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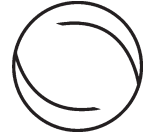
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Abstract

Top management teams are crucial in managing the ambidexterity paradox. This endeavour, however, generates cognitive conflicts. Surprisingly, this particular topic has received little attention within the ambidexterity literature. We aim to address this lacuna and, in doing so, extend the paradox literature and the emerging socio-cognitive perspective on ambidexterity. In our hypothesized mediation model, top management teams embrace the exploration-exploitation paradox through reflexivity, then overcome this paradox through paradoxical cognitive processing – the capacity to cognitively differentiate and integrate exploration and exploitation – which finally fosters ambidexterity. We test and find support for our hypotheses using a sample of 335 Dutch and German small and medium enterprises. We end with a discussion on how socio-cognitive factors influence the management of the ambidexterity paradox. In doing so, we refine scholarly understanding of motivating and enabling factors that allow top management teams to deal with the paradoxical tensions surrounding ambidexterity.

Keywords

ambidexterity, information processing, paradox, reflexivity, top management teams

Introduction

In order to survive and thrive both in the present and the future, organizations must continuously explore new competencies and capabilities while at the same time exploiting current ones (O'Reilly

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& Tushman, 2008). Explorative and exploitative activities are perceived to be contradictory in nature, as they follow different logics and often incite competition for organizational resources (Smith & Tushman, 2005). Nonetheless, exploration and exploitation, while distinct and contradictory, need to be reconciled and combined to foster joint value creation. This paradoxical process is conceptualized as organizational ambidexterity (Smith, 2014). The top management team (TMT) of an organization plays a crucial role in managing this paradoxical tension between exploration and exploitation activities (i.e. 'the exploration-exploitation paradox'), to further firm-level ambidexterity (O'Reilly & Tushman, 2013).

Managing the exploration-exploitation paradox is challenging, as it results in cognitive conflicts that cause psychological discomfort that TMTs will be inclined to avoid, reduce or ignore (Festinger, 1957; Lewis, 2000). The Polaroid Corporation provides a well-known illustration of what can happen if TMTs fail to overcome these cognitive conflicts (Tripsas & Gavetti, 2000). Although Polaroid was highly successful in both exploration and exploitation activities, the reluctance of the TMT to let go of the 'razor-blade business model' acted as a perceptual filter, leading the TMT to ignore other possible business models that could have enabled Polaroid to capitalize on their revolutionary digital camera technology. This hesitation limited the TMT's collective ability to create a bridge between Polaroid's exploration and exploitation activities and realize the novel combinations that were needed to compete in the future, ultimately resulting in its demise. This example points to the social and cognitive aspects of a TMT's ability to manage the exploration-exploitation paradox.

Drawing on socio-cognitive theory, we forward two interrelated, yet distinct, TMT-level mechanisms that help TMTs manage explorative and exploitative tensions: reflexivity and paradoxical cognitive processing. TMT reflexivity refers to the extent to which a TMT assesses 'current information and past or planned actions, decisions or conclusions, with respect to goals, processes or outcomes' (Schippers, Edmondson, & West, 2014, p. 735). Reflexivity stimulates learning and has the potential to be vital in terms of increasing awareness and motivation to engage with and 'work through' the paradox (Knight & Paroutis, 2017; Lüscher & Lewis, 2008). As such, TMT reflexivity enables TMTs to *embrace* the tensions surrounding the exploration-exploitation paradox. TMT paradoxical cognitive processing, on the other hand, pertains to the cognitive capacity of a TMT to handle inconsistencies (Smith & Tushman, 2005). In light of ambidexterity, we define this as the managerial capacity to *overcome* tensions between the present (exploitation) and the future (exploration). This capacity is dependent upon cognitive differentiation and integration; two opposing but also mutually enabling mechanisms (Bartunek, Gordon, & Weathersby, 1983; Coren & Suedfeld, 1995). By introducing TMT paradoxical cognitive processing as a mediator between TMT reflexivity and organizational ambidexterity, we are able to make several contributions.

First, we contribute to the emerging socio-cognitive perspective within the ambidexterity literature (e.g. Heavey & Simsek, 2017; Knight & Paroutis, 2017). Socio-cognitive factors may influence a TMT's ability to process and structure information, which is crucial to the management of the exploration-exploitation paradox. Despite its importance, research to date has seldom used an explicit socio-cognitive lens to examine the pursuit of exploration-exploitation. Moreover, when it has, this research has focused on different levels of analysis, such as the project-team level (Jansen, Kostopoulos, Mihalache, & Papalexandris, 2016) and the individual level (Kauppila & Tempelaar, 2016). With our socio-cognitive model that stresses discourse and information processing, we provide a more thorough explanation of how TMTs realize organizational ambidextrous outcomes.

Second, past research on paradoxical tensions has either focused on the mindset of embracing tensions (e.g. Lüscher & Lewis, 2008; Miron-Spektor, Ingram, Keller, Smith, & Lewis, 2018) or of overcoming them (e.g. Heavey & Simsek, 2017; Jansen et al., 2016). While these insights are important, we posit that both singular foci paint an incomplete picture. By including TMT

reflexivity as a shared, motivational means of embracing paradox and TMT paradoxical cognitive processing as a way of overcoming paradox, we are able to theorize and test a model in which embracing and overcoming are sufficient and necessary conditions to create ambidexterity.

Third, we re-conceptualize the nature and role of reflexivity in relation to managing the exploration-exploitation paradox. Where previous conceptualizations have implied instigation by outside parties (Lüscher & Lewis, 2008; Pradies, Tunarosa, Lewis, & Courtois, 2021), we argue and find that TMTs concerned with ambidexterity can have the capacity to engage in reflexive behaviour, systematically and of their own accord. Informed by literature on organizational behaviour, we define TMT reflexivity as a discursive, group-level construct that refers to a shared state which, through information-processing, contributes to learning and precedes adaptation (Konradt, Otte, Schippers, & Steenfatt, 2016; Schippers et al., 2014). Moreover, reflexive behaviour does not directly relate to a TMT's ability to deal with the exploration-exploitation paradox. Rather, informed by reflexivity literature (e.g. De Dreu, 2007; De Jong & Elfring, 2010), we argue and find that TMT reflexivity is an important input for TMT paradoxical cognitive processing.

Finally, we provide a more thorough theoretical foundation for paradoxical cognitive processing as proposed within the ambidexterity literature. In our study, we draw on cognitive theory (Bartunek et al., 1983; Keller & Chen, 2017) to better embed and delineate the paradoxical cognitive processing construct. Furthermore, despite broad theorization (Smith & Lewis, 2011; Smith & Tushman, 2005; Westenholtz, 1993), the concept awaits empirical testing in relation to ambidexterity (Birkinshaw & Gupta, 2013; Schad, Lewis, Raisch, & Smith, 2016). Building on this refined conceptualization, we develop an operationalization of paradoxical cognitive processing and argue and find initial confirmation that paradoxical cognitive processing is a necessary step for reflexive TMTs to take, to address the exploration-exploitation paradox.

To test our model, we use a sample of 335 Dutch and German small and medium-sized enterprises (SMEs). SMEs face the same paradoxical tensions as larger organizations but may not have the slack resources or sophisticated administrative and/or information-processing systems to draw upon (Voss & Voss, 2013). Consequently, they are more reliant on their TMT's ability to become ambidextrous and on the capacity of their TMT to deal with the exploration-exploitation paradox (Lubatkin, Simsek, Ling, & Veiga, 2006). This makes this empirical setting especially relevant in terms of testing our model.

Theoretical Background

How TMTs experience the exploration-exploitation paradox

Organizations that simultaneously pursue high levels of exploration and exploitation run into a paradox as they seek to manage the tension between the organization's past and future. The paradoxical notion that, within organizations, explorative and exploitative activities might compete for resources, while at the same time have the potential to be complementary, has been firmly established within the ambidexterity literature (Cao, Gedajlovic, & Zhang, 2009; Jansen, Tempelaar, van den Bosch, & Volberda, 2009; Smith & Lewis, 2011). Knowledge, ideas, or insights that have been generated through explorative activities can provide input for subsequent exploitative efforts and, simultaneously, exploitative activities have the potential to generate a deeper understanding of alternative reconfigurations and encourage the absorption of new external knowledge and resources (Cao et al., 2009). The extent to which TMTs are able to facilitate such cross-fertilization within their organizations depends on their capacity to overcome inherent tensions between exploration and exploitation (Birkinshaw & Gupta, 2013).

