(e.g. Putnam et al., 2016). Indeed, self-referential causation could be argued for the other parts of my theoretical framework: Are individual resources really nurtured through the organizational context or do individual resources simultaneously shape the organizational context? Is unit ambidexterity a product of individual ambidexterity, or is it perhaps caused by a strategy that also influences processes and, consequentially, individual behavior? As these variables influence each other over time from a paradox perspective, the directional, deductive framework I develop in the dissertation necessarily remains under-complex. While I acknowledge this critique, I would address it by going back to the statement that the purpose of management theory is to provide managerially useful insight (REF). From this constructivist point of view, a theoretical description must not necessarily be true in an ontological sense, but lead to a practical understanding in the form of more adaptive behavior. As notions of self-referential causal loops are not very accessible – at least not to most Western thinkers (Keller et al., 2017) – I believe that my framework is still valuable as an actionable, meaningful approximation.

## Potentials for Future Research

Ambidexterity has great potential to develop in very meaningful ways over the next years. As technological cycles become ever faster, the challenge of profitable growth through efficient exploitation of core capabilities and exploration of new, digital business models is a top of mind issue for many executives. As such, ambidexterity theory speaks to an urgent challenge for practitioners. While management research has produced many useful insights, there are also many potentials for ambidexterity theory to develop over the coming years.

*Micro-foundations and emergence mechanisms*

While chapter 4 introduced a first description of the process of ambidexterity emergence in the contingent dual-process model, emergence deserves much more scrutiny in future research. Organizational ambidexterity is not the simple sum of its members' individual ambidexterity (Raisch et al., 2009). Indeed, the ambidexterity of some members might be more important than of others (Mom, Fourne & Jansen, 2015), and a first study shows that contingency factors might moderate the upward contribution from individual ambidexterity to organizational ambidexterity (Mom, Chang, Cholakova & Jansen,

2018). Such contingency factors are as important as the managerial capability they moderate to understanding organizational ambidexterity. Still, discussions about these contingency factors are absent from the literature.

Future research could build on the contingent dual process model of ambidexterity emergence. Researchers could expand my framework with insights from models of human capital emergence (e.g. Ployhart 2004), which postulate emergence enabling states (EES) as moderators of the upward contribution from individual-level factors. Building on an interdisciplinary perspective (Ployhart & Moliterno, 2011), EES can be segmented into affective, behavioral, and cognitive EES, and follow previous research insights that these EES work in concert to determine emergence (Kozlowski et al., 2013; Kozlowski & Ilgen, 2006; Ployhart & Moliterno, 2011). Crucially for ambidexterity emergence, these psychological states may regulate socially acceptable expressions of homogeneity and heterogeneity in the group. I suggest building on the contingent dual process model of emergence, and predict that the emergence of ambidexterity is contingent on the presence of suitable EES for the dominant emergence process (compilation vs. composition).

As an important affective EES in the context of ambidexterity, conformity influences the social exchange within teams with regards to whether a common group norm is established and socially enforced (Miron, Erez & Naveh, 2004). Therefore, I would theorize a high level of conformity within a team to be more useful for a composition emergence process that builds on team homogeneity than for a compilation emergence process that builds on team heterogeneity.

In the context of behavioral EES, I would refer to the psychological constructs of opening and closing leadership behaviors, which have been found to be especially relevant for ambidexterity (Zacher & Rosing, 2015). Leadership is an important consideration with regards to the emergence of ambidexterity in general and has already been a focus in chapters 2 and 3. With closing leadership behaviors, the leader defines and establishes routines within the team, whereas with opening leadership behaviors, the leader gives employees more flexibility and freedom to do things differently (Zacher & Rosing, 2015). While opening leadership behaviors promote heterogeneity, which I theorize as useful for a compilation emergence process of ambidexterity, closing leadership behaviors promote homogeneity, which, based on my reasoning, are more useful for composition emergence.

For the category of cognitive EES, I would examine the psychological construct of transactive memory systems. This construct is concerned with socially distributed cognition, i.e. cognition where different parts of the cognitive operation are fulfilled by different team members who have intermittent contact to each other (Lewis, 2003). In such a way, transactive memory systems empower teams to capitalize on heterogeneous inputs from individual team members. Thus, they are especially relevant to enable compilation emergence processes of ambidexterity.

In this way, future research could examine the central black box of ambidexterity emergence in more detail and build on the work presented in the dissertation.

*Ambidexterity beyond established companies*

While ambidexterity theory is characterized by the desire to explain how companies can manage the tension between exploration and exploitation, a lot of the empirical research has actually been fairly one-sided. Most typically, research concerns itself with established companies that already exhibit a clear exploitative focus, and the paradoxical tensions these companies face when they strive to be more explorative.

However, the case of *WeWork* mentioned in the beginning of the dissertation alludes to the flip-side of this: How can start-ups, which are extremely explorative, integrate more exploitative structures as they mature without losing their exploration prowess? As more and more start-ups achieve unicorn status (i.e. valuations of 1 bn USD or higher) based on growth alone (graph this??), managers and investors alike have to provide a believable pathway for how to translate growth into profitability, or, to plug the title of this dissertation, how to translate the promise of tomorrow into the profits of today. Aggressive growth and an investment hypothesis that can be summed up as "become the dominant platform and then realize monopoly gains while being shielded from competition due to network effects" might not be a sufficient solution to this problem, as demonstrated by *Uber*, for example.

The challenge entailed by a transformation from a purely explorative focus to an ambidextrous one is duly noted by founders. Indeed, in 2001 *Google* co-founder Larry Page introduced Eric Schmidt as CEO of Google by declaring that the company needed "adult supervision". However, maturing start-ups also need to stay explorative rather than just transferring their energies to a more exploitative focus as described in the literature on temporal ambidexterity. For example, *Slack,* as one of the most successful

start-ups with a Software as a Service (SaaS) model (some numbers), still faces stiff competition from the incumbent giant *Microsoft*, which has belatedly but forcefully entered the same space with its Teams suite. If Slack is not able to constantly out-innovate Microsoft, it stands little chance of successfully competing, since Microsoft brings vastly superior strategic resources to the table: A strong integration with a large existing ecosystem, comprising solutions such as Office, LinkedIn, Project, and Skype for Business; established capabilities to build enterprise-grade solutions with all the requirements this entails in terms of security, interfaces, and versioning; and an established customer base far wider than anything Slack has been able to acquire.

In addressing this challenge, many start-ups choose to stay private much longer than used to be possible – just a couple of years ago, private companies with valuations in the tens of billion USD would have been mostly unheard of, yet now they are becoming commonplace. While this allows start-ups to avoid the exploitative pressures that come with being publicly listed and continue to focus on growth exclusively, this strategy is not sustainable – not for the individual start-up, and not systemically. Individually, start-ups will only be able to attract capital for so long before investors will want to cash out. Systemically, this strategy is enabled by the unprecedented low cost of capital that start-ups have access to at the moment. However, the economy is in the longest uninterrupted bull market in history and the yield curve of the federal reserve bank has inverted for several months earlier this year. Every time that has happened in the past, it has been followed by a major recession 12-18 months later. When the recession happens, monetary policy has nowhere to go to provide additional stimulus across nearly all developed economies. Even large and well-funded start-ups face a real and near-time danger of the same fate as the dot.com bubble companies if they are not able to transform from pure exploration into profitable growth and sustainable cash-flow management.

For all these reasons, there is an urgent need to formulate systematic and replicable models for start-ups to transform from a pure focus on exploration to a more ambidextrous orientation. Ambidexterity theory is thus in a good position to make a meaningful contribution to this highly relevant challenge – if researchers decide to explore this opportunity.

*Ambidexterity and emerging technology*

As automation driven by progress in artificial intelligence reaches “knowledge work”, the challenge of managing the interfaces between exploratory and exploitative activities will be substantively transformed. This creates a vast opportunity for future, phenomenon-driven research in ambidexterity.

The combination of substantial mathematical developments, exponential growth of data production, and the availability of ever more cheap computational power have fueled a well-documented revolution in the area of deep learning, and artificial intelligence more broadly. One of the most widely discussed trends caused by this is the potential for widespread automation of knowledge work. While the lay press typically frames this discussion in terms of jobs replacement, it would be more accurate to talk about the automation of tasks than of jobs per se. Jobs can be thought of as comprised of bundles of different tasks, and as tasks get automated, job profiles change over time, get merged with each other, or disappear. Tasks, however, are not automated at random but are automated based on their characteristics.

