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What I do or how I do it - the effect of accountability focus on individual exploration

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ABSTRACT

Because accountability is a central feature of many management practices, feeling accountable is a fact of life in modern organizations. Accountability has been found to have many beneficial outcomes, yet it may also increase certain cognitive biases. Building on the social contingency model of accountability, we examine the effect of accountability on manager's individual decision making about exploration vs. exploitation. We distinguish between outcome and process accountability and examine them as independent predictors of exploration behaviour. Although previous work suggests that outcome accountability may lead managers to quickly switch to old ways of working (i.e., exploitation), we propose that process accountability will increase individual exploration. Furthermore, employing the concept of disfluency, we propose that this positive effect of process accountability will be especially strong when outcome accountability is also high. Combining two survey studies ($n = 361$, $n = 438$) with employees and a lab experiment ($n = 211$), we find overall support for our hypotheses. Specifically, we find that process accountability increases exploration while outcome accountability decreases it (and increases exploitation). We also find partial support for a positive interaction of process and outcome accountability.

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Accountability; exploration; exploitation; innovation

Introduction

Accountability, defined as actors' feeling that they will be called on to explain, justify and defend their work (Lerner & Tetlock, 1999), is a fact of life in modern organizations. Many organizational practices, including leadership behaviours, and performance and reward management, will result in actors feeling accountable to some audience, such as a supervisor or senior manager (Hall et al., 2007). Holding managers or other employees accountable can have a significant impact on their behaviour and decision-making (Hall et al., 2017; Lerner & Tetlock, 1999). Sometimes, these effects are beneficial, such as a reduced tendency to engage in unethical behaviour (Pitesa & Thau, 2013) and reduced self-superiority beliefs (Sedikides et al., 2002). However, accountability can also have undesirable effects by amplifying certain cognitive biases. One particularly important effect that may often be unintended is that accountability may lead individuals to focus on what has worked well in the past (exploitation) at the expense of trying something new (exploration), because exploitation behaviour is more easily justifiable (Brown, 1999; Gardner, 2012; Lee & Meyer-Doyle, 2017; O'Reilly & Tushman, 2004). Although exploitation behaviours are beneficial and important (e.g., becoming more efficient in existing activities), felt accountability may amplify a tendency to stick with existing solutions that may or may not be optimal, resulting in organizations focusing on short-term efficiency to the potential detriment of long-term adaptation (Eisenhardt et al., 2010).

Existing research on the effects of accountability on exploitation vs. exploration behaviour, however, is limited. Firstly, not many studies have empirically examined the effects of accountability in the context of the exploration-exploitation trade-off (Gardner, 2012). Secondly, and more importantly, what existing research has in common is that it looks at one specific type of accountability, namely accountability for outcomes or results. In this paper, we propose that it is important to differentiate between outcome and process accountability (Siegel-Jacobs & Yates, 1996). Outcome accountability means that one feels the need to justify work *results*, whereas process accountability prompts a need to justify a *work strategy or process* with which a work results was achieved. A growing body of research has shown differential results for outcome and process accountability on behaviour and decision-making (Dalla Via et al., 2019; L. J. Chang et al., 2013; De Langhe et al., 2011; Siegel-Jacobs & Yates, 1996). Building on this literature, and on the social contingency theory of accountability (Tetlock, 1992), we hypothesize that outcome accountability will reduce an individuals' focus on exploration (relative to exploitation), whereas process accountability will increase a focus on exploration. Furthermore, we propose that outcome and process accountability often co-exist and that they may interact to affect the exploitation-exploration decision. There are conflicting theoretical accounts to predict that shape of this interaction, yet building on recent insights from cognitive psychology (Oppenheimer, 2008) and organizational behaviour (Patil & Tetlock, 2014), we argue that hybrid accountability (i.e., a combination of high outcome and high process accountability) will increase cognitive disfluency and, as a result, most likely lead to increased attention to alternative options, resulting in increased focus on exploration.