TMTs experience a tension between exploration and exploitation through incompatible cognitive frames that underlie these opposing activities (Keller & Chen, 2017). Cognitive frames provide structure and meaning to behaviour and thinking (Walsh, 1995). Exploration, for instance, is associated with experimentation, flexibility and divergent thinking, whereas exploitation is associated with efficiency, refinement and focus (March, 1991). These incompatibilities hamper the ability of the TMT to bridge these differences and realize a novel shared understanding (Cronin & Weingart, 2007). This situation is further exacerbated by the tendency of group members to discuss information that is shared at the expense of information that is available to individual TMT members (Schippers et al., 2014; Stasser & Titus, 1985). As such, being confronted with incompatible explorative and exploitative frames leads to cognitive dissonance among TMT members and, as a result, cognitive and emotional strain (Festinger, 1957). Consequently, TMT members will seek to maintain their existing beliefs. This means they will favour an exclusively exploitative or explorative approach (Levinthal & March, 1993) and interpret new information as being *either* explorative *or* exploitative (Lewis, 2000). As a result, the possibility that there could be a logical (synergetic) connection between the two becomes difficult to imagine (Keller & Chen, 2017). Consequently, such TMTs will tend to shy away from trying to realize synergies between explorative and exploitative activities (Lewis, 2000; Smith & Lewis, 2011; Smith & Tushman, 2005). This means that explorative and exploitative frames are self-referential in character and constrain a TMT's vision (Mervis & Rosch, 1981). They are, however, also subject to learning (March & Simon, 1958), meaning that they can be changed as new information becomes available (Neisser, 1976). As such, TMTs can be prompted to embrace and even overcome the perceived incompatibilities between exploration and exploitation.

A socio-cognitive perspective on TMT ambidextrous ability

To overcome the tensions between exploration and exploitation, TMTs must have, or develop, the capacity to cognitively reframe the way they perceive exploration and exploitation activities and the tensions between them (Bartunek, 1988; Smith & Tushman, 2005). When TMTs reframe a situation, they impose a substantially new framework regarding the way they perceive explorative and exploitative activities and the interrelationships between them; they develop 'a new "lens" for seeing and understanding it' (Bartunek, 1988, p. 139). TMTs pursuing ambidexterity are required to make sense of explorative and exploitative information with less interference of their own biases. As such, reframing results in substantial changes in what the TMT knows, assumes or believes and/or how this content is structured or arranged (Hahn, Preus, Pinkse, & Figge, 2014; Walsh, 1995). Thus, reframing is governed by deep learning processes that substantially alter the way TMTs perceive exploration and exploitation.

Social cognitive theory (Bandura, 2001) helps us understand the ways in which TMTs may achieve such reframing. The key assumption of social cognitive theory is that individuals learn not only on the basis of their own experiences, but also vicariously from the actions of others. More importantly, vicarious learning may compensate for shortcomings at the individual level (Myers, 2018). In light of overcoming inhibiting frames, past research has emphasized the individual's ability to achieve ambidexterity (Kauppila & Tempelaar, 2016; Tempelaar & Rosenkranz, 2019). Yet others have pointed out that the ability to achieve ambidexterity resides between individuals – in the social realm (Mom, Chang, Cholakova, & Jansen, 2019). As such, the way TMT members interact with each other is crucial to their ability to see beyond their existing polarizing frames and realize organizational ambidexterity (Cao et al., 2009; Lubatkin et al., 2006).

In the next section, we take an explicit information-processing perspective in seeking to explain how TMTs respectively embrace and overcome the ambidexterity paradox. In contrast to earlier

work (Lewis, 2000; Smith & Lewis, 2011), we assume that there is a logical, sequential order to embracing and overcoming the exploration-exploitation paradox.

Hypotheses

Embracing paradox: the role of TMT reflexivity on ambidexterity

Past research has highlighted the role of TMT reflexivity in organizational decision making (e.g. Konradt et al., 2016). As reflection on goals, processes, or outcomes interrupts the normal way of doing things, it can increase awareness of information shortages (De Dreu, 2007; Ellis, Carette, Anseel, & Lievens, 2014). This motivates reflexive teams to actively search for, share, evaluate and elaborate on information (Konradt, Schippers, Garbers, & Steenfatt, 2015). Because of its influence on the TMT's information processing, it forms a critical aspect of team learning and precedes adaptation (Schippers et al., 2014). Based on reflexivity theory, we conceptualize TMT reflexivity as a team-level construct (Schippers et al., 2014; West, 2000) that has lasting effects on TMTs' awareness of the exploitation-exploration paradox, their motivation to *embrace* this paradox and their capacity to learn about it. We therefore argue that TMT reflexivity influences ambidexterity for two reasons.

First, TMT reflexivity increases ambidexterity as it heightens shared awareness and increases the motivation of the TMT to embrace the exploration-exploitation paradox. When jointly pursuing exploration and exploitation, TMT members are likely to be inhibited by their self-referential explorative or exploitative frames. TMT reflexivity, however, motivates TMTs to bridge these differences and realize a novel shared understanding (Cronin & Weingart, 2007). A reflexive TMT is more prone to externalize its reasoning, motivating others within the TMT to challenge and exchange these ideas, and thereby increasing shared awareness (Senge, 1990; Vashdi, Bamberger, Erez, & Weiss-Meilik, 2007). Therefore, reflexive teams are more likely to incorporate information held by individual TMT members than they are to focus on information that they have in common (Stasser & Titus, 1985). Because of their increased awareness and motivation, a reflexive TMT will have a better chance of embracing and reframing the tensions between exploration and exploitation.

Second, reflexive TMTs systematically analyse their behaviour and assess performance outcomes, which generates learning outcomes (Ellis et al., 2014). They reflect on the past, the present and the future (West, 2000). In connecting the past with the current state of an organization, TMTs engage in experiential learning (Gavetti & Levinthal, 2000). This type of learning takes into account an organization's current set of activities with the aim of optimizing them based on historical feedback and can thus be considered a form of 'shallow' reflection (Schippers, den Hartog, & Koopman, 2007) that leads the TMT to refine its methods and its understanding of markets, clients, products and/or competitors. As such, this constitutes a focus on exploitation among TMT members. Reflecting on the future, on the other hand, results in an exploration of alternatives, stemming from the extrapolation of the current state of an organization to viable future developmental paths. This generates a forward-looking capacity among TMTs (Gavetti & Levinthal, 2000). This capacity enables TMTs to reflect on the kinds of activities that will be necessary to pursue these alternative explorative paths. This is a form of 'deep' reflection (Schippers et al., 2007), a type of reflection that moves beyond an organization's current state and helps move toward 'what-if' scenarios. This induces an explorative orientation among TMT members. As reflexive TMTs engage in both shallow and deep reflection, they engage in dual thinking (De Jong & Elfring, 2010) and develop the capacity to see value in both exploitative and explorative efforts, increasing the likelihood of ambidextrous outcomes (Smith & Tushman, 2005).

As such, rather than trying to avoid, reduce or ignore the cognitive conflicts surrounding the exploration-exploitation paradox, reflexive TMTs are more likely to embrace it. Therefore, we hypothesize the following:

Hypothesis 1: TMT reflexivity is positively related to organizational ambidexterity.

Overcoming paradox: the role of TMT paradoxical cognitive processing in realizing ambidexterity

Past research has theorized about the importance of paradoxical cognition in realizing ambidexterity (Smith & Tushman, 2005). In the context of ambidexterity, we define paradoxical cognitive processing as the managerial capacity to *overcome* tensions between the present (exploitation) and the future (exploration) through cognitive differentiation and integration. Here, cognitive differentiation refers to an ability to recognize different dimensions within the content of a particular domain (i.e. explorative or exploitative activities) while also being able to look at this domain from different perspectives. Cognitive integration in turn is related to the creation of conceptual connections between differentiated domains (Cheng & Cheung, 2005; Coren & Suedfeld, 1995; Smith & Tushman, 2005). Cognitive differentiation and integration are related to – but distinct from – paradoxical cognitive frames. While a paradoxical cognitive frame influences the degree to which ‘individuals feel comfortable with and energized by tensions’ (Miron-Spektor et al., 2018, p. 38), cognitive differentiation and integration provide the TMT with the capacity to act when faced with the tension between exploration and exploitation activities. While, in an ontological sense, this notion is critical, this distinction has never been made explicit in previous accounts of paradoxical cognitive processing (Hahn et al., 2014; Smith & Tushman, 2005).

Both cognitive differentiation and integration are of equal importance in terms of overcoming the exploration-exploitation paradox; they are two sides of the same coin (Bartunek, 1988; Smith & Tushman, 2005). As cognitive differentiation drives the complexity and nuance of thinking of the TMT, the capacity of the TMT to construct conceptual linkages based on their new, richer understanding between explorative and exploitative domains is equally affected, thus increasing cognitive integration. Likewise, cognitive integration contributes to a more refined understanding of the exploration and exploitation activities involved, thus increasing cognitive differentiation. In line with Mintzberg’s (1989) metaphor on strategizing, the capacity of the TMT to deal with these opposing activities walks on two feet. One cannot move without the other: both are an integral part of management’s capacity to walk or rather, given the nature of the challenges surrounding the paradox, *wade* through the paradox.

Paradoxical cognitive processing enables TMTs to simultaneously combine information from multiple sources, even when this information seems incongruous. Here, cognitive differentiation enables TMTs to draw distinctions between exploration and exploitation activities, providing them with the necessary contrast and offering them alternative cognitive and behavioural responses (Lynn, 2005; O’Reilly & Tushman, 2008; Smith & Tushman, 2005). This increases the likelihood that TMTs will develop the capacity for complex and multi-dimensional information processing that spans the differentiated categories (Bartunek et al., 1983; Woznyj, Banks, Dunn, Berka, & Woehr, 2020). Paired with cognitive integration, it allows TMTs to reframe this interrelationship and construct new conceptual linkages between these opposing activities, thereby realizing a new synthesis of explorative and exploitative activities. This, in turn, enables TMT members to demonstrate greater empathy towards each other, as well as to adopt the perspective of those with potentially conflicting views (Bartunek et al., 1983; Graf-Vlachy, Bundy, & Hambrick, 2020). This

capacity to switch perspectives increases the likelihood that paradoxical viewpoints will be overcome in a cooperative way and a synthesis between exploration and exploitation activities can be realized (Tempelaar & Rosenkranz, 2019).