Deep Learning algorithms excel at finding patterns in huge amounts of data. Based on these patterns, they are able to categorize typical cases with great speed and precision. Based on this categorization, the processing of cases can be automatized to the degree to which the processing can be handled algorithmically. For example, a deep learning algorithm processing expense claims might be able to categorize claims and automatically issue the corresponding payout, as well as edit the relevant company databases.

These characteristics lead to the prediction that highly routinized tasks in particular will become more and more automated in the near-term future. Such routinized tasks tend to produce large data sets for the algorithms to learn from, and largely consist of the categorization of new events into existing categories, such as business processes, which can then be realized algorithmically. From an ambidexterity perspective, this means that exploitative tasks, which are highly routinized and based on formalizing existing capabilities into best practice processes, are going to be easily automated, while explorative tasks will be much harder to automate. Consequently, managing the interface between exploration and exploitation will increasingly mean managing the interface between human employees and algorithms. This will have interesting

implications for ambidexterity theory. For example, it could be hypothesized that while differentiation between exploration and exploitation is much easier in this setting, integration between the two is going to become much harder. In the end, empirical research will be needed to answer the question of how ambidexterity is transformed through this new technology.

An illustrative example might be the case of online education provider *Udemy*. The company found that algorithms trained on their vast database of sales interactions are very successful at predicting sales success through various features of the interaction. However, the best way to capture this value found by *Udemy* has not been to automate the sales process but to build synergy: Every interaction a sales rep has with a customer is monitored by the algorithm, which provides guidance and suggestions for the sales rep as soon as it identifies a pattern from its database. However, the more unusual requests are best handled with the understanding and creativity only a human sales representative can provide. The precise management of these kinds of interfaces will be an important determining factor for whether companies can successfully combine exploration and exploitation in the future. However, ambidexterity theory so far has very little insight into this emerging topic. Thus, I argue it represents an interesting opportunity for future research and new thinking.

*Ambidexterity beyond firm boundaries*

Much of the theorizing around ambidexterity implies a very traditional view of what constitutes a firm. As management science moves more and more towards understanding the act of value creation as a social interaction between actors distributed throughout the ecosystem of the company, fundamental notions of ambidexterity research appear to be ripe for reformulation.

First, we have to look at whether ecosystems experience exploration-exploitation tensions. It seems fairly obvious that they do. Constant exploration is a major requirement for ecosystems, indeed as Jacobides puts it: “In ecosystem competition, success involves helping other firms innovate” (2019). However, exploitation is also crucial in ecosystems, not only to ensure current financial viability, but also for structural reasons: As ecosystems depend on joint value creation in multilateral relationships, reducing variance is a prerequisite for successful orchestration. Without strong alignment between the players in an ecosystem, the multilateral partnering will

not be synergistic and, thus, will not result in superior value propositions. This constitutes a need for a strong focus on exploitation to align players and keep the ecosystem functional.

If business ecosystems are characterized by exploration-exploitation tensions, we should ask whether these can successfully be managed through existing ambidexterity solutions.

First, contextual ambidexterity seems fairly unlikely to be a suitable solution to transfer to the ecosystem level. As a cultural variable, which shapes individual behavior in a situated way through socialization processes, it is hard to imagine how the intermittent interactions in an ecosystem would create a similar causal mechanism.

In the case of temporal ambidexterity, the transformation from an exploratory focus to a more exploitative focus is fairly intuitive – indeed, as ecosystems mature, they often transform from the more informal orchestration of an ecosystem to the more standardized, technological interfaces between actors within a platform. Consider, for example, *Google Nest*. The manufacturer of smart digital thermostats first established an innovation ecosystem in the form of Works with Nest. Partners included *Fitbit*, a producer of fitness trackers that could signal to Nest that the wearer was about to wake up, so that Nest would then begin warming the user's "smart" home. As the ecosystem matured, Google transferred it over to the more standardized platform Works with Google Assistant. However, the transformation in the opposite direction seems riddled with obstacles: Going from a mature, standardized platform to more flexible, decentralized structures focused on nurturing exploration would require an extremely synchronized change in behavior between a wide variety of actors. On the company level, these changes are usually driven by the owner (cf. Raisch & Zimmermann, 2017) and often accompanied by change in executive leadership. Only the most centralized platforms will have a focal actor with enough sway over the ecosystem to affect this sort of change.

Structural ambidexterity, finally, might be an instructive model in need of substantial adaptions to account for the new context. At first glance, having some actors focused on efficient processes and some actors engaged in exploration seems a fairly logical approach. This is most clearly represented in ecosystems consisting of large incumbent companies focused on exploitation in the backend, and more agile, technology-driven

start-ups focused on exploration in the customer-facing frontend. For example, *Toyota* as an incumbent partnered with South East Asian ride-hailing start-up *Grab*. In this case, Toyota still exploits its core capability of manufacturing reliable low-cost cars, while Grab explores new ways to drive demand for these cars in a mobility-as-a-service (MaaS) business model. In a similar way, many incumbent banks and insurances follow a model in which they focus on exploiting their existing core capabilities in the backend, while presenting an innovative frontend developed by a start-up. In the Swiss domestic market, this dynamic is illustrated by the ecosystem comprising *Twint*, as the explorative start-up, and *UBS*, as the established bank in the backend. At the same time, however, a central tenet of structural ambidexterity is the integrative role of top management – which is absent in the case of ecosystems. While ecosystems usually do have one actor serving as a central orchestrator, the role and resources attached to this function are very different from that of an executive at a singular company. Thus, the process of integration between exploration and exploitation cannot realistically be described by existing ambidexterity theory in the context of business ecosystems.

Overall, while central ideas of ambidexterity theory have some application to exploration-exploitation tensions at ecosystem level, they will need substantial adaptations to account for the dynamics at this new level of analysis. Similar to the case of competitive dynamics between companies and nations (Porter, 1990), we might find that, while causal mechanisms do not repeat themselves across levels, they just might rhyme.

## Managerial Implications

*All happy families are alike; each unhappy family is unhappy in its own way.*
(L. Tolstoy, *Anna Karenina*)

True to the St. Gallen approach to management science captured in its motto "from insight to impact", my research also carries important managerial implications. Different companies will have unique sets of challenges in achieving greater ambidexterity, as alluded to in the quote above. In order to illustrate how the mechanisms identified in my dissertation play out in practice, I will focus on one of the more frequent scenarios: How can companies develop from having a heavy focus on exploitation to a more ambidextrous approach?

The central message of the micro-foundations view of ambidexterity developed in this dissertation is a primacy of people over processes: Any development in organizational ambidexterity is driven by changes in individual behavior by the organization's members. Accordingly, *managers should focus on shaping an organizational context that engenders the kind of individual behavior necessary for organizational ambidexterity.* Having clarity about how the individual behavior has to change precisely, instead of thinking in more elusive, macro-level relations, allows for a much more focused transformation process.

The empirical parts of my dissertation build on this general framework and provide specific guidance on how to design this context. Chapter two demonstrated how social context shapes the cognitive underpinnings of individual ambidexterity. Thus, I recommend: *Align the distal and proximal social contexts in the organization towards ways to increase the explorative self-efficacy of your employees.* Chapter three focused on the recursive individual-level processes governing mindset development and stabilization. Based on my results, I recommend: *Combine persuasive informational messaging with motivational mechanisms aimed at emotions* and *Find concrete ways for your employees to engage in ambidextrous work so they can hone their capability*. Finally, chapter four analyzed the social emergence processes transferring individual ambidexterity to ambidexterity at higher levels of analysis. Accordingly, I recommend: *Create a sense of shared identity that empowers individual employees to take ownership and shape organizational outcomes*.

In order to illustrate these recommendations with practical examples, I will describe two transformation processes: Microsoft, as instigated by Satya Nadella from 2014 to 2019, and *3M* under George Buckley from 2006 to 2011. Both cases are described based on published materials (cf. HBR case, Paul & Fenlason, 2014).

*Building the Micro-Foundations of Ambidexterity at Microsoft*

When Satya Nadella took over as CEO at Microsoft in 2014, the company had a wildly one-sided emphasis on exploitation. The single-minded focus on increasing efficiency was apparent, for example, in the stack-ranking performance management system: In this system, performance evaluations followed a fixed distribution, which meant that 10% of employees would always receive a poor rating, independent of their absolute level of contribution. This contributed to a cut-throat culture bent on identifying

and eliminating mistakes – mostly the mistakes of others. In the words of a product manager: *If you don't play the politics, it's management by character assassination"* (case study). The exclusive interest on exploitation was also apparent in Microsoft's aggressive opposition to open source innovation, with then-CEO Steve Ballmer calling Linux *a cancer that attaches itself in an intellectual property sense to everything it touches*. Internal projects with a more explorative focus also had a hard time: *Potential market-busting businesses, such as e-book and smart phone technology, were killed or delayed amid bickering and power plays* (Eichenwald, 2018).