With this paper, we contribute to the growing literature on the individual-level (rather than organizational-level) exploration-exploitation trade-off by showing that outcome and process accountability, and their hybrid form, have differential

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effects. These findings may prove of value beyond the concept of accountability. As accountability is considered "a natural bridging construct" between individual actors and organizational-level practices (Lerner & Tetlock, 1999, p. 256), applying an "accountability lens" (Hall et al., 2007) can help to advance our understanding about the relationship between control mechanisms and exploration. We also contribute to the accountability literature itself, by theorizing and empirically examining how hybrid accountability is related to individual decision-making. Hybrid accountability has received very little empirical attention in the literature, which represents an important gap, as hybrid accountability likely commonly occurs in practice (Patil et al., 2017). To test our predictions, we present the results of three studies. First, we report a survey study among employees to examine the role that accountability plays in driving the relative attention to exploration, relative to exploitation, in a work context. Second, we present the results of a lab experiment to establish stronger causal evidence for the relationship between accountability focus and individual exploration. Third, we conducted another field study in which we are able to examine the effects of accountability on exploration and exploitation in absolute terms, not relative to each other, but as separate, orthogonal factors.

Theoretical framework

Accountability and individual exploration/exploitation

It is commonplace in society that people have to justify their actions and accomplishments to others (Frink & Klimoski, 1998; Lerner & Tetlock, 1999). Especially in organizations, management control mechanisms are installed explicitly to make people in the organization accountable for what they accomplish and/or how they accomplish it (Markman & Tetlock, 2000). Thus, a common feature of these systems is that they instil feelings of accountability in individuals. Accountability has been defined as "the implicit or explicit expectation that one may be called on to justify one's beliefs, feelings, and actions to others" while there are also significant consequences associated with not providing a satisfactory justification (Lerner & Tetlock, 1999, p. 255). While accountability has been studied in relation to many outcomes (for a review, see Hall et al., 2017), its relationship to individual exploration/exploitation has not been studied directly.

Exploration activities entail the search for alternative options, broadening the scope of possible variations, and experimenting with and evaluating those new possibilities (Katila & Ahuja, 2002; Zollo & Winter, 2002). This includes an individual's focus on activities that require a deviation from the current situation, and these activities can be described as searching, discovering, creating or experimenting with practices that are new to the organization (Mom et al., 2007). Exploration activities increase the probability of failure, as their results are always relatively distant and uncertain (Ahmadi et al., 2017). In contrast, exploitation entails refinement and further implementation of what was already in the existing set of organizational routines (Levinthal & March, 1993). This would include a focus on individual activities that involve selecting, implementing, improving or refining existing ways of working (Mom et al., 2007). Chances of failure are lower for such activities, because their results are typically more certain and immediate.

It is important to note that exploration and exploitation are both learning activities that can improve organizational routines. Where exploration increase learning breath, exploitation increases the depth of learning (Katila & Ahuja, 2002; March, 1991). However, each may be more appropriate at different times or for different activities and, for organizations, an optimal balance between exploration and exploitation is important for long term success (Junni et al., 2013). Although extensively studied at the organizational or business unit level (see O'Reilly & Tushman, 2013), ultimately the decision to explore or exploit has to be made by managers or employees within those organizations (Mom et al., 2009; Van der Borgh & Schepers, 2014). Despite many calls for research (e.g., Gupta et al., 2006; Raisch & Birkinshaw, 2008), there is still relatively little research on how individuals make the exploration-exploitation trade-off (Bonesso et al., 2014; Rosing & Zacher, 2017; Tuncdogan et al., 2017).

Exploration and exploitation orientations can be conceptualized either as two ends of a continuum or as two independent orthogonal factors. The former approach conceptualizes exploration and exploitation as mutually exclusive activities, proposing that limited time and resources will cause that the emphasis on one always is to the detriment of the other. This conceptualization is particularly relevant at lower levels of analysis (e.g., one individual decision maker), because at that level there are less opportunities to expand resources (e.g., invest more time in learning overall) compared to the organizational level (Cao et al., 2009). This is consistent with recent empirical work at the individual level (e.g., Kauppila, 2018; Lee & Meyer-Doyle, 2017; Rogan & Mors, 2014), as well as insights from neuroscience that show that exploration and exploitation draw from different brain regions and cannot be active simultaneously (Laureiro-Martínez et al., 2015). However, it is also possible to conceptualize exploration and exploitation as orthogonal, meaning that both can high or low, independently of each other. This is more common at higher levels of analysis, as larger units have the opportunity to assign resources to different types of learning simultaneously. However, individuals may also be able to engage in both exploration or exploitation, by separating both activities over time (Lavie et al., 2010; Rosing & Zacher, 2017). In this paper, we will operationalize exploration and exploitation both as the relative focus on exploration vs. exploitation (study 1 and 2) and on the absolute level of both simultaneously (study 3).