The mediating role of paradoxical cognitive processing

In the next section, we argue that TMT paradoxical cognitive processing mediates the relationship between TMT reflexivity and organizational ambidexterity. While TMT reflexivity increases the awareness of and motivation to embrace the exploration-exploitation paradox, it does not explain *how TMTs are able to perceive these opposing concepts simultaneously, nor how they concurrently create the opportunity to conceptualize linkages between contrasting activities* (Bartunek, 1988; Cheng & Cheung, 2005). The overarching conceptual motivation for our mediation model lies with paradox theory. Here, the articulation of distinct goals and associated challenges provides a foundation for confronting both differences and similarities, which in turn may enhance synergetic performance (Smith & Tushman, 2005). As a mechanism driving such articulation, TMT reflexivity is not oriented towards overcoming the exploration-exploitation paradox per se; rather it enables TMTs to embrace the paradox (i.e. increase their awareness of certain assumptions regarding exploration, exploitation and their interrelationship while also providing an impetus to engage with the surrounding tensions).

Recent research has shown that team reflexivity increases team outcomes primarily due to its effects on the emergence of team and task mental models (i.e. TMT paradoxical cognitive processing), which in turn affects team performance and adaptation (i.e. ambidexterity) (Konradt et al., 2015, 2016). These authors stress that reflexive activities help TMT members to increase their mutual understanding by collectively sharing and combining their knowledge. Early work already underlined the importance of the encouragement of dissenting viewpoints in the development of cognitive differentiation and integration (Bartunek et al., 1983). The learning that takes place during shallow and deep TMT reflection stimulates the development of cognitive differentiation and integration processing respectively. Shallow reflection supports the demarcation of the boundaries between explorative and exploitative domains. This refines the internal logic and coherence of the underlying cognitive frames and strengthens the capacity of the TMT to engage in cognitive differentiation (Smith & Tushman, 2005). This richer cognitive structure enables TMTs to notice – and cognitively differentiate between – very nuanced aspects of exploration and exploitation activities (Ellis & Davidi, 2005; Neisser, 1976). Thus, this capacity for cognitive differentiative processing is strengthened by the tendency of reflexive TMTs to seek various points of view and their proclivity to extensively assess pros and cons (Evans & Stanovich, 2013; Stanovich, 2011).

On the other hand, deep reflection enhances the capacity for cognitive integration by helping TMTs see the potential of creating new categories within existing cognitive schemata. As reflexive TMTs are likely to develop a broader set of (differentiated) viewpoints and a richer understanding of these respective knowledge domains, it will be easier for them to construct conceptual linkages between differentiated domains (Carroll & Bright, 2010; Cheng & Cheung, 2005). Moreover, as reflexive TMTs become more accustomed to making these cognitive leaps, they feel more at ease with the discussion of the assumptions of their world views. This helps in maintaining an open mind regarding integrative suggestions, even when this seems challenging.

As such, although TMT reflexivity is an important antecedent to ambidexterity as it motivates TMTs to embrace the exploration-exploitation paradox, it is the TMT's capacity for paradoxical cognitive processing that channels the efforts of a reflexive TMT towards synergy. This is a vital step in the realization of ambidextrous outcomes. We hypothesize:

Hypothesis 2: TMT paradoxical cognitive processing mediates the relationship between TMT reflexivity and organizational ambidexterity.

Methods

Data and sample

To investigate our model, a survey was conducted among Dutch and German firms. From this database, we selected firms with 25 to 500 employees to be included in the analysis. The 500-employee headcount is generally accepted to be the upper-level cut-off point for SME categorization (US International Trade Commission, 2010). Firms with fewer than 25 employees were omitted, as very small firms are not likely to have the capacity to continuously invest time and resources in exploring and exploiting simultaneously (Lubatkin et al., 2006; Voss & Voss, 2013). We selected SMEs, as TMTs' attempts to make sense of the exploration-exploitation paradox are strongly dependent on their ability to process information. Relatively speaking, TMTs in SMEs cannot rely on elaborate structures for differentiation and integration to create a fit between the information-processing requirements and their information-processing capacity (Tushman & Nadler, 1978). In contrast, it is more likely that they will seek more organic and team-based means of interacting to create the processing capacity required to cope with uncertainty regarding the ambidexterity paradox (Turner, Swart, & Maylor, 2013). When asking CEOs to fill in the questionnaire, we assured them of confidentiality and offered them a report in which their firm was compared to others in their sector (with other firms listed anonymously). When approaching the 4878 CEOs that we selected, we also asked them to invite other senior managers within their organization to fill out the survey. In total, we received 81 additional surveys from other senior managers, generating a total of 699 responses (a response rate of 14.3%). This procedure allowed us to further assess the validity and reliability of the answers provided by the CEOs. After omitting the companies that fell outside the 25-to-500-employee headcount, screening the data and accounting for missing data, we retained 365 usable individual questionnaires working at 335 organizations from the initial 699 respondents.

The final sample covers a wide range of industries including manufacturing (35.9%); agriculture, forestry, fishing and hunting (0.8%); retail, wholesale trade, transportation and warehousing (19.2%); administrative support, management of companies, professional, scientific and technical services, finance and insurance, real estate rental and leasing and information (31.5%); utilities, mining and construction (6%); arts, entertainment, recreation, accommodation and food industries (2.2%); health care, social assistance and educational services (2.2%); and other services (2.2%). On average, the firms in the sample were 46.12 years old (s.d. = 8.88) and consisted of 123.5 full-time employees (s.d. = 106.46).

To test for non-response bias, we examined differences between respondents and non-respondents in the number of full-time employees, total assets and prior performance. T-tests showed no significant differences. We also compared early and late respondents on demographic characteristics and model variables. These comparisons did not reveal any significant differences ($p < .05$). This indicates that non-response bias was not a problem.

Measurements

Unless otherwise noted, all measures used a response scale in which 1 indicated 'strongly disagree' and 7 indicated 'strongly agree'. All main variable items can be found in the supplemental material of the online version of this article.

Ambidexterity. To measure organizational ambidexterity, we used the scales from Jansen, van den Bosch and Volberda (2006). Both organizational exploration and exploitation were measured using seven items. Here the exploration scale captured the extent to which organizations depart from existing knowledge and pursue radical innovations for emerging customers or markets. In contrast, the exploitation items reflect the extent to which organizations build upon existing knowledge and pursue incremental innovations that meet the needs of existing customers. In line with our conceptualization that ambidexterity is the synthesis of exploration and exploitation (Cao et al., 2009; Jansen et al., 2009), we treat exploration and exploitation as orthogonal variables and measure ambidexterity as the sum of exploration and exploitation. The additive operationalization is preferable to the multiplicative measure for ambidexterity as its use has been shown to lead to lower loss in information (Jansen et al., 2016). To demonstrate the robustness of our findings, we performed our analyses using the multiplicative operationalization of ambidexterity as well. These results are consistent with those obtained with the use of the additive operationalization of ambidexterity. We performed exploratory and confirmatory factor analyses to assess the construct validity of our measurement. The exploratory factor analysis on the combined items revealed that we needed to drop two items from the exploration scale and four items from the exploitation scale. The resulting two-factor solution showed the intended two-factor structure, with five items for exploration ($\alpha = 0.86$, composite reliability [CR] = 0.86, average variance extracted [AVE] = 0.55) and three items for exploitation ($\alpha = 0.75$, CR = 0.78, AVE = 0.55), with each item loading clearly on its intended factor (all factor loadings were above 0.66, with cross loadings under 0.20) and both factors having eigenvalues greater than one. The confirmatory factor analysis demonstrated a good fit with the data ($\chi^2 = 45.71$, DF = 17, CFI = 0.98, RMSEA = 0.07).

Top management team reflexivity. To measure reflexivity, we used a six-item scale based on Schippers et al. (2007). After our factor analysis, we maintained five items that, together, demonstrated high reliability and convergent reliability ($\alpha = 0.92$, CR = 0.93, AVE = 0.72) with corresponding high factor loadings (all factor loadings above 0.79). Confirmatory factor analysis provided further confirmation of the construct validity of reflexivity ($\chi^2 = 4.28$, DF = 4, CFI = 1.00, RMSEA = 0.01).

Top management team paradoxical cognitive processing. As we were not aware of any published scales for *TMT paradoxical cognitive processing*, a new six-item scale was developed. Based on Smith and Tushman (2005), the scale measures the extent to which the top management team engages in differentiation and integration processes. We consulted five academic experts and two corporate members for further refinement. For differentiation, we asked the TMT members to indicate the extent to which the TMT differentiates between existing and new products and devises appropriate strategies for each. For integration, we asked the TMT members to define the extent to which they identify linkages and synergies between existing and new products and services. An exploratory factor analysis revealed that we needed to drop two items. The remaining four items all had factor loadings above 0.62 and showed high reliability and convergent validity ($\alpha = 0.78$, CR = 0.81, AVE = 0.52). An additional CFA revealed a very close-fitting model ($\chi^2 = 3.29$, DF = 2, CFI = 1.00, RMSEA = 0.04), which provided further evidence of the construct validity of the scale.