After one decade of pure exploitation, the impact started to show: The market developed from desktop computers towards smart phones, from Microsoft's Windows to Apple's iPhone and Google's Android. The exploitative part of the business was still going strong, with revenue tripling and profits doubling during Ballmer's tenure between 2000 and 2014. However, the missing exploration put in question the future viability of the company, leading essentially to flat stock price development over the same period, even as the valuations of competitors, such as Apple and Google, soared to record highs. This development also affected employee moral: Then-CEO Ballmer's Glassdoor rating from his own employees was at a mere 29%. By comparison, Google CEO Larry Page commanded an approval rating of 94% on Glassdoor, beaten by Facebook's Mark Zuckerberg at 99% approval.

As soon as Satya Nadella took the reins in 2014, he immediately called out the excessive focus on exploitation and efficiency at the expense of exploration: *Microsoft's culture had been rigid. (...). Accountability – delivering on time and hitting numbers – trumped everything. (...) Hierarchy and pecking order had taken control, and spontaneity and creativity had suffered* (11). Against this, Nadella articulated a vision of ambidexterity*: Employees wanted a CEO who would make crucial changes, but one who also respected the original ideas of Microsoft (...)* (14). Nadella believed that this combination of change and stability, of exploration and exploitation, should lead Microsoft in a new era. In order to achieve this vision of a new Microsoft, Nadella knew that he had to prioritize nurturing a new kind of culture, one that would change the way his employees acted and interacted. In other words, he needed to build the micro-foundations of ambidexterity at Microsoft.

Mr. Nadella chose to communicate his vision for Microsoft as such: *We can have all the bold ambitions. (...). But it's only going to happen if we live our culture, if we*

*teach our culture. And to me, that model of culture is not a static thing. It is about a dynamic learning culture. In fact, the phrase we use to describe our emerging culture is `growth mindset', because it's about every individual, every one of us having that attitude – that mindset – of being able to overcome any constraint, stand up to any challenge making it possible for us to grow and thereby for the company to grow* (19). Notice how his vision incorporates several themes of my dissertation. The notion that organizational growth is the outcome of individual growth reflects the micro-foundations perspective. His explicit reference to psychological mindsets stems from personal consultations with the "godmother" of mindset theory, Professor Carol Dweck (23), and illustrates its central importance for individual ambidexterity. Nadella appears to also include explorative self-efficacy, the other individual-level capability analyzed in my dissertation, in his definition of mindset: being able to overcome any constraint and standing up to any challenge is precisely the behavior of a highly self-efficacious individual. His quest to transform Microsoft's employees *from know-it-alls to learn-it-alls* (22) illustrates how the angles identified in my dissertation can be implemented in practice.

Chapter two of my dissertation argued that social factors are the basis of individual capabilities necessary for ambidexterity. Furthermore, proximal social factors, such as leadership, and distal, more contextual social factors have to be aligned towards an inclusive message for exploration. Right after taking charge, Mr. Nadella started to transform Microsoft's leadership and its social context.

Take leadership: Under Mr. Nadella, leaders at Microsoft were required to read Marshall Rosenberg's book on nonviolent communication and to reflect on their interactions with their subordinates. Leaders were tasked with closing meetings with a reflection on whether this meeting was a growth-mindset or a fixed-mindset meeting. Nadella also brought founders of companies that Microsoft had acquired into the senior leadership circle: *These new Microsoft leaders were mission-oriented, innovative, born in the mobile-first and cloud-first world. (…) The only problem was that most of these leaders did not officially 'qualify' to go to executive retreats given the person's level in the organization. To make matters worse, neither did their manager or even their manager's manager… Inviting them was not one of my more popular decisions. But they showed up bright-eyed, completely ignorant of the history they were breaking. They asked questions. They shared their own journeys. They pushed us to be better* (18). Satya

Nadella also strived to personally model the kind of leadership necessary for his transformation to stick: Remaining curious with a focus on learning, rather than demonstrating that he knows best. For example, when asked during a Q&A whether he had any recommendations for women seeking pay raises, he advised patience and faith in the system that it would provide the correct raises. After the predictable outrage that followed this rather ill-advised remark, Nadella wrote an email to all his employees stating that he had *answered the question completely wrong* and proceeded to explore his own biases, while demanding that his leadership team do the same. In his own words: *I was committed to use the incident to demonstrate what a growth mindset looks like under pressure* (36). In 2016 Microsoft suffered a PR debacle after its AI-based chatbot Tay started sharing racist tweets and had to be discontinued. Nadella chose to publicly endorse the developer team behind the failed experiment: *Keep pushing and know that I am with you*. Expressing trust in the face of public defeat is a great illustration of how leaders can support their follower's self-efficacy in practice.

The more distal social context was also transformed in order to align with this new leadership style. The corporate strategy had been adopted to focus more heavily on explorative new business opportunities in cloud and mobile computing. Symbolic monthly video-messages from Satya Nadella discussed his latest learnings and served as a reminder that Microsoft is supposed to be a learning company. Elevators in the corporate headquarters were decorated with the Chinese symbol for listen, and even the napkin holders in the cafeteria reminded workers to be lifelong learners. Through many nudges across the organization, a supportive context for exploration besides the heavy focus on exploitation was reinforced. In the words of the senior leader tasked with changing this overall social context: *We never believed that there would be one thing that would change the company. It would be a lot of things, big and small, reinforcing the change* (27).

In order to transform mindsets, chapter three argues, leaders have to make use of both informational and motivational angles. The new mindset then stabilizes over time as more explorative and exploitative behavior is shown. In the transformation of Microsoft, both angles are readily apparent. Mr. Nadella invited Professor Dweck to the company to explain how mindsets work and why a growth mindset is important. He appointed 17 leaders to be his "culture cabinet", and tasked them with articulating a clear and persuasive message about what growth mindset meant for Microsoft. As seen

above, he also personally explained the mindset concept and its importance in his frequent addresses to the company. In addition to these informational approaches, he targeted the more emotional and motivational mindset aspects. He sent managers on "immersive experiences" with customers, in which the managers were supposed to train their ability to listen and learn. According to a senior manager, *getting to know each other in the context of solving a partner's problems was more meaningful than ropes exercises or off-site discussions* (30). Nadella abolished the infamous stack-ranking evaluation system and replaced it with a greater focus on feedback and continual improvement, with much wider decision-making authority on the level of the individual manager. When he wrote his autobiography about his personal learning journey, every employee received a copy of the book with a handwritten letter from Nadella. In trying to reach the emotional side of his employees, Nadella even turned to (engineer-adjusted) poetry and cited V. Seshadri in outlining the company's vision of continuous learning: *The soul, like the square root of minus 1, is an impossibility that has its uses* (46). In order to tap into the recursive cycles between mindset development and ambidextrous behavior, practical ways had to be devised for employees to engage in more explorative tasks in addition to their exploitative routine jobs. A concrete example of this is OneWeek, the annual Hackathon hosted by Microsoft. At this event, employees had the chance to explore new business opportunities before returning to their more exploitative day jobs. This allowed employees to test out their more ambidextrous mindset and to reinforce the value of exploration alongside exploitation.

Finally, chapter four of my dissertation suggests that organizations should create a sense of shared identity that empowers individual employees to take ownership and shape organizational outcomes. The very first action Nadella took when he embarked on his quest for transformation directly communicated such a message of individual ownership: *I heard from hundreds of employees at every level and in every part of the company. We held focus groups to allow people to share their opinions anonymously as well. Listening was the most important thing I accomplished each day, because it would build the foundation of my leadership for years to come* (14). This message to the employees demonstrated that they would be allowed to, and expected to, take active ownership in shaping the new Microsoft culture and organization. In order to engender this process, it was instrumental to instill a sense of shared identity, both on the level of leadership and for front-line employees. Nadella reflected on the importance of shared identity in the senior leadership team: *The senior leadership team [SLT] needed to*

*become a cohesive team that shared a common world view… We needed everyone to view SLT as his or her first team, not just another meeting they attended. We needed to be aligned on mission, strategy and culture* (17). In order to instill this sense of shared identity for front-line employees, the new value One Microsoft was introduced as one of the three cultural pillars: *We are one company, one Microsoft – not a confederation of fiefdoms. Innovation and competition don't respect our silos, so we have to learn to transcend those barriers* (24).