Exploration and exploitation are related to, yet separate from, creativity and innovation. Creativity pertains to the development of novel and (potentially) useful ideas (Amabile, 1996), and innovation requires that these ideas are further developed and implemented (e.g., Scott & Bruce, 1994). Although an individual's focus on exploration can be conducive to the development of creative ideas, the two cannot be equated (Bledow et al., 2009; Rosing & Zacher, 2017). Similarly, a focus on exploitation can be useful in further development or implementation of novel ideas once they have been generated, yet exploitation is not to be equated with innovation. Yet, because

their shared emphasis on novelty, research on creativity can be informative about the conditions that may also stimulate exploration activities.

Existing research suggests that when faced with the decision to explore or exploit, individuals often show a preference for exploitation (March, 2006; Raisch et al., 2009). There are two theoretical reasons for this. First, exploitation is more likely to lead to valued outcomes, and these outcomes are more certain, predictable, and closer in time (Benner & Tushman, 2003; March, 1991). Because of these characteristics, it is likely that decision-makers become "strategically persistent" and stick to their current way of working (Audia & Goncalo, 2007; Audia et al., 2000). Second, the preference for exploitation may be further explained by the fact that exploration requires mindful, effortful and systematic experimentation, while exploitation can be less mindful, automated and heuristic behaviour (Levinthal & Rerup, 2006). As, all else equal, individuals prefer to exert lower effort compared to higher (Hobfoll, 1989), it follows that exploitation often is a more desirable course of action.

To our knowledge, no research has directly examined the relationship between individuals' feelings of accountability and the exploration-exploitation trade-off. However, studies on related concepts suggest that accountability hampers exploration (relative to exploitation). Notably, the literature on social-evaluative pressure, which is a well-documented consequence of accountability (Hall et al., 2006; Laird et al., 2009), tends to show negative effects on individual creative exploration, at least at relatively high levels of social-evaluative pressure (Byron et al., 2010). Consistent with this, Gardner (2012) found that when project teams at a consultancy firm worked under high performance pressure, they adopted a "getting the job done" mode, which means that they disregarded advice that challenged their current understanding of their task, thus quenching any chance for exploration of different paths.

Hence, evidence from this literature suggests that accountability will be negatively related to individuals' tendency to explore and will increase a tendency towards exploitation. However, accountability can take different shapes and forms. Specifically, in this paper, we argue that it is important to distinguish between different accountability foci.

Outcome and process accountability and exploration/exploitation

The literature has distinguished different accountability foci, with outcome accountability referring to feelings that one will have to provide justification for *task results*, and process accountability referring to feeling that the *process or strategy* to achieve a result will need justification (Siegel-Jacobs & Yates, 1996). The accountability literature has demonstrated that the distinction between outcome and process accountability is critical (Patil et al., 2014; Siegel-Jacobs & Yates, 1996), and that outcome and process accountability have different effects in diverse areas such as consumer decision making (Zhang & Mittal, 2005), negotiations (L. J. Chang et al., 2013), and job candidate selection (Brtek & Motowidlo, 2002). However, theory and empirical work is lacking on their differential effects on the exploration-exploitation trade-off.

Accountability changes the trade-off that individuals make when deciding between exploration and exploitation, as there are now stakes associated with not reaching an "acceptable" solution. For example, the more uncertain route of exploration may become even more undesirable, as the chance of ending up with worse performance than with an existing solution is very real. Indeed, especially in the short run, exploration will often lead to worse results, given that the fitness landscape in which organizations operate is often unpredictable in shape (Levinthal & Warglien, 1999). As a result, exploration activities should become less attractive when individuals are held accountable (Kahneman & Lovallo, 1993; Weigold & Schlenker, 1991). However, theory from social psychology suggests that this will mainly pertain to outcome but not process accountability.

A framework to understand the effects of accountability on decision-making is the social contingency model (Tetlock, 1983, 1992). This model suggests that accountability is an undesirable state that motivates individuals to do whatever it takes to effectively and efficiently reduce it. According to Tetlock (1992), actors under accountability act like metaphorical politicians, who do whatever they have to, to satisfy the expectations of the audience they are accountable to. The task strategy that an actor uses can thus, according to the social contingency model, be seen as a coping mechanism for dealing with the pressure associated with accountability (Tetlock et al., 1989). Based on the specific characteristics of the situation (i.e., the type of accountability, the type of task), different coping mechanisms will be preferred, based on how easy they are to defend to others. In turn, the choice of coping mechanism has implications for the degree of information elaboration and breath of options considered (Scholten et al., 2007) and, as we argue here, for the level of exploration/exploitation that an actor engages in.