Control variables. We also controlled for several alternative explanations or other known influencing factors. Larger organizations may have more resources, yet they may lack the flexibility to pursue explorative and exploitative activities simultaneously (Lubatkin et al., 2006). Therefore, we included the number of full-time employees within organizations to account for *firm size*. Also, as

research indicates that inertia increases with age as incumbent firms are naturally more inclined towards exploitation (Gilbert, 2005), we added the number of years since the firm was founded to account for *age*. In uncertain environments, a delicate balance may be more difficult to sustain; therefore, we included a three-item measure ($\alpha = 0.85$) for *uncertainty concerning the environmental state* (Ashill & Jobber, 2010). As TMTs that control organizations with excess resources find it easier to balance the tension between exploration and exploitation (Lubatkin et al., 2006), we used a three-item scale based on the scale from Atuahene-Gima (2005) to control for the presence of *slack resources* ($\alpha = 0.74$). We included a dummy variable for *country* as the data spans two countries, the Netherlands and Germany, which may influence the results. We also controlled for the *structural differentiation* of the organization using a four-item scale ($\alpha = 0.68$). Organizations that are separated in different spatially dispersed units are better able to develop a structure that encompasses both explorative and exploitative activities (Jansen et al., 2009). Similarly, we controlled for *cross-functional interfaces* that enable knowledge exchange between explorative and exploitative units using a six-item scale ($\alpha = 0.86$) (Tsai & Ghoshal, 1998). Finally, as results in terms of exploitation or exploration may be industry-specific, we recoded the NAICS industry codes into eight different industry dummy variables.

Data aggregation

We calculated an inter-rater agreement score (r_{wg}) for the data on the main variables before aggregating the data at the organizational level (James, Demaree, & Wolf, 1993). The average inter-rater agreement was 0.85 for exploration, 0.86 for exploitation, 0.76 for paradoxical cognition and 0.83 for TMT reflexivity. Values above 0.7 indicate a 'good' fit (James et al., 1993).

Further psychometric assessment of measurements and robustness checks

In addition to the assessment of our measurements, we conducted several tests to verify the convergent and discriminant validity of our model. First, we ran an integrated exploratory factor analysis with all the retained items (varimax rotation). This resulted in an expected four-item solution in which all items returned dominant loadings above 0.63 and cross loadings below 0.36. Second, we conducted an integrated confirmatory factor analysis on all the main variables. The model in which the items loaded on their corresponding latent constructs demonstrated a good fit ($\chi^2 = 251.53$, $DF = 111$, $CFI = 0.96$, $RMSEA = 0.06$) for models of this complexity and number of observations (Hair, Black, Babin, Anderson, & Tatham, 2006). All item loadings were as anticipated and significant ($p < 0.000$). Third, to ensure the distinct factor structure of our proposed model we compared our hypothesized three-factor model to different competing models, all of which returned inferior fit indices. A two-factor model in which we specified TMT reflexivity and TMT paradoxical cognitive processing to load on one factor and ambidexterity on the other ($\chi^2 = 616.448$, $DF = 115$, $CFI = 0.86$, $RMSEA = 0.11$), a model in which we included the items of TMT reflexivity within the second-order ambidexterity construct by loading them on exploration (thus forming one factor) and paradoxical cognitive processing on the other ($\chi^2 = 1039.64$, $DF = 115$, $CFI = 0.74$, $RMSEA = 0.15$), and a final model in which the items of TMT paradoxical cognitive processing were integrated in the second-order ambidexterity construct by setting them to load on exploration (again forming one factor) and TMT reflexivity on the other factor ($\chi^2 = 787.81$, $DF = 115$, $CFI = 0.81$, $RMSEA = 0.13$). Fourth, to provide further evidence of discriminant validity at the item level instead of the scale level, we compared the constrained and unconstrained model fit for each possible pair of constructs in our conceptual model (Anderson & Gerbing, 1988). As shown in Table 1, in every case, the χ^2 difference test returned a significant

Table 1. Constrained and unconstrained model fit for all construct pairs.

	Unconstrained					Constrained					χ^2 -difference test
	χ^2	DF	CFI	RMSEA	RMSEA- CI	χ^2	DF	CFI	RMSEA	RMSEA- CI	
Reflexivity Paradoxical cognition	62.63	25	0.98	0.06	0.05-0.08	79.27	26	0.97	0.08	0.06-0.09	16.64***
Reflexivity Ambidexterity	138.81	60	0.97	0.06	0.05-0.07	222.16	61	0.94	0.09	0.07-0.1	83.35***
Paradoxical cognition Ambidexterity	134.17	50	0.96	0.07	0.05-0.08	191.20	51	0.93	0.09	0.07-0.10	57.03***

superior fit for the freely estimated model ($p < 0.001$). In sum, these results confirm the construct and discriminant validity of our measures.

Common method variance. To address potential concerns regarding common method variance (CMV), we took several steps to mitigate and assess the potential for common method variance. First, following the recommendations of Podsakoff, MacKenzie, Lee and Podsakoff (2003), we took several precautions to reduce the risk of CMV. Procedurally, we pre-tested the survey items, ensured anonymity, counterbalanced the order of the measurement of the dependent and independent variables, and included an introduction to the survey stipulating its purpose. Second, we statistically verified whether or not CMV was present in the data. As there are different ways of assessing the presence and extent of CMV in the data, each with their own advantages and disadvantages (Podsakoff et al., 2003), we combined the most commonly applied (Harmon-One and Correlational Marker Techniques), as well as most appropriate methods (CFA Marker Technique) to provide a rigorous test for CMV (Podsakoff et al., 2003). For the Harmon-One factor test, we ran an exploratory factor analysis including all items of the hypothesized model (including control variables) revealing eight different factors that, together, explained 68% of the variance. With 27% of the variance, the first factor did not account for the majority of the variance. The dependent and independent factors loaded on different factors. These outcomes indicate that CMV was not a reason for concern. Similarly, the Correlational Marker Technique, in which we used the educational level of our respondents as marker, did not reveal any reason for concern. Using Lindell and Whitney’s (2001) formula, we removed the shared variance between the marker variable and other variables. The correlations remained significant after correction, providing evidence that a significant common method bias was not present. However, the more stringent CFA marker technique (Williams, Hartman, & Cavazotte, 2010) did indicate the presence of a specific bias among the substantive variables in our model. When comparing the CFA marker model in which we specified our marker variable to covary with the latent constructs in our model and a common latent factor (CLF) which we set to load with equal constraints on all observed items in our model, with the same model without a CLF, we find a modest but significant chi-square difference ($\Delta\chi^2 = 3.07$, $DF = 1$, $p = 0.08$). Overall, though, model fit continued to be high ($\chi^2 = 383,719$, $DF = 196$, $CFI = 0.95$, $RMSEA = 0.05$) and the differences between item loadings were small (< 0.08). Moreover, all item loadings remained strong and significant while the total amount of CMV was relatively modest at 8%. We used TMT intuition ($\alpha = 0.79$) as a marker variable (Dayan & Elbanna, 2011), as we did not expect TMT intuition to have a

strong theoretical relationship to the other variables in our model. This was confirmed by the relatively low intra-correlation the construct had with the other variables in our model (highest correlation being -0.25, average -0.18), making it a suitable marker variable (Lindell & Whitney, 2001). Despite that these results indicate that the influence of CMV seems to be relatively limited, we nevertheless decided to create bias-corrected measures based on the CFA Marker Technique (for the dependent, independent and control variables in our model). We conducted our regression analyses based on the uncorrected and bias-corrected datasets. The results from the bias-corrected model are similar to the uncorrected version, and lead to the same conclusions, which is further testament to the minimal impact of CMV in our data.

Results

The descriptive statistics and correlations are presented in Table 2. To check for potential multicollinearity issues, we calculated the variance inflation factors (VIFs). The highest VIF score was 2.12, which is well below the cut-off value of 10 (Hair et al., 2006).