After four years of hard and diligent work building the micro-foundations of ambidexterity at Microsoft, the results have begun to show. Employee morale is up, and Nadella's approval rating stands at 95%. Microsoft is rated as one of the five best AI companies to work for (41). The combination of existing capabilities and new explorative working in the cloud world have resulted in over 95% of Fortune500 companies using Azure, Microsoft's cloud service. Finally, the stock market also believes in Microsoft's future potential again, and the company's transformation resulted in Microsoft passing the 1 trillion USD market cap in June 2019. This represents a quadrupling in value in the five years of Nadella's tenure, as illustrated in figure 21.

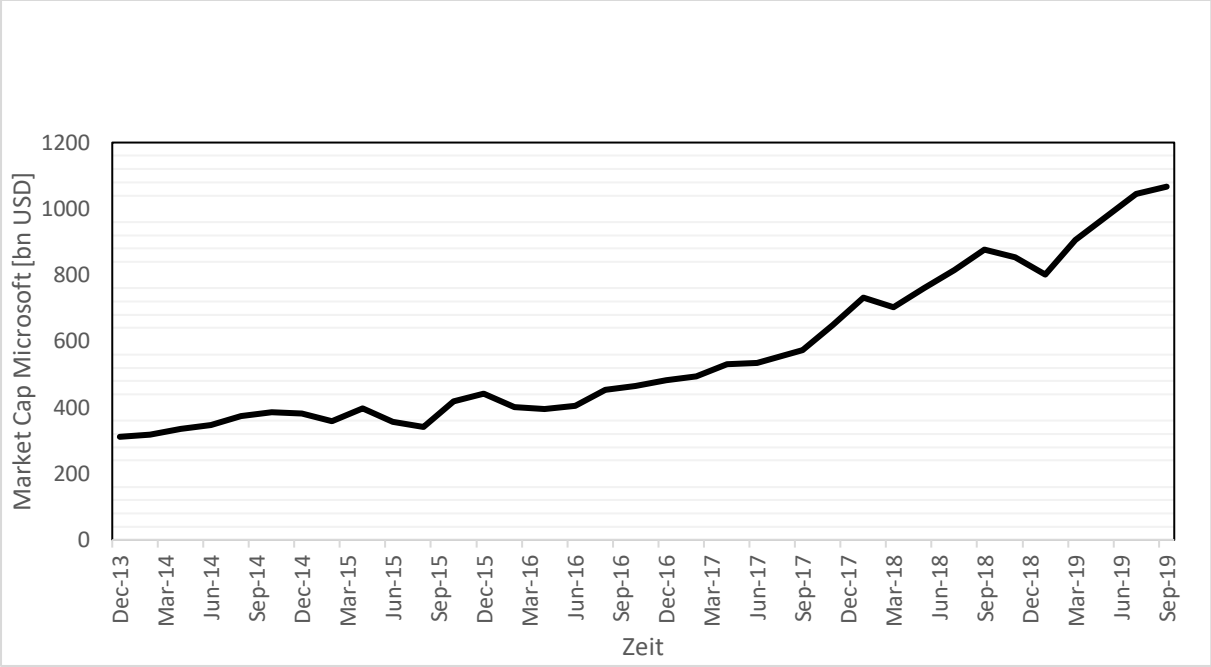


Figure 21: Market cap Microsoft in USD bn

*Building the Micro-Foundations of Ambidexterity at 3M*

3M is renowned for its imprinted focus on exploration. In fact, as early as the 1920's, then-CEO McKnight wrote: "In business, the first principle is the promotion of

entrepreneurship and insistence upon freedom in the workplace to pursue innovative ideas" (Paul & Fenlason, 2014, p. 570). Signature practices, such as the renowned fact that 3M scientists can freely spend 15% of their time, on innovative pet projects cement the company's status as an innovation leader. It was celebrated in the influential best-seller *Built to Last* (Collins & Porras, 1994), and 3M regularly features on *Fortune*'s list of the World's Most Admired Companies. However, as global competition picked up in the 90's, the board and investors began to scrutinize the return on investment of the companies' many exploratory initiatives.

In 2001, 3M hired its first outsider CEO, James McNerney. Formerly CEO of GE, McNerney came with a mandate to cut costs and increase profitability at 3M. His main initiative to "change the DNA of the place" (Hindo, 2007, p?) was to introduce a comprehensive Six Sigma program, as popularized by GE. The goal of his initiative was to cut costs and reduce inefficiencies in all 3M processes, from production, to HR to R&D. Indeed, McNerney's change program proved effective along these dimensions as profitability rose and development time for new products was reduced from an average of 4 years to a mere 2.5 years. However, the price was an almost exclusive focus on incremental, exploitative innovation, which fit much better into the new demands of predictability, process and the high ratio of new ideas to product launches demanded by the Six Sigma methodology. After Mr. McNerney left 3M at the end of 2005, for a position as CEO of Boeing, incoming CEO George Buckley described this dilemma as follows: "Invention is by its very nature a very disorderly process. You can't put a Six Sigma process into that area and say `well, I'm getting behind on invention, so I'm going to schedule myself for three good ideas on Wednesday and two on Friday.' That's not how creativity works" (Hindo, 2007, p.?).

The development so far could be described as a fairly typical dynamic of temporal ambidexterity (Boumgarden et al., 2012): The company moves from a focus on exploration to a focus on exploitation, and as internal triggers signal an over-emphasis on exploitation, the company prepares to move back to a focus on exploration (cf. Raisch & Zimmermann, 2017). However, Buckley instead started to pursue a goal of contextual ambidexterity and strived to combine exploration and exploitation at the same time, in the same structures, wondering: "How could 3M achieve a balance between innovation and operational excellence?" and "How could 3M unleash the magic of its employees'

creativity without sacrificing efficiency and effectiveness?" (Paul & Fenlason, 2014, p. 569, p. 573).

In his quest to build a more ambidextrous organization, Buckley illustrated the central proposition of my dissertation: the call for a micro-foundations perspective of ambidexterity. As written above, *managers should focus on shaping an organizational context that engenders the kind of individual behavior necessary for organizational ambidexterity.* The high-level action plan for achieving "balance between innovation and operational excellence" at 3M was summarized as: "Get conditions right, then work on attitudes and behavior to improve organizational outcomes" (Paul & Fenlason, 2014, p. 574). This mental model perfectly aligns with a micro-foundations view of ambidexterity: From organizational context, "conditions", to conditions of individual action, "attitudes", to individual action, "behaviors", to "organizational outcomes".

Chapter two argues that *managers should align the proximal and distal social context to engender explorative self-efficacy and individual ambidextrous behavior*. This combination of top-down distal social context and proximal, local leadership, is readily apparent in the transformation of 3M. In their analysis, Paul and Fenlason note that "while the basic tools and fundamental aspirations […] are global, capitalizing on these fundamentals is the responsibility of 3M's managers in every country" (2014, p. 574). Local managers were, in fact, responsible for about 70% of employee engagement initiatives during the transformation of 3M. This approach allowed proximal leaders to tailor initiatives to the particular needs of their workforce in order to create a context conducive to ambidextrous behavior. As Paul and Fenlason note, "Management plays a big role in engaging employees and giving them the best opportunity to innovate. […] They encourage risk taking. They reassure employees that innovation is a priority and that they have the support and backing of top management, and that failure will be tolerated. They cultivate trust in management through timely and meaningful feedback and discussion, and by rewarding employees for taking risks and for success in bringing new products to the market, by giving them cash rewards, status, or promotion, according to what managers feel will be the most valued by employees" (2014, p. 576).

But the distal context also had to be transformed in order for the change to stick. For example, one of the 4 Human Resource Principles at 3M under Buckley was: "Encourage the initiative of each employee by providing both direction and the freedom to work creatively. Risk taking and innovation are required for growth. Both are to be

encouraged and supported in an atmosphere of integrity and mutual respect" (Paul & Fenlason, 2014, p. 576). In addition, the distal social context also needed to demonstrate commitment to exploration through provision of the necessary resources. In the case of 3M, this related to both idea flow through the organization and financial resources.