Specifically, when individuals feel outcome accountable, this will likely lead to the use of a coping mechanism referred to as an acceptability heuristic, meaning that the actor will make decisions for which they are confident that they will lead to an acceptable result for whatever audience they are accountable to (Tetlock, 1992). Focusing on outcomes will thus engender a focus on maintaining an established way of working, which should be a safe way to maintain outcome levels. Even when they result is less than expected, it is possible to refer to how the same strategy has previously led to acceptable results, making it easier to justify than exploring a new strategy.

Hence, and consistent with the literatures on evaluation pressure, short-term rewards, and regulatory focus, we propose the following:

HYPOTHESIS 1. *Outcome accountability will lead to lower exploration orientation and higher exploitation orientation compared to when there is no outcome accountability (i.e., under no accountability, or only process accountability)*

For process accountability, in contrast, the acceptability heuristic is often not a viable way to deal with the performance pressure that this type of accountability creates. While an actor can refer to previous ways of working to justify a result, the "why" question that process accountability poses cannot be readily answered by referring to previous

outcomes. As a result, individuals under process accountability show the tendency to engage in more effortful consideration of their working strategy, because they expect that this is what the audience requires them to do (Tetlock et al., 1989). In the context of a task where there is little or no prior information about what works and hence there is usually no fixed working procedure, such as is the case in innovation tasks, the most effective and safe way to deal with process accountability is to come up with a well-thought through task strategy. In the social contingency model, this is the second coping mechanism, referred to as *pre-emptive self-criticism*. This means that actors attempt to predict any potential objections to their solution and engage in self-critical information processing. This more complex information-processing is has been suggested to lead to high quality decisions (Tetlock et al., 1989).

Previous research provides support for the potential positive effects of process accountability on the depth of information processing and, indirectly, the quality of decision-making (Hall et al., 2017; Scholten et al., 2007). In their seminal experiment, Siegel-Jacobs and Yates (1996) asked participants to select jury members for a fictional court case. They found that when working under process accountability, participants engaged in pre-emptive self-criticism and took more advantage of the available information about potential jury members. This more systematic information processing was positively related to the accuracy of their choices, but only when the information was relevant to the case. Similarly, Brtek and Motowidlo (2002) asked participants to watch a video recording of a job interview and try to predict the performance of the candidates in the video. Participants working under process (vs. outcome) accountability approached the task more systematically and made more accurate predictions. More recently, De Langhe et al. (2011) found that when people were working under process accountability, they performed better when a task could be best solved using a cognitively-taxing systematic approach, whereas participants under outcome accountability performed better when solutions could best be found via a heuristic task approach.

These examples show a positive effect of process accountability, compared to outcome accountability, on the depth of information processing. However, it is also clear, in the context of the social contingency model, that this will only be the case for tasks where there is no (strong) normative expectation about what constitutes a good process or strategy. If there is such a salient process norm, it is likely that actors under process accountability could use an acceptability heuristic and follow that existing strategy (Patil et al., 2017, 2014). Regardless, because the type of situation in which the trade-off between exploration and exploitation has to be made typically does not have a fixed thinking strategy or working process that could be used in an acceptability heuristic, process accountability is not expected to reduce exploration like outcome accountability. Rather, process accountability is expected to lead to pre-emptive self-criticism, and a higher chance that individuals will critically examine current ways of working and engage in exploration of new ways.

Hence, we propose:

HYPOTHESIS 2. *Process accountability will lead to higher exploration orientation compared to when there is no process accountability (i.e., no accountability, or only outcome accountability)*

Note that we predict that outcome accountability, due to a wish to please the audience and reduced risk-taking, will simultaneously increase exploitation and reduce exploration (Hypothesis 1), but that we do not expect the opposite from process accountability. Thus, we expect process accountability to increase a focus on exploration, because this may help justify one's decision processes (e.g., "I also tried something new"), but perhaps not necessarily reduce exploitation activities at the same time (unless the two are seen as mutually exclusive).

Hybrid accountability and exploration

Process and outcome accountability can also be combined. In fact, in practice, it will often be the case that managers have multiple and diverse audiences and accountability foci (Hall et al., 2007; Patil et al., 2014). What will happen under such *hybrid* accountability conditions is less straightforward compared to under *only* outcome or process accountability. On the one hand, the literature on multiple goals suggests that individuals that pursue diverse (possibly conflicting) goals experience tension and additional pressure (Dickerson & Kemeny, 2004; Quigley et al., 2007). Multiple goals may, as a result, lead to a sort of "analysis paralysis", as actors may never be able to fully decide what goal to pursue in their decision making (Ethiraj & Levinthal, 2009). In addition, competing goals may not only lead to higher total experienced evaluative pressure, but because of their inconsistency they may also be perceived as more uncontrollable, which in itself could reduce creative exploration (Byron et al., 2010).