Table 3 shows the outcomes of the hierarchical regression analyses, following the four-step Baron and Kenny (1986) procedure. Model 1 represents the baseline model containing only the control variables. Model 2 adds the direct effect of TMT reflexivity to the baseline model, representing the first step of the Baron and Kenny procedure. This effect is positive and highly significant ($\beta = 0.18, p < 0.01$). As such, we find confirmation of hypothesis 1. Model 3 includes the mediating variable, TMT paradoxical cognitive processing, to the factors already incorporated in model 2. As can be seen in model 3, the relationship between paradoxical cognitive processing and organizational ambidexterity is highly significant ($\beta = 0.40, p < 0.001$). Moreover, the introduction of the mediating variable, paradoxical cognitive processing, renders the relationship between TMT reflexivity and ambidexterity insignificant ($\beta = 0.02, p < \text{n.s.}$). Finally, model 4 consists of the baseline model and the effect of TMT reflexivity on paradoxical cognitive processing. This final step, again, shows a strong and significant relationship ($\beta = 0.40, p < 0.001$). The influence of TMT reflexivity on ambidexterity becomes non-significant after the introduction of our mediating variable. As the effect of TMT reflexive climate on TMT paradoxical cognitive processing is significant as well, we see a strong indication of full mediation (Baron & Kenny, 1986). To provide further evidence of this mediating effect and to address some of the methodological limitations of the Baron and Kenny method (Hayes, 2009), we used PROCESS version 3.5 to estimate the indirect effect with confidence intervals set at 95% (Hayes, 2017). The findings confirm the results of the Baron and Kenny four-step procedure, demonstrating a strong indirect influence of TMT reflexivity through paradoxical cognitive processing on organizational ambidexterity (Indirect effect = 0.20, Boot SE = 0.05, CI-95 0.12-0.30). Moreover, we also find evidence in support of our hypotheses when we use our bias-corrected measurements as the basis of our analysis. As a further robustness check for our findings, we tested several alternative models. First, we specified TMT reflexivity to moderate the relationship between TMT paradoxical cognitive processing and ambidexterity. This effect was insignificant ($\beta = 0.01, p < \text{n.s.}, \text{CI } -0.11, 0.13$). Second, we ran different parallel mediation models in which we directly contrasted TMT paradoxical cognition with one other mediator (either cross-functional interfaces, shared leadership, or TMT intuition). In addition, we specified a model in which we combined all the forementioned potential mediating variables together with TMT paradoxical cognitive processing in a parallel mediation model. Throughout these different parallel mediation models, the indirect effect of paradoxical cognition remained significant and stable.

Table 2. Descriptive statistics and correlations.

	Mean	SD	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.
1. Ambidexterity	9.71	1.74	I																	
2. TMT Reflexivity	4.99	1.16	0.25	I																
3. TMT Paradoxical cognitive processing	4.79	1.07	0.50	0.58	I															
4. Structural differentiation	4.10	1.32	0.01	-0.06	-0.03	I														
5. Cross-functional interfaces	4.70	1.21	0.24	0.62	0.39	0.00	I													
6. Organizational slack	4.05	1.31	0.23	0.37	0.07	0.18	0.28	I												
7. State uncertainty	4.48	1.11	-0.07	0.38	0.32	0.01	0.25	0.07	I											
8. Firm size	122.62	106.99	-0.14	-0.01	-0.08	-0.01	0.02	-0.11	0.10	I										
9. Firm age	46.27	8.55	-0.05	0.13	0.03	-0.05	0.12	0.01	-0.05	0.01	I									
10. Country dummy	0.44	0.50	0.03	0.18	0.20	-0.41	0.15	0.18	0.14	0.27	-0.02	I								
11. Agriculture, forestry, fishing and hunting	0.01	0.08	0.03	0.00	-0.01	0.04	-0.07	-0.00	-0.01	0.12	-0.04	-0.07	I							
12. Mining, utilities, construction	0.06	0.24	-0.08	-0.04	-0.04	0.06	0.01	0.04	-0.00	-0.04	0.09	-0.12	-0.02	I						
13. Manufacturing	0.37	0.48	-0.04	0.00	-0.03	-0.14	-0.07	-0.07	-0.03	0.13	0.09	0.19	-0.06	-0.19	I					
14. Trade, transportation & warehousing	0.19	0.40	0.09	0.05	0.06	0.11	0.06	0.06	0.03	-0.16	-0.04	-0.10	-0.04	-0.12	-0.38	I				
15. Information, finance, real estate, administrative, professional, scientific & technical services	0.31	0.46	0.02	-0.05	-0.03	0.08	0.05	0.03	0.03	-0.01	-0.01	-0.09	-0.07	-0.05	-0.17	-0.51	-0.33	I		
16. Educational services, health care & social assistance	0.02	0.15	-0.01	0.04	0.08	-0.09	0.03	0.01	0.01	0.10	0.03	0.06	-0.01	-0.04	-0.12	-0.08	-0.10	-0.10	I	
17. Arts, entertainment, recreation, accommodation & food services	0.02	0.14	0.02	0.10	0.02	-0.01	0.01	-0.04	0.01	-0.08	0.05	-0.05	-0.01	-0.04	-0.11	-0.07	-0.10	-0.02	-0.02	I
18. Other services	0.02	0.14	-0.04	-0.08	-0.03	-0.09	-0.10	-0.06	0.03	-0.07	-0.12	0.08	-0.01	-0.04	-0.11	-0.07	-0.10	-0.02	-0.02	-0.02

Note: Correlations above |.1| are significant at the 0.5 level (two tailed).

Table 3. Results of Hierarchical Regression Analyses.

Control variables	Model 1			Model 2			Model 3			Model 4		
	β	SE	P	β	SE	P	β	SE	P	β	SE	P
Base model												
Organizational age	-0.06	0.01	0.25	-0.08	0.01	0.14	-0.07	0.01	0.14	-0.02	0.01	0.72
Organizational size (employees)	-0.14**	0.00	0.01	-0.13**	0.00	0.01	-0.08	0.00	0.09	-0.11*	0.00	0.03
Structural differentiation	0.12*	0.07	0.05	0.12*	0.07	0.05	0.06	0.07	0.27	0.15*	0.04	0.04
Cross-functional interfaces	0.28***	0.08	0.00	0.21***	0.09	0.00	0.18***	0.08	0.00	0.08	0.05	0.15
Organizational slack	0.22***	0.07	0.00	0.18***	0.07	0.01	0.19***	0.07	0.00	-0.03	0.04	0.52
State-uncertainty	0.03	0.08	0.57	-0.02	0.09	0.79	-0.08	0.08	0.13	0.17**	0.05	0.01
Country(d)	0.02	0.21	0.73	-0.00	0.21	0.92	-0.04	0.20	0.14	0.09	0.12	0.12
Agriculture, forestry, fishing and hunting (d)	0.03	1.13	0.54	0.02	1.21	0.68	0.03	1.04	0.58	-0.01	0.64	0.80
Mining, utilities, construction (d)	-0.07	0.38	0.16	-0.06	0.38	0.22	-0.06	0.36	0.22	-0.01	0.22	0.83
Trade, transportation & warehousing (d)	0.01	0.25	0.89	0.01	0.24	0.93	0.00	0.23	0.98	0.01	0.14	0.87
Information, finance, administrative, professional, scientific, technical services (d)	-0.01	0.21	0.92	0.00	0.21	0.96	0.01	0.20	0.80	-0.03	0.12	0.61
Educational services, health care & social assistance (d)	-0.01	0.57	0.86	-0.01	0.57	0.83	-0.03	0.53	0.54	0.04	0.32	0.34
Arts, entertainment, recreation, accommodation & food services (d)	0.00	0.61	0.98	-0.02	0.61	0.72	-0.00	0.57	0.98	-0.04	0.35	0.38
Other services (d)	-0.00	0.62	0.94	-0.00	0.62	0.94	0.01	0.57	0.79	-0.02	0.35	0.64
Independent variables												
TMT Reflexivity				0.18**	0.10	0.01	0.02	0.10	0.72	0.40***	0.06	0.00
Mediator variable												
TMT paradoxical cognitive processing							0.40***	0.09	0.00			
R ²	0.20			0.22			0.35			0.35		
F Δ	7.01			7.44			50.04			41.59		
P	0.00			0.01			0.00			0.00		

Notes: n = 335. Standardized regression (β) coefficients, standard errors (SE), significance values (p) are reported. * $p < .05$ ** $p < .01$ *** $p < .001$; (d) indicates dummy variables; reference group is NA-ICS3 (manufacturing).

Discussion and conclusion

In this paper, we have discussed how TMTs might manage the exploration-exploitation paradox despite the fact that this paradox is rife with emotional and cognitive barriers. We theorize, test and find support for a model in which TMT paradoxical cognitive processing mediates the relationship between TMT reflexivity and organizational ambidexterity. With this model, we seek to merge perspectives on embracing and overcoming the exploration-exploitation paradox, something past literature has not addressed. In doing so, we join a recent stream in the ambidexterity literature that focuses on the socio-cognitive antecedents of ambidexterity (i.e. Heavey & Simsek, 2017; Jansen et al., 2016; Kauppila & Tempelaar, 2016; Knight & Paroutis, 2017).

Theoretical implications

This study has four important theoretical implications. First, former ambidexterity research focusing on the TMT has primarily highlighted the role of TMT leadership and outcome-directed mechanisms such as TMT shared vision (Jansen, George, van den Bosch, & Volberda, 2008). Although leadership and goal-oriented mechanisms may affect the variables in our model, they are neither leadership driven nor explicitly outcome oriented. Rather, the concepts put forward in this manuscript highlight an intricate relationship between individual-level and collective expertise, motivation and action. In line with social cognitive theory (Bandura, 2001), our results suggest that TMT members both produce an environment conducive to ambidexterity, as well as become the product of this environment. Reflexivity, for instance, may start with a question at the individual level that then co-evolves into a TMT setting where questioning is part of their DNA. As questioning becomes routine among TMT members, individuals become more comfortable with contradiction, conflict and cognitive dissonance (Schippers et al., 2014). This allows TMT members to better share and comprehend specific explorative and exploitative intricacies, and find communalities and synergies between them. This dynamic provides an alternative explanation to previously made assertions surrounding TMT leadership and outcome orientation in ambidexterity research and points to the importance of information processing and learning within TMTs in relation to the management of the ambidexterity paradox.