3M traditionally hired college graduates and promoted almost exclusively from within, creating a committed but fairly insular company culture. Buckley started recruiting much more experienced professionals from the outside to create a greater mix and an influx of new knowledge from other companies. In order to make this change palatable to 3M employees, pension plans were redesigned to allow for greater portability in case of job changes. In this way, 3M employees had much better financial prospects when looking for external jobs at the same time that they were facing more competition for internal promotions. The message was clear: Employment at 3M should last as long as it was mutually beneficial. In another example of increasing idea flow through the company, Buckley installed several informal internal communities dedicated to knowledge exchange, such as the Technical Council at the top level and the Technical Forum at the middle level. Even during the recession, Buckley increased R&D spending to an impressive 6% of turnover from 2010 to 2011, which is among the highest for a large company worldwide (Hagerty, 2012). In 2016, headcount in R&D had increased by over 50% by comparison with 2011.

Chapter three argued that *managers should make use of both informational and motivational angles to shape the mindsets of their followers*.

In order to make use of the informational angle, Buckley focused on data-driven communication. The main source of data behind the communication was a broad set of surveys assessing the organizational context. Chief among them was the Standard Opinion Survey, which was distributed to all employees annually and benchmarked with over 40 internationally operating corporations. In addition, 3M administered a targeted Leadership Survey specifically adapted to document progress on the transformation initiative. Finally, locally adaptable custom surveys were made available for interested work teams. Internal research was widely distributed, documenting the importance of employee engagement for exploration. In the words of Angela Lalor, Senior Vice President of HR, during the transformation: "We also knew from our internal research that employee engagement predicted subsequent innovation in our business labs" (Paul & Fenlason, 2014, p. 573). In addition to this survey-based data, 3M also widely featured

its internal metric of innovation, i.e. the New Product Vitality Index, as a measure of organic growth and even linked it to executive pay plans. The fact that this measure served as a leading indicator for many more established performance indicators for 3M was a running theme in many of Buckley's executive addresses. Taken together, a wide variety of data points were consistently communicated in order to convince 3M employees of the importance of combining exploration and exploitation.

In the course of the transformation at 3M, Buckley also established a variety of measures targeted at the motivational angle in order to change mindsets. This mostly relates to personal, immersive experiences for the employees. For example, the culture leadership team offered "Confronting Reality" workshops, which could be booked by local leaders as a wake-up call for their teams. Another motivational basis for a more ambidextrous mindset turned out to be trust in management: Explorative innovation could happen in an ambidextrous environment only if employees feel that "the hierarchy will tolerate failure and back them up through the ups and downs of developing a totally new product" (Paul & Fenlason, 2014, p. 575). Leadership trainings prominently featured this insight, for example, through the well-known story of the Post-It Note. Accordingly, leaders were not asked to stop using exploitative Six Sigma processes, but rather to adapt them so that they would allow for "funneling 5000 or 6000 good ideas into a winning product" (Paul & Fenlason, 2014, p. 576).

In addition to adaptive measurement of failures, rewarding explorative success was another focus of Buckley's motivational efforts. One hallmark for this is 3Ms dual career ladder system, which doesn't require scientists to become managers in order to advance in their careers. The technical track allows employees to advance to the level of corporate scientist, which is the same rank as an upper level director. This both demonstrates the value of exploration, i.e. research, and exploitation, i.e. management, and also establishes a reward system to navigate the more chaotic channel of exploration.

An interesting example of the *concrete ambidextrous behaviors employees at 3M engaged in* as a consequence of this mindset shift was documented during the recession: "During the economic downturn, heavy emphasis on cash flow management became the edict of the day and many businesses emphasized new products as a way to improve cash flow" (Paul & Fenlason, 2014, p. 579). This use of explorative activities for an

exploitative purpose perfectly demonstrates the successful mindset shift with regards to the complementarity of innovation and efficiency.

Finally, chapter 4 argues the creation of *a sense of shared identity to promote individual ownership of organizational results*. This angle is most evident in the transformation at 3M in the focus on employee engagement as the central metric to drive ambidexterity. According to Lalor (Senior Vice President of HR, during the transformation): "We knew if we wanted to be successful we needed to educate supervisors, leverage our historic strengths while continuing to drive the changes needed to compete effectively. We knew the only way to achieve this was by driving engagement and candidly sharing priorities. We wanted to expose and involve as many people as possible in the planning process" (Paul & Fenlason, 2014, p. 573). 3M defines engagement "as an individual's sense of purpose and focused energy, evident to others in the display of personal initiative, effort, and persistence directed toward *organizational goals*" (Paul & Fenlason, 2014, p. 573). This greater focus on individual ownership of organizational outcomes is an important goal in day-to-day activities of managers: "Through engagement, they make sure the aims of the firm and those of its employees are aligned" (Paul & Fenlason, 2014, p. 576). One practice used to achieve this collective engagement is the Employment Value Discussions, which are discussions between supervisors and direct reports that focus on joint reflection of the aspects of the work the employee considers engaging and or not engaging. During these discussions, the supervisor gets a better sense of the individual needs and wants around engagement and consequently build alignment between the firm's strategy and the employees' priorities.

In addition to this message of individual ownership, 3M also stressed the idea of the shared identity. According to Fred Palensky, Executive Vice President of R&D: "Our businesses are all interdependent and collaboratively connected to each other, across geographies, across businesses, and across industries. The key is culture" (Paul & Fenlason, 2014, p. 579). A prime example for this shared identity is documented in the way the company treats its 46 technology platforms: Each of them belongs to the entire organization, not to a single researcher or business. "This is a critical element of 3M's success, sharing technologies across business and collaborating so that they can be leveraged and improved upon by the strength of the collective" (Paul & Fenlason, 2014, p. 579).

After 5 years of transformation, the results have begun to show at 3M. Employee engagement has been rising continually, as illustrated in figure 22

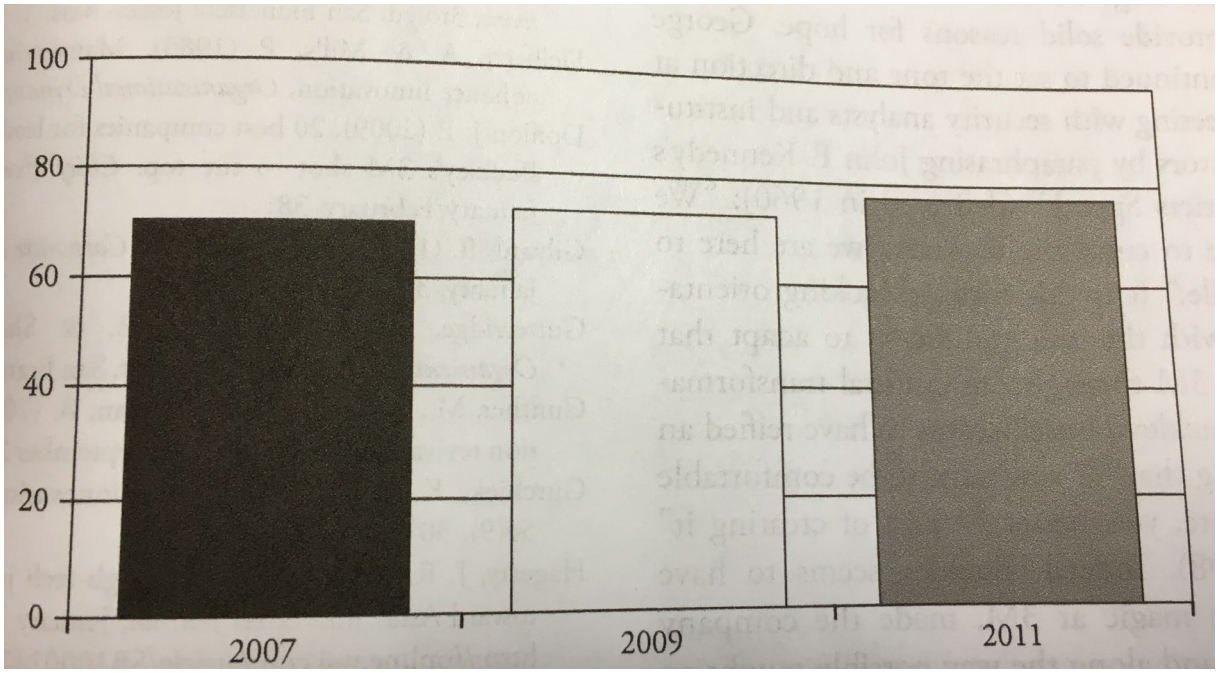


Figure 22: Development of Employee Engagement (% favorable), after Paul & Fenlason, 2014

The New Product Vitality Index, i.e. the percentage of turnover from products developed in the last 5 years, was up to 32% in 2011 from a baseline of 21% in 2005. Importantly, this explorative success did not come at the expense of exploitation and efficiency. Indeed, 3M also had the seventh highest Return on Assets in the Dow30 in 2011, and an impressive return on invested capital of 19.9%. This is all the more impressive as 3M didn't start their transformation from a point of crisis, rather 3M had distributed cash dividends for 380 consecutive quarters and increased the annual dividend for 54 consecutive years when the company embarked on its transformation journey.