Second, with our mediation model, we link information processing and learning by merging perspectives on embracing and overcoming paradoxes. Past literature has either focused on embracing or overcoming exclusively and has not touched upon their interwoven relationship. In order to embrace rather than reject inconsistencies between exploration and exploitation, TMTs need to process explorative and exploitative information on their own merits. Reflexive TMTs tend to display greater motivation to exchange, challenge and discuss different viewpoints. This increases awareness of the exploitation-exploration paradox and results in a greater willingness to engage with it, increasing the chance for ambidextrous outcomes. In addition, it also lays the foundation for the development of TMT paradoxical cognitive processing, which is essential in overcoming the exploitation-exploration paradox. Through engaging in shallow and deep learning, reflexivity allows TMTs to draw actionable distinctions between explorative and exploitative activities which stimulates the development of TMT cognitive differentiation and integration.

Along these lines, we find that the influence of reflexivity on ambidexterity is fully mediated by paradoxical cognitive processing: a capacity to overcome paradoxes. These findings open up a discussion as to whether or not it is enough for TMTs seeking ambidextrous outcomes 'to be open to paradox' as suggested previously (Miron-Spektor et al., 2018). This study represents a first theoretical assertion, as well as an empirical indication, that both embracing and overcoming are necessary to realize ambidextrous outcomes. Interestingly, we find support for this model while

controlling for general, structural organizational factors, such as TMT size, organizational size and slack, and specific ambidextrous design features, like structural differentiation and cross-functional interfaces. This resonates with previous work on ambidexterity, where there are different pathways depending on hierarchical level: more directed, formal mechanisms at lower levels, versus more informal mechanisms at the TMT level (Jansen et al., 2009). At higher organizational levels, TMTs experience more complexity and interdependency (Daft & Lengel, 1986), which requires ‘frequent adjustments and more informal means of integration’ (Jansen et al., 2009, p. 808). We expand this insight by teasing apart TMT ‘adjustments’ and ‘integration’ in the form of reflexivity and paradoxical cognitive processing, respectively. As such, our model represents an important step towards a more complete understanding of the management of the ambidexterity paradox.

Third, returning to our social-cognitive narrative, this study indicates that achieving ambidexterity is not only driven by the organizational context, i.e. environmental variables (Gibson & Birkinshaw, 2004) or by individual tendencies (Tempelaar & Rosenkranz, 2019), but by a blend of the two. Our conceptualization of reflexivity as a persistent, shared characteristic of a TMT highlights this assertion. Lüscher and Lewis’s (2008) study shows how reflexive questions from an independent third party can trigger individuals to carefully examine the assumptions that underlie their understanding of the world. Likewise, Pradies et al. (2021) describe how the promotion of reflection enables actors to transition from a vicious to a virtuous cycle and facilitate the creation of new responses to competing demands. We extend these studies by contending that reflexive behaviour can, in fact, be conceived of as a stable, relational TMT property that has an enduring influence (Schippers, den Hartog, Koopman, & van Knippenberg, 2008). Reflexive behaviour can be set in motion by the TMT itself and the support of an outsider is not necessary to trigger reflection. Furthermore, our treatment of reflexivity refines current thinking on the vital role that (different) learning activities play in relation to dealing with the ambidexterity paradox, i.e. shallow and deep reflection. Past research tended to focus on deep reflection styles, i.e. double-loop learning – over shallow reflection, i.e. single-loop learning – asserting that actors need to break free from single-loop learning in order to embrace paradoxes (Lüscher & Lewis, 2008). We concur that deep reflection will increase awareness of existing mental models, associated tensions and the perspective-limiting ‘either/or mind-set’ (Smith, 2014). However, we also highlight the value of shallow reflection activities as drivers of more refined and elaborate knowledge structures. This is key, as TMTs with a rich understanding of a specific topic are more likely to find solutions to a given problem. Moreover, as refined knowledge domains go hand-in-hand with a detailed vocabulary, the greater eloquence of these TMTs helps them to articulate and discuss ideas more easily. In line with social cognitive theory, this indicates that TMT-level efforts to achieve ambidexterity are ‘the product not only of the shared intentions, knowledge, and skills of its members, but also of the interactive, coordinated, and synergistic dynamics of their transactions’ (Bandura, 2001, p. 14). As such, shallow and deep reflection can be seen as complementary, as opposed to countervailing, mechanisms in the context of TMTs seeking to embrace the exploration-exploitation paradox.

Finally, we contribute to existing literature by refining and testing the impact of paradoxical cognitive processing on organizational ambidexterity. We do so in two distinct ways. First, we draw on cognitive theory (Bartunek et al., 1983; Keller & Chen, 2017) as a theoretical foundation for the paradoxical cognitive processing construct. Our conceptualization and operationalization bring the tension between the current and future states of an organization to the fore. This allows for a parsimonious link with the ambidexterity construct, which deals with interlinkages between current success and future viability in the form of exploitation and exploration. Second, we extend existing theoretical assumptions regarding antecedents of paradoxical cognition. In contrast to previous conceptualizations, we show that embracing paradoxes is not solely a matter of cognition

(Miron-Spektor et al., 2018; Smith & Tushman, 2005). Through reflexivity, we emphasize a discursive, relational TMT characteristic that allows perspectives among members to shift. Building on information-processing theory, we argue that reflexive behaviour is essential to developing TMTs' capacity for creating temporary cognitive representations independently from their existing working models (Evans & Stanovich, 2013; Stanovich, 2011). This, in turn, enhances cognitive differentiation and integration among TMT members. This is an important step, as our mediation results indicate that TMT paradoxical cognitive processing is pivotal in the achievement of organizational ambidexterity with reflexive TMTs. Our additional model specifications highlight the singular nature of this relationship, as results show that reflexivity and paradoxical cognitive processing do not moderate each other. Theoretically, it makes sense that they do not synergize (i.e. moderate). The intervention of paradoxical cognitive processing in the relationship between reflexivity and ambidexterity is transformative as unstructured reflections are reframed into differentiated information which is used to find synergies. Without this transformation, TMTs are unlikely to overcome the exploitation-exploration paradox. Alternatively, it is also unlikely that reflexivity moderates the relationship between paradoxical processing and ambidexterity. When tensions have been overcome, a reiterated understanding (provided by TMT reflexivity) on the underlying tensions is superfluous. As with many paradoxical interrelationships, this drives home the notion that TMT reflexivity and TMT paradoxical cognitive processing are equally important: one cannot exist without the other in its impact on organizational ambidexterity.

Managerial implications

There are a number of managerial implications that flow from this study. First and foremost, TMTs concerned with ambidexterity should foster reflexivity. The aforementioned interwovenness of the individual and team levels suggests how this might be managed. Interventions can help create critical mass among TMT members, after which reflexivity may become part of the way TMTs operate. Past research has highlighted the effectiveness of interventions in helping create reflexivity among teams (Konradt et al., 2015; Vashdi et al., 2007). In our model, there is a natural relationship between reflexivity and the TMT capacity for paradoxical cognitive processing. However, as past work has shown, third parties are also able to stimulate reframing in order to encourage alternative mindsets (Lüscher & Lewis, 2008; Pradies et al., 2021). The aim of such efforts should be that both reflexivity and paradoxical cognitive processing become routine among TMT members.

Second, past research has also highlighted an inherent emotional response being evoked by switching between exploration and exploitation (Bidmon & Boe-Lillegraven, 2020). Reflexivity may result in cognitive conflict when opposing ideas are brought to the table (Tjosvold, Hui, & Yu, 2003), and this, in turn, may elicit negative emotion. Members of the TMT would do well to take note of such dynamics and address friction when it arises as this influences the likelihood that TMT members will embrace (rather than reject) the contradictions between exploration and exploitation (Lewis, 2000).

Nonetheless, the socio-cognitive nature of reflexivity and paradoxical cognitive processing merits a word of caution in relation to more top-down or leader-centric approaches to ambidexterity. While the creation and maintenance of reflexivity might require a directed spark, its effects are self-contained. It is through discourse and interaction that its beneficial effects take hold. More transformational or empowering leadership styles might be preferable for reflexive TMTs. These leadership styles help create shared frames of reference among TMT members, which foster reflexive behaviours (Schippers et al., 2008) whereas more directive styles may stifle appropriate learning behaviours, like deep reflection.

Limitations and further research

We would like to draw attention to some limitations that open up interesting avenues for future research. First, social cognitive theory points towards interaction between individual-level variables and social structure. In keeping with social cognitive theory, TMT reflexivity and paradoxical cognitive processing both impact individual- and team-level characteristics and behaviour. It would be interesting to investigate, however, the way in which this interaction may be advanced or hindered by the individual level. For instance, certain individual characteristics, like openness to experience, extraversion, or risk aversion – or emotions and certain beliefs, might affect – and be affected by – the constructs in our model (Schad et al., 2016). Alternatively, one could also investigate TMT composition in this respect. In ambidexterity research, balance is usually key. Being off-balance usually leads to an emphasis on exploitation over exploration, or vice versa (Levinthal & March, 1993). Future research could look at team composition from this balance perspective, exploring, for instance, whether teams are evenly distributed along the dimension ‘risk prone versus risk averse’, and whether this has moderating effects on reflexive TMTs and individuals and their ambidextrous tendencies.