As Buckley noted: "Our 2011 results demonstrate the underlying strength of 3M's business model, as we once again generated double-digit top-line growth and premium return on capital" (Paul & Fenlason, 2014, p. 582).

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## APPENDIX

*Practical Approaches to Ambidexterity*

Finally, I will contextualize these transformation cases with a more systematic collection of practical approaches that managers might adopt to create an ambidextrous context that empowers exploration alongside exploitation. The collection is based on the St.Gallen Innovation Culture Navigator (Gassmann, Wecht, Meister & Boemelburg, 2018). I describe more concrete culture practices, which can be employed in the course of an ambidextrous transformation to change routines, and to build an ambidextrous context. The individual practices are briefly sketched out to serve as inspiration for practitioners. These are not meant to be recommendations, but should serve purely as inspiration. If managers want to implement these measures in their own companies, the practices must be carefully adapted to the respective organizational and strategic contexts.

Name: Online Jam Sessions

How: Create a virtual space (e.g. a crowd-sourcing platform) in which employees, customers and partners can meet for targeted collective brainstorming to generate and exchange ideas with each other

Why: Through company-wide / worldwide brainstorming, there are no physical limits to the generation of ideas, and the full potential of employees can be utilized.

Example: IBM's original Innovation Jam was attended by 150,000 employees, family members, business partners, customers and scientists. They jammed for three days non-stop. The result of this session included the Smart Healthcare Payment System.

Companies: IBM, Cisco, SAP

Name: Kill Projects

How: Check your projects regularly and use clear, consistent rules to eliminate those with no recognizable, outstanding potential, or that are a poor fit for the strategic goals. Define a cyclical schedule for this.

Why: Companies lose speed by letting innovation projects with marginal prospects run too long for political and emotional reasons. In addition to efficiency gains, project shutdowns send a clear message: failure (that involves best efforts and leads to learning success) is allowed.

Example: Hilti's Pit Stop stops and checks all activities once a year. Activities that do not deliver decisive additional value are discontinued.

Companies: Hilti, RELX Group, Sonova, Google, Daimler

Name: Go Open Source

How: Use open source solutions wherever possible and share new technological developments with the community.

Why: The use of open source solutions keeps the company in touch with continuing technological developments and creates a precedent for the acceptance and sharing of information across company boundaries, which is crucially important for exploration.

Example: Adobe leverages the creative power of open source solutions and has released over 35 gigabytes of its proprietary code in a total of 91 languages.

Companies: Adobe, Airbnb, Google, Amazon, Facebook, Netflix

Name: Agile Project Management

How: Switch your project management to more agile methods like Scrum. Use right time constraints, regular (re-)prioritization and iterative learning in your own team and beyond.

Why: More transparency and continuous feedback in iterative cycles enable rapid response to changes and bottlenecks in the development process. Innovation-promoting processes, such as the rapid production of tangible prototypes or the cyclical questioning of basic project assumptions, are thus encouraged.

Example: Siemens Medical Technologies has undertaken an "agile transformation". This includes the introduction of Scrum teams, the training of agile architects, and the implementation of the first large agile project as early as 2010.

Companies: Siemens Medical Solution, Adobe, CNN, XING, Logitech

Name: Digital Cooperation

How: Use modern ICT solutions to intensify cooperation in projects, even in virtual teams. Collaborative project management tools, such as Slack, Trello or JIRA are particularly suitable here.

Why: Collaboration tools support and promote collaboration within the project team and enable agile, self-organized work, even over long distances.

Example: The German start-up company Flixbus uses Trello as a project management solution, for example to plan launches in new countries.

Companies: Flixbus, DB, UNICEF, LinkedIN, Accenture, Uber, CapitalOne

Name: Custom(er) Developed

How: Organize workshops on current innovation topics, in which customers are actively involved to be involved in the evaluation of ideas and development process. Alternatively, or additionally, conduct targeted interviews with customers.

Why: Consistent orientation towards customer value creation requires constant feedback and, therefore, an agile approach.

Example: DHL established innovation centers and invited its customers to exchange ideas with DHL employees. This collaboration has led to a number of new initiatives, including the Parcelcopter.

Companies: DHL, SAP, Twitch.tv, Lego, Hilti

Name: Embrace Design Thinking

How: Train your employees in design thinking and regularly apply the method in projects – be it for new product development or just redesigning the office. Guided by empathy and feedback, this process requires constant practice to master.

Why: Design thinking forces employees to maintain regular customer contact and trains the ability to systematically increase empathy for one's own customers.

Example: SAP founder Hasso Plattner established a close cooperation with Stanford Professor and inventor of Design Thinking, Larry Leifer via the d.school, and set up an elaborate training program in design thinking for all employees, right up to creating a specialized career path ("Design Thinking Coach").

Companies: SAP, KPMG, Volkswagen, Swisscom

Name: Fast Prototyping

How: Equip your employees with the necessary tools and resources to convert their innovative ideas into prototypes quickly and with no fuss, and test them with relevant target groups.

Why: Rapid testing and an experimental approach are important pre-requisites for a first-class culture of innovation. For employees to be able to embody these values in their work, they need fast, fuss-free access to both test customers and the necessary resources.

Example: At Swisscom, every employee can apply internally with an idea for the Kickbox program. The Kickbox contains a small financial starting credit, a time budget, and contacts to innovation experts, as well as a manual with valuable tips.

Companies: Swisscom, Lego, Mockplus, InVision

Name: Crowdsource Internal Wisdom

How: Use systematic idea management to collect and evaluate ideas from employees. Also integrate "non-innovative" departments like HR.

Why: Integrated idea management does not exclude anyone and offers a straightforward way to quickly evaluate existing ideas through a multifunctional perspective.

Example: BASF launched an internal crowdsourcing platform "simplify BASF" in the Asia-Pacific region. Every employee has the opportunity to post a topic, discuss it with

colleagues from throughout the region, and develop a mini business plan for management.

Companies: BASF, Microsoft, Vitra, Airbus, Bombardier, Axa, Cisco Systems

Name: Innovation Mentors

How: Create a pool of innovation mentors who are experts in their respective phase of the innovation process (e.g. generating, testing, championing and scaling ideas). The mentors help innovation teams by serving as external reflection partners and ensure rapid learning effects.

Why: Different phases of innovation require different methods and processes in order to be agile and efficient. Especially at the beginning, external coaches help the innovation team to implement and maintain the necessary change of perspective.

Example: In the SBB Innovation Incubator, the “Board of Business Angels” acts as a pool of mentors from SBB management. Together with external experts, they support the employee’s innovation projects.

Companies: SBB, SAP, Rocket Internet

Name: Intrapreneurship

How: Start an intrapreneurship program and allow your employees to suggest their own ideas for new products and services. The ideas are evaluated by a jury and the best ones can then be followed up on by the proposing employees in their own “start-up inside the company”.

Why: Many successful founders had their idea at their last job, but did not have the freedom nor the incentive to realize it there.

Example: Pioneer Intel launched the New Business Initiative back in 1998, where employees can present their ideas and the winners can look forward to having the money and time to develop the new business area.

Companies: Intel, 3M, Lockheed Martin, DreamWorks, Helvetia

Name: Playground Atmosphere

How: Enrich the working environment of your employees with playground elements, such as slides, table tennis or video game consoles.

Why: The playful, childlike joy of discovery is the archetype of creativity. Short, playful breaks awaken the spirit of discovery in employees and inspire them to come up with new ideas.

Example: Red Bull equipped its Santa Monica office with a skate ramp throughout the building. Google installed slides next the stairs that the employees can use to move across the different levels in a lively and playful manner.

Companies: Red Bull, Google, Adidas, Nike, SAP, ResearchGate

Name: Include Outsiders

How: Use the swarm intelligence outside of your company. For special innovation challenges, consult external partners and experts and provide them with the most important information and an appealing incentive.

Why: The key to success often lies in the experience of other industries or external partners. Creative ideas can be generated from a variety of sources.

Example: With the Connect+Develop initiative, Procter & Gamble invites 70 technology entrepreneurs as external partners and innovators to contribute their ideas to P&G's innovation challenges to identify new business opportunities.

Companies: P&G, Rolls Royce, Novartis, Intel

Name: Increase Diversity

How: Generate creative tension by putting together diverse teams, with regards to gender, age, culture and nationality, but also to education, function or company affiliation.

Why: Different perspectives and assumptions spur a creative process if they are supported by the necessary values, such as acceptance of differences and a common vision within the team.

Example: Novartis has a Diversity & Inclusion (D&I) vision and a D&I strategy to promote diversity within the organization.

Companies: Novartis, Facebook, IBM

Name: Step Out of Comfort Zone

How: Break out of your typical routines and move (a little) outside of your comfort zone – preferably with your whole team.

Why: Stepping out of your comfort zone, voluntarily or not, can lead to the achievement of goals you never thought possible.

Example: The northern German hotel chain Upstalsboom offers its employees various ways to broaden their perspective, be it through training on the psychology of happiness or in the joint ascent of Kilimanjaro together with the trainees.

Companies: Upstalsboom, IBM, Opel, Amazon

Name: Field Trips

How: Leave the office and go into the field together with your team in order to gain direct experience from the customer's perspective.

Why: Field trips help to identify and solve customer needs, especially those that the customers themselves are not fully aware of.

Example: Nissan sent a team of engineers to Europe in order to gain personal experience on the German Autobahn and small French roads. Inspired by this experience, the team designed the Primera, Nissan's first successful model in Europe. Intuit calls a similar method "follow me home". Customers are visited, observed and their problem-solving behavior is recorded.

Companies: Nissan, Intuit, Volkswagen, Schindler, Hilti, DuPont, IDEO

Name: Speaker Series

How: Once a month, invite an external speaker to give an afternoon lecture on his or her research topic and its potential implications.

Why: External speakers give input in concise keynotes and promote an exchange between the employees. They make the workplace a place to learn and discuss innovative ideas.

Example: With the famous Talks@Google, Google invites inspiring and controversial speakers from fields as diverse as technology, design, research and art to discuss their ideas with its employees.

Companies: Google, Mettler-Toledo, IBM, Ringier, PwC

Name: Unfocus Groups

How: Invite atypical, unusual people and let them think aloud about what kind of new products or services they would like to have.

Why: Unfocus groups explore the white spaces, the terra incognita, and thus provide new insights and inspiration.

Example: IDEO includes exceptional people in its unfocus groups, such as someone with a shoe fetish or a dominatrix.

Companies: IDEO

Name: Zero Barriers to Users

How: Reduce or eliminate barriers between your employees and your customers.

Why: A direct interface between product teams and customers increases empathy and the speed of innovation.

Example: At Stripe, all the engineers work in Customer Support for one day a week. This increases their empathy for customers' pain points – and their motivation to find

solutions. At Hilti more than 70% of the employees work in the field and have daily customer contact.

Companies: Stripe, Hilti, ResearchGate, Schindler

Name: Internal Inspiration

How: Establish internal interest groups, where employees can inspire each other by sharing their knowledge and perspectives.

Why: In addition to generating inspiration, barriers between teams can be dismantled and information silos removed.

Example: Siemens uses an internal social media application called TechnoWeb in order to exchange ideas between employees worldwide.

Companies: Siemens, SAP, Facebook, Google, Daimler

Name: Lunch Roulette

How: Break silos by creating a lunch lottery, in which every employee can participate and gets matched to have lunch with interesting colleagues they wouldn't normally meet.

Why: Informal relationships across silos are of key importance for a healthy and creative flow of ideas through the company. Having lunch with colleagues outside of your regular social network helps build these relationships.

Example: Kickstarter programmed their own lunch roulette app to automatically create diverse and stimulating lunch groups – and the code is open source on GitHub.

Companies: Kickstarter, Google, Boehringer Ingelheim

Name: Team Contest

How: Give two (or more) teams the same challenge. The team with the most innovative solution wins the competition and receives a prize.

Why: The competition promotes the creativity of the teams in a playful way and offers an incentive to think outside the box.

Example: Toyota has established an annual innovation fair. It is a one-day event where teams create prototypes for solutions to existing business challenges. The teams compete for awards, prizes and money.

Companies: Toyota, QIAGEN, Novartis, Hoffmann-LaRoche

Name: Idea Quota

How: Ask teams, departments or managers to regularly present a certain number of new ideas: new products, new processes, or business models. Anything innovative is allowed.

Why: The message is actually more important than the absolute quality of the ideas. We all need to be innovative, and we want to measure that. So areas such as accounting or procurement can also be integrated into the innovation process.

Example: General Electric requires each business unit manager to present three ideas with a substantial innovation potential per year.

Companies: General Electric, Reckitt Benckiser

Name: Trust Policies

How: Show your employees trust by giving them a certain degree of autonomy, even at lower levels, e.g. with regards to budget.

Why: A culture of innovation only works with motivated and proactive employees who take responsibility for their own actions. Without decision-making autonomy – especially on important issues – it is difficult for employees to develop this innovation culture.

Example: Netflix is recognized in Silicon Valley for its outstanding culture of innovation. The (entire) expense policy at Netflix is “act in the best interest of Netflix”, while the vacation policy is “take the vacation you consider appropriate”.

Companies: Netflix, LinkedIn, Virgin Group, GitHub

Name: Project Choice

How: Give your employees the opportunity to refuse to participate in projects. This makes managers responsible for promoting their projects and convincing employees that the project is worth their time.

Why: Project choice equips employees with greater influence over their own work and on the organization – with positive effects both on their creative motivation and on the multitude of perspectives considered when allocating resources to projects.

Example: Google does not assign employees to approved projects. Instead, the responsible manager must recruit his or her team by convincing employees that the projects are interesting and promising.

Name: Make the world your lab

How: Give your employees the opportunity to use their points of contact with customers for small tests and experiments. Record successful experiments and scale the insights into the rest of the company.

Why: Particularly in companies with well-segmented touchpoints, such as differentiated stores in retail, this approach enables a large number of experiments to be run simultaneously and increases the design freedom of the responsible employees.

Example: Wal-Mart considers every store to be a small laboratory. Employee ideas are sought in the areas of pricing, product selection and presentation of goods. These ideas are implemented in numerous small experiments. Successful measures are rolled out throughout the network.

Companies: Wal-Mart, McDonalds, Xerox

Name: No title, no ranks

How: Do not use titles on business cards, offices or email signatures, especially for senior management.

Why: Without titles, experienced hierarchy is reduced. As a result, employees increasingly exchange information directly with management. In this way, knowledge, information and ideas can circulate freely within the company and stimulate innovation.

Example: Gore, known for its GORE-TEX product, celebrates the bottom-up approach. There are no employees, but rather 8,000 associates. They even elect their CEO, who has so far always been accepted by the board of directors. This creates great trust and confidence in the organization.

Companies: Gore, haufe-umantis

Name: Peer2Peer Reward

How: Give your employees a platform to acknowledge innovative contributions by their peers, and sponsor rewards from management for the most frequently recognized colleagues.

Why: Innovative contributions by individual employees are often hard to judge for managers. Empower peers, such as teammates, to voice their views and create meaningful benefits for their colleagues.

Example: Oracle implemented a social reward solution with a fixed credit that each employee can spend on colleagues for their contribution and collaboration. Attractive rewards await the most frequently recognized colleagues.

Companies: Oracle, Pointroll, ZipRecruiters, CBInsights

Name: 5x5x5 Projects

How: Designate five teams of five people each to design a portfolio of five business experiments within five days. These experiments must be feasible to run within five weeks, cost a maximum of 5,000 Euros to implement and have high potential for the creation of knowledge in the company.

Why: This unusual approach offers an efficient introduction to a corporate culture that thinks more freely and has routinized the value of systematically testing hypotheses.

Example: Microsoft has an entire analysis and experimentation department that conducts more than 10,000 such experiments per year. Simple adjustments, such as rearranging the positioning of advertisements, already allowed sales growth of 12% to be achieved.

Companies: Microsoft, Booking.com, Hertz, Singapore Airlines

Name: Reverse Mentoring

How: Designate younger employees as “mentors” for senior managers for new technologies and trends. Younger employees often have a natural intuition for current technologies and trends.

Why: A “mentoring relationship” also makes these trends and technologies more accessible to decision-makers and creates important communication channels outside of the classic reporting lines. This increases transparency for employees and shows appreciation for younger employees.

Example: Marc Benioff, founder and CEO of Salesforce, has several “inverse mentors” who grew up with digital technologies.

Companies: Salesforce, UnitedHealth, Target, Microsoft

Name: Internal Fellowships

How: Create short-term (or long-term) opportunities for your employees to work in different departments.