Second, in line with previous studies, we have investigated the impact of the TMT on firm-level ambidexterity (Heavey & Simsek, 2017; Jansen et al., 2008; Lubatkin et al., 2006). There are, however, ambidextrous design factors that might influence this relationship. First, there is structural ambidexterity, which underscores the structuring of exploration and exploitation into separate units, and integration through cross-functional interfaces and TMT integrative efforts (O’Reilly & Tushman, 2008). It would be interesting to examine whether the impact of reflexive, paradoxically cognitive TMTs on firm-level ambidexterity is greater or lesser, depending on the way ambidexterity is structured. For example, if an organization separates exploitative and explorative activities into specialized units, perhaps TMT members would be better equipped to differentiate cognitively as well. Differentiation is already ingrained in such firms through their design. Conversely, perhaps TMTs find it more difficult to integrate, since separation is such an important part of the organization. Second, there is contextual ambidexterity, in which ambidexterity is generated through an organizational context that pushes a single unit to pursue both exploration and exploitation (Gibson & Birkinshaw, 2004). We conducted our research among SMEs as TMTs usually have a primary influence on the direction of such firms. However, we expect SMEs to emphasize more contextual efforts to achieve ambidexterity. Should structure come into play as a moderator, we would advise future research to include larger firms as well, as to create more variance in ambidextrous design features. Interestingly, our organizational size control variable has a significant negative effect on ambidexterity. This provides further reason to delve into the different ways of achieving ambidexterity in both smaller and larger firms.

Finally, although we make the logical assumption that learning behaviours affect the cognitive processes required for differentiation and integration, the development of these processes could also lead to a certain preference for shallow and deep reflection. Uncovering the iterative dynamics of learning and cognition in TMTs might provide insights into how these processes are related. Empirically, future studies could adopt a process approach or a combination of process and variance approaches in order to assess both the sequence and magnitude of this dynamic (De Guinea & Webster, 2017; van de Ven & Poole, 2005).

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Supplemental material

Supplemental material for this article is available online.

References

- Anderson, James C., & Gerbing, David W. (1988). Structural equation modelling in practice: A review and recommended two-step approach. *Psychological Bulletin*, *103*, 411–423.
- Ashill, Nicholas J., & Jobber, David (2010). Measuring state, effect, and response uncertainty: Theoretical construct development and empirical validation. *Journal of Management*, *36*, 1278–1308.
- Atuahene-Gima, Kwaku (2005). Resolving the capability–rigidity paradox in new product innovation. *Journal of Marketing*, *69*, 61–83.
- Bandura, Albert (2001). Social cognitive theory: An agentic perspective. *Annual Review of Psychology*, *52*(1), 1–26.
- Baron, Reuben M., & Kenny, David A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, *51*, 1173–1182.
- Bartunek, Jean M. (1988). The dynamics of personal and organizational reframing. In Robert E. Quinn & Kim S. Cameron (Ed.), *Paradox and transformation: Toward a theory of change in organization and management* (pp. 137–162). Cambridge, MA: Ballinger.
- Bartunek, Jean M., Gordon, Judith R., & Weathersby, Rita P. (1983). Developing ‘complicated’ understanding in administrators. *Academy of Management Review*, *8*, 273–284.
- Bidmon, Christina M., & Boe-Lillegraven, Siri (2020). Now, switch! Individuals’ responses to imposed switches between exploration and exploitation. *Long Range Planning*, *53*, 101928.
- Birkinshaw, Julian, & Gupta, Kamini (2013). Clarifying the distinctive contribution of ambidexterity to the field of organization studies. *Academy of Management Perspectives*, *27*, 287–298.
- Cao, Qing, Gedajlovic, Eric, & Zhang, Hongping (2009). Unpacking organizational ambidexterity: Dimensions, contingencies, and synergistic effects. *Organization Science*, *20*, 781–796.
- Carroll, Joshua, & Bright, Alan (2010). Integrative complexity of public beliefs toward wildfire management: Development of a scale. *Journal of Applied Social Psychology*, *40*, 344–359.
- Cheng, Cecilia, & Cheung, Mike W. (2005). Cognitive processes underlying coping flexibility: Differentiation and integration. *Journal of Personality*, *73*, 859–886.
- Coren, Stanley, & Suedfeld, Peter (1995). Personality correlates of conceptual complexity. *Journal of Social Behavior and Personality*, *10*, 229–242.
- Cronin, Matthew A., & Weingart, Laurie R. (2007). Representational gaps, information processing, and conflict in functionally diverse teams. *Academy of Management Review*, *32*, 761–773.
- Daft, Richard L., & Lengel, Robert H. (1986). Organizational information requirements, media richness and structural design. *Management Science*, *32*, 554–571.
- Dayan, Mumin, & Elbanna, Said (2011). Antecedents of team intuition and its impact on the Success of new product development projects: Team intuition and new product development. *Journal of Product Innovation Management*, *28*, 159–174.
- De Dreu, Carsten K. W. (2007). Cooperative outcome interdependence, task reflexivity, and team effectiveness: A motivated information processing perspective. *Journal of Applied Psychology*, *92*, 628–638.
- De Guinea, Ana O., & Webster, Jane (2017). Combining variance and process in information systems research: Hybrid approaches. *Information and Organization*, *27*, 144–162.
- De Jong, Bart A., & Elfring, Tom (2010). How does trust affect the performance of ongoing teams? The mediating role of reflexivity, monitoring, and effort. *Academy of Management Journal*, *53*, 535–549.

- Ellis, Shmuel, Carette, Bernd, Anseel, Frederik, & Lievens, Filip (2014). Systematic reflection: Implications for learning from failures and successes. *Current Directions in Psychological Science*, 23, 67–72.
- Ellis, Shmuel, & Davidi, Inbar (2005). After-event reviews: Drawing lessons from successful and failed experience. *Journal of Applied Psychology*, 90, 857–871.
- Evans, Jonathan St. B. T., & Stanovich, Keith E. (2013). Dual-process theories of higher cognition: Advancing the debate. *Perspectives on Psychological Science*, 8, 223–241.
- Festinger, Leon (1957). *A theory of cognitive dissonance* (Vol. 2). Stanford, CA: Stanford University Press.
- Gavetti, Giovanni, & Levinthal, Daniel A. (2000). Looking forward and looking backward: Cognitive and experiential search. *Administrative Science Quarterly*, 45, 113–137.
- Gibson, Christina B., & Birkinshaw, Julian (2004). The antecedents, consequences, and mediating role of organizational ambidexterity. *Academy of Management Journal*, 47, 209–226.
- Gilbert, Clark G. (2005). Unbundling the structure of inertia: Resource versus routine rigidity. *Academy of Management Journal*, 48, 741–763.
- Graf-Vlachy, Lorenz, Bundy, Jonathan, & Hambrick, Donald C. (2020). Effects of an advancing tenure on CEO cognitive complexity. *Organization Science*, 31, 936–959.
- Hahn, Tobias, Preuss, Lutz, Pinkse, Jonatan, & Figge, Frank (2014). Cognitive frames in corporate sustainability: Managerial sensemaking with paradoxical and business case frames. *Academy of Management Review*, 39, 463–487.
- Hair, Joseph F., Black, William C., Babin, Barry J., Anderson, Rolph E., & Tatham, Ronald (2006). *Multivariate data analysis*. Upper Saddle River, NJ: Prentice Hall.
- Hayes, Andrew F. (2009). Beyond Baron and Kenny: Statistical mediation analysis in the new millennium. *Communication Monographs*, 76, 408–420.
- Hayes, Andrew F. (2017). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. New York: Guilford Publications.
- Heavey, Ciaran, & Simsek, Zeki (2017). Distributed cognition in top management teams and organizational ambidexterity: The influence of transactive memory systems. *Journal of Management*, 43, 919–945.
- James, Lawrence R., Demaree, Robert G., & Wolf, Gerrit (1993). R_{wg} : An assessment of within-group interrater agreement. *Journal of Applied Psychology*, 78, 306–309.
- Jansen, Justin J. P., George, Gerard, van den Bosch, Frans A. J., & Volberda, Henk W. (2008). Senior team attributes and organizational ambidexterity: The moderating role of transformational leadership. *Journal of Management Studies*, 45, 982–1007.
- Jansen, Justin J.P., Kostopoulos, Konstantinos C., Mihalache, Oli R., & Papalexandris, Alexandros (2016). A socio-psychological perspective on team ambidexterity: The contingency role of supportive leadership behaviours. *Journal of Management Studies*, 53, 939–965.
- Jansen, Justin J. P., Tempelaar, Michiel P., van den Bosch, Frans A. J., & Volberda, Henk W. (2009). Structural differentiation and ambidexterity: The mediating role of integration mechanisms. *Organization Science*, 20, 797–811.
- Jansen, Justin J. P., van den Bosch, Frans A. J., & Volberda, Henk W. (2006). Exploratory innovation, exploitative innovation, and performance: Effects of organizational antecedents and environmental moderators. *Management Science*, 52, 1661–1674.
- Kauppila, Olli P., & Tempelaar, Michiel P. (2016). The social-cognitive underpinnings of employees' ambidextrous behaviour and the supportive role of group managers' leadership: The underpinnings of employees' ambidextrous behaviour. *Journal of Management Studies*, 53, 1019–1044.
- Keller, Joshua, & Chen, Erica W. (2017). A road map of the paradoxical mind. In Wendy K. Smith, Marianne W. Lewis, Paula Jarzabkowski, & Ann Langley (Eds.), *The Oxford handbook of organizational paradox* (pp. 66–86). Oxford, UK: Oxford University Press.
- Knight, Eric, & Paroutis, Sotirios (2017). Becoming salient: The TMT leader's role in shaping the interpretive context of paradoxical tensions. *Organization Studies*, 38, 403–432.
- Konradt, Udo, Otte, Kai-P., Schippers, Michaéla C., & Steenfatt, Corinna (2016). Reflexivity in teams: A review and new perspectives. *Journal of Psychology*, 150, 153–174.
- Konradt, Udo, Schippers, Michaéla C., Garbers, Yvonne, & Steenfatt, Corinna (2015). Effects of guided reflexivity and team feedback on team performance improvement: The role of team regulatory processes and cognitive emergent states. *European Journal of Work and Organizational Psychology*, 24, 777–795.