Why: Radical innovation requires a comprehensive, transparent perspective on one’s own company. In this respect, rotations between market-sided roles (such as sales) and product-sided roles (such as product management) are particularly helpful.

Example: Metso offers its employees a structured job rotation program in which employees learn to understand the value creation process of the company from different perspectives.

Companies: Metso, Deloitte, IBM, Henkel, HSBC, SAP

Name: Innovation Portfolio Management

How: Create a tool for innovation portfolio management, which is accessible to all employees, and which clearly shows core information and key performance indicators for each of the company's innovation projects.

Why: This creates visibility for innovation activities, inspires employees and encourages links between colleagues who are already actively working on innovation topics.

Example: The Kaleidoscope of the SAP innovation division shows all employees the ongoing innovation projects and their respective statuses.

Companies: SAP, ABB

Name: Radical Transparency

How: Make all internal information accessible to employees at all times. From email to individual targets.

Why: Radical transparency can simplify cumbersome search processes for information and promote productivity through open and fast communication. This signals genuine confidence in employees and communicates their role as key shapers of the company's future.

Example: At the American payment processing start-up Stripe, "open email" makes all communication between employees, but also with external customers, visible to everyone. As a result, even an intern can read e-mails from the Management Board.

Companies: Stripe, Buffer, Whole Foods, Bullhorn, Qualtrics

Name: Celebrate Failure

How: Reward specific individuals or teams who have made a mistake and communicated it openly to allow others to learn from it. This reduces the fear of failure.

Why: Failures are a part of innovation. No risk, no innovation. Knowing that something is not working and the reason behind it is often as valuable as the solution itself.

Example: At the American advertising group Grey, the “Heroic Failure Award” is awarded as a trophy for a big mistake and stays with the winner until the next epic mistake is made.

Companies: Grey, Tata, Phonak, Amazon, Intuit

Name: Thank God It’s Friday Meetings

How: Organize events where employees can ask their questions (private or business) directly to the top management.

Why: Regular direct interactions with top management accelerates the flow of information and prevents rumors. Because these meetings were always held on Fridays at pioneer Google, they are known as “Thank God it’s Friday (TGIF) Meetings”.

Example: Zappos regularly organizes all-hands meetings, at which all employees are informed about current developments and can address questions and feedback to top management.

Companies: Zappos, Google, Holcim, Stadler Rail

Name: Use the Power of Symbols

How: Use symbols to illustrate the central importance of innovation for the long-term success of your business.

Why: Visual and tangible symbols are a regular source of inspiration and trigger conversations and exchanges with visitors and customers about the importance of innovation in the company.

Example: Google’s giant dinosaur skeleton at their campus in Menlo Park reminds everyone that today’s success does not guarantee tomorrow’s survival.

Companies: Google, Alibaba, Amazon

Name: Innovation Vernissage

How: Present new solutions and developments by the corporation to the employees, customers and partners of the company at a special event.

Why: Innovation is quickly lost in day-to-day business. Awareness can be raised with regular events at which top management shows its special support for innovation. This can also reduce the political obstacles faced by innovators from middle management.

Example: The German carmaker Mercedes Benz uses Group Innovation Days to give top management, colleagues and customers a better feeling for the benefits of innovation.

Companies: Daimler, Air Liquide

Name: Borrow with Pride Award

How: Give symbolic recognition to teams and employees who have creatively adopted and adapted ideas from outside the company.

Why: You don't have to reinvent the wheel if there is already a solution to your challenge in another industry. A prize for creative borrowing of ideas from other areas can be used to combat the "not invented here" syndrome.

Example: Henkel presents the annual "Borrow with Pride Award". The compressed dishwasher tabs were created by modifying a production machine for caramel chocolates.

Companies: Henkel, Siemens, Procter & Gamble

Name: Flexible Performance Goals

How: Exchange classic KPIs for more flexible performance measurements of your team.

Why: Fixed KPIs set strict guidelines within which teams can optimize. As a result, employees who have contributed to the company's success in unusual or unforeseen ways may be "punished" for their initiative. A more flexible performance measurement can prevent this and creates greater congruence between company goals and employee goals.

Example: Companies like Salesforce, Netflix and LinkedIn have moved from KPIs to the more flexible Objectives and Key Results (OKRs) as a performance measurement method.

Companies: Salesforce, Netflix, LinkedIn, Twitter

# Curriculum vitae – Raphael Boemelburg

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Email: Raphael.boemelburg@unisg.ch
Date of birth: June 16th, 1990

## Education

| | |
|---|---|
| 02/2017-present | **UNIVERSITY OF ST. GALLEN** (Switzerland)<br>Ph.D. Candidate; Supervisor: Prof. Oliver Gassmann (ITEM-HSG) (Start: February 01st, 2017; Defended: February 24th, 2020; Award ceremony: September 14th, 2020) |
| 09/2012-07/2015 | **RUHR UNIVERSITY BOCHUM** (Germany)<br>M.Sc. Psychology (Ø 1.5) |
| 09/2009-07/2012 | **Ruhr University Bochum** (Germany)<br>B.Sc. Psychology (Ø 1.5) |
| in 2009 | **Gymnasium am Ostring** (Germany)<br>Abitur (Ø 1,5) |

## Employment history (selected)

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|---|---|
| 03/2020-present | **ERASMUS University Rotterdam**<br>Visiting Researcher at the Department of Strategic Management and Entrepreneurship (Chair: Prof. Jansen) |
| 09/2016-03/2020 | **UNIVERSITY OF ST. GALLEN** (St. Gallen, Switzerland)<br>Research Associate at the Institute of Technology Management (Chair: Prof. Gassmann) |
| 09/2016-03/2020 | **SAP AG, NEW VENTURES AND TECHNOLOGIES** (St. Gallen, Switzerland)<br>PhD-Student |
| 11/2014-04/2016 | **Happiness Research Organisation** (Dusseldorf, Germany)<br>Data Scientist |
| 04/2014-11/2014 | **SmileSense** (Palo Alto, CA)<br>Data Scientist |
| 04/2014-09/2014 | **Stanford University** (Stanford, CA, USA)<br>Visiting Student Researcher |
| 07/2012-12/2012 | **University of Miami** (Miami, FL, USA)<br>Visiting Student Researcher |
| 02/2010-07/2014 | **Ruhr University Bochum** (Bochum, Germany)<br>Research Assistant |

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## Supervision of students

| | |
|---|---|
| Bachelor's thesis | Clemens Munter<br>Carolin Hunkemoeller<br>Sena Lazarevic |
| Master's thesis | Ines Freiburghaus<br>Martin Bodner<br>Claudia List<br>Selina Lorenz |

## Teaching activities

| | |
|---|---|
| 09/2016-present | **UNIVERSITY OF ST. GALLEN** (Switzerland)<br>Teaching assistant since 2016; Innovation & Führung (Master) and Forschungs-, Venture & Praxisprojekte (Master), Business Innovation I (Master), Elective Course Business Model Innovation (MBA), CAS Business Model Innovation, Publishing in Management, Technology and Innovation (PhD) |
| 09/2011-08/2014 | **Ruhr University Bochum** (Germany)<br>Teaching assistant from 2011-2014; Experimental Research Methods (Master), Linear Algebra and Statistics II (Bachelor) |

## Active memberships in scientifc societies

| | |
|---|---|
| 2016-present | Ad-hoc reviewer for *Journal of Strategy and Management*, *Creativity and Innovation Management*, and *Technovation* |
| 2018-present | Strategic Management Society (SMS) |
| 2018-present | Academy of Management (AoM) |

## Prizes, Awards and Fellowships

- Best paper Award Academy of Management 2019
- SNF doc.mobility fellowship
- Scholarship student German National Academic Foundation (awarded to top 1% of students in Germany)
- Wings of Excellence Award, top 40 out of 1300 contributions for St. Gallen Symposium
- Semi-Finalist College Success Prize. Team application with Stanford Interventions Lab for five-million-dollar prize awarded to technology-based solutions for educational disadvantages for marginalized students
- Ambassador for Kiron Higher Education, charitable initiative for open and degree-granting higher education for refugees
- Member of the Board Doc.Net association of PhD students at the University St. Gallen (2018)

## Personal skills

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|---|---|
| **Languages:** | German (native), English (fluent), Spanish (basic) |
| **Software**: | R, SPSS / AMOS, MPlus, Matlab, G*Power, LaTex |
| **Data science**: | GLM, QCA, Conditional Process Analysis, Multivariate Analysis, Machine Learning, Multilevel Modeling |