- Levinthal, Daniel A., & March, James G. (1993). The myopia of learning. *Strategic Management Journal*, *14*, 95–112.
- Lewis, Marianne W. (2000). Exploring paradox: Toward a more comprehensive guide. *Academy of Management Review*, *25*, 760–776.
- Lindell, Michael K., & Whitney, David J. (2001). Accounting for common method variance in cross-sectional research designs. *Journal of Applied Psychology*, *86*, 114–121.
- Lubatkin, Michael H., Simsek, Zeki, Ling, Yan, & Veiga, John F. (2006). Ambidexterity and performance in small- to medium-sized firms: The pivotal role of top management team behavioral integration. *Journal of Management*, *32*, 646–672.
- Lüscher, Lotte S., & Lewis, Marianne W. (2008). Organizational change and managerial sensemaking: Working through paradox. *Academy of Management Journal*, *51*, 221–240.
- Lynn, Monty L. (2005). Organizational buffering: Managing boundaries and cores. *Organization Studies*, *26*, 37–61.
- March, James G. (1991). Exploration and exploitation in organizational learning. *Organization Science*, *2*, 71–87.
- March, James G., & Simon, Herbert A. (1958). *Organizations*. New York: John Wiley & Sons.
- Mervis, Carolyn B., & Rosch, Eleanor (1981). Categorization of natural objects. *Annual Review of Psychology*, *32*(1), 89–115.
- Mintzberg, Henry (1989). *Mintzberg on management: Inside our strange world of organizations*. New York: Simon & Schuster.
- Miron-Spektor, Ella, Ingram, Amy, Keller, Joshua, Smith, Wendy K., & Lewis, Marianne W. (2018). Microfoundations of organizational paradox: The problem is how we think about the problem. *Academy of Management Journal*, *61*, 26–45.
- Mom, Tom J., Chang, Yi Y., Cholakova, Magdalena, & Jansen, Justin J. (2019). A multilevel integrated framework of firm HR practices, individual ambidexterity, and organizational ambidexterity. *Journal of Management*, *45*, 3009–3034.
- Myers, Christopher G. (2018). Coactive vicarious learning: Toward a relational theory of vicarious learning in organizations. *Academy of Management Review*, *43*, 610–634.
- Neisser, Ulric (1976). *Cognition and reality: Principles and implications of cognitive psychology*. San Francisco: W.H. Freeman.
- O'Reilly III, Charles A., & Tushman, Michael L. (2008). Ambidexterity as a dynamic capability: Resolving the innovator's dilemma. *Research in Organizational Behavior*, *28*, 185–206.
- O'Reilly III, Charles A., & Tushman, Michael L. (2013). Organizational ambidexterity: Past, present, and future. *Academy of Management Perspectives*, *27*, 324–338.
- Podsakoff, Philip M., MacKenzie, Scott B., Lee, Jeong-Y., & Podsakoff, Nathan P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, *88*, 879–903.
- Pradies, Camile, Tunarosa, Andrea, Lewis, Marianne W., & Courtois, Julie (2021). From vicious to virtuous paradox dynamics: The social-symbolic work of supporting actors. *Organization Studies*, *42*, 1241–1263.
- Schad, Jonathan, Lewis, Marianne W., Raisch, Sebastian, & Smith, Wendy K. (2016). Paradox research in management science: Looking back to move forward. *Academy of Management Annals*, *10*, 5–64.
- Schippers, Michaëla C., den Hartog, Deanne N., & Koopman, Paul L. (2007). Reflexivity in teams: A measure and correlates. *Applied Psychology: An International Review*, *56*, 189–211.
- Schippers, Michaëla C., den Hartog, Deanne N., Koopman, Paul L., & van Knippenberg, Daan (2008). The role of transformational leadership in enhancing team reflexivity. *Human Relations*, *61*, 1593–1616.
- Schippers, Michaëla C., Edmondson, Amy C., & West, Michael A. (2014). Team reflexivity as an antidote to team information-processing failures. *Small Group Research*, *45*, 731–769.
- Senge, Peter (1990). The leader's new work: Building learning organizations. *Sloan Management Review*, *32*, 7–23.
- Smith, Wendy K. (2014). Dynamic decision making: A model of senior leaders managing strategic paradoxes. *Academy of Management Journal*, *57*, 1592–1623.

- Smith, Wendy K., & Lewis, Marianne W. (2011). Toward a theory of paradox: A dynamic equilibrium model of organizing. *Academy of Management Review*, 36, 381–403.
- Smith, Wendy K., & Tushman, Michael L. (2005). Managing strategic contradictions: A top management model for managing innovation streams. *Organization Science*, 16, 522–536.
- Stanovich, Keith (2011). *Rationality and the reflective mind*. Oxford, UK: Oxford University Press.
- Stasser, Garold, & Titus, William (1985). Pooling of unshared information in group decision making: Biased information sampling during discussion. *Journal of Personality and Social Psychology*, 48, 1467–1478.
- Tempelaar, Michiel P., & Rosenkranz, Nicole A. (2019). Switching hats: The effect of role transition on individual ambidexterity. *Journal of Management*, 45, 1517–1539.
- Tjosvold, Dean, Hui, Chun, & Yu, Ziyou (2003). Conflict management and task reflexivity for team in-role and extra-role performance in China. *International Journal of Conflict Management*, 14, 141–163.
- Tripsas, Mary, & Gavetti, Giovanni (2000). Capabilities, cognition, and inertia: Evidence from digital imaging. *Strategic Management Journal*, 21, 1147–1161.
- Tsai, Wenpin, & Ghoshal, Sumantra (1998). Social capital and value creation: The role of intrafirm networks. *Academy of Management Journal*, 41, 464–476.
- Tushman, Michael L., & Nadler, David A. (1978). Information processing as an integrating concept in organizational design. *Academy of Management Review*, 3, 613–624.
- Turner, Neil, Swart, Juani, & Maylor, Harvey (2013). Mechanisms for managing ambidexterity: A review and research agenda. *International Journal of Management Reviews*, 15, 317–332.
- Van de Ven, Andrew H., & Poole, Marshall S. (2005). Alternative approaches for studying organizational change. *Organization Studies*, 26, 1377–1404.
- Vashdi, Dana R., Bamberger, Peter A., Erez, Miriam, & Weiss-Meilik, Ahuva (2007). Briefing–debriefing: Using a reflexive organizational learning model from the military to enhance the performance of surgical teams. *Human Resource Management*, 46, 115–142.
- Voss, Glenn B., & Voss, Zannie G. (2013). Strategic ambidexterity in small and medium-sized enterprises: Implementing exploration and exploitation in product and market domains. *Organization Science*, 24, 1459–1477.
- Walsh, James P. (1995). Managerial and organizational cognition: Notes from a trip down memory lane. *Organization Science*, 6, 280–321.
- West, Michael A. (2000). Reflexivity, revolution and innovation in work teams. In Michael M. Beyerlein, Douglas A. Johnson, & Susan T. Beyerlein (Eds.), *Product development teams*. Advances in interdisciplinary studies of work teams (Vol. 5, pp.1–29). Stamford, CT: JAI Press.
- Westenholz, Ann (1993). Paradoxical thinking and change in the frames of reference. *Organization Studies*, 14, 37–58.
- Williams, Larry J., Hartman, Nathan, & Cavazotte, Flavia (2010). Method variance and marker variables: A review and comprehensive CFA marker technique. *Organizational Research Methods*, 13, 477–514.
- Woznyj, Haley M., Banks, George C., Dunn, Alexandra M., Berka, G., & Woehr, David (2020). Re-introducing cognitive complexity: A meta-analysis and agenda for future research. *Human Performance*, 33, 1–33.

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