On the other hand, it has been argued that hybrid accountability may result in a "best of both worlds" situation when it comes to weighing deviation and conformity (Patil et al., 2014). This is also supported by recent empirical findings that show that forecasters under hybrid accountability outperform those under "pure" forms of accountability (W. Chang et al., 2017). In addition, in the management control literature, recent conceptual and empirical work has emphasized the non-unitary design of control mechanisms (Cardinal et al., 2017). For example, a recent meta-analytical review of the literature found that outcome and process-based control mechanisms do not substitute each other, but rather positively interact to predict increased performance (Sihag & Rijsdijk, 2019).

When it comes to stimulating exploration, positive effects of different accountability foci may be expected exactly *because* they are conflicting, as they have the potential to stop automatic cognitive processes in their tracks, which can increase divergent thinking (Lu et al., 2017; Patil & Tetlock, 2014). In other words, when actors are faced with multiple foci of accountability, their decision making becomes more difficult or less fluent (i.e., less quick and certain). While fluency is important when the aim is to efficiently perform a standard task, disfluency has the benefit of disrupting fixation on known solutions (Alter et al., 2007; Hernandez & Preston, 2013). Simultaneously considering the defensibility of a decision outcome *and* a decision process requires

answering two very different questions that are unlikely to be answered quickly, or fluently. This *disfluency* in processing stimulates actors to abandon the solutions that are suggested via an acceptability heuristic and examine the problem in a more thorough and abstract way (Alter, 2013; Alter & Oppenheimer, 2008; Oppenheimer, 2008), making it more likely that actors decide to explore, rather than exploit existing solutions.

Although there are thus arguments suggesting positive and negative effects on exploration, we argue that, on balance, the theoretical and extant empirical evidence is more suggestive of a positive effect. Hence, we propose that hybrid accountability (i.e., a positive interaction of outcome and process accountability) will be associated with more exploration, relative to exploitation.

HYPOTHESIS 3: *Outcome and process accountability will interact, such that the positive effect of process accountability on exploration (in absolute terms or relative to exploitation) is stronger when outcome accountability is also high.*

Overview

These hypotheses were tested in three studies. We start with a field study in which we measured employees' felt accountability and their exploration orientation, relative to exploitation orientation. A field study has the benefit of being able to capture the focal phenomena in real-life and shows that practical relevance of the concepts. However, because the survey studies that we present cannot be used to establish causal relationships, we also conducted an experiment in which we manipulated accountability focus and measured objective exploration behaviour. Finally, in a third study we replicate our field study, but operationalize exploration and exploitation as separate orthogonal variables, allowing us to examine the effects of accountability on absolute levels of exploration (and exploitation) as well as on the balance between them (ambidexterity).

Study 1

Sample

We recruited participants for this survey study via Prolific (www.prolific.co), a platform that allows researchers to conduct online surveys and experiments. We pre-screened participants to only allow individuals for who English was their first language, had working experience at a high level (at least some managerial experience), and had a good track record completing tasks on the platform (acceptance rate of at least 80%). In addition, students were filtered out via a custom pre-screening that we conduced. We obtained a sample of 379 participants. In line with the recommendations made in the literature (e.g., Goodman et al., 2013) we also included two attention check questions. Participants that failed both checks ($n = 14$) were not included in further analyses. In addition, four participants did not specify their job type, leaving us with a final sample of 361 participants.

The average age of participants was 36.67 years ($SD = 10.52$), 54.85% were female and 89.47% had higher a higher education degree. 49.03% were currently in a management position, and 26.87% held an expert role (trained professional, consultant or researcher). Because of the relatively high qualification and job levels, the sample was appropriate to study strategic decision making in a work context.

Measures

Exploration

Following earlier research on exploration and exploitation at the individual level (Lee & Meyer-Doyle, 2017; Rogan & Mors, 2014), in this study we conceptualized exploration and exploitation on a continuum (i.e., as a relative focus on exploitation versus exploration behaviour). We used the five-item measure developed by Kauppila (2018) to assess the degree to which individuals have pursued novel vs. familiar tasks. Participants were presented with contrasting statements and had to indicate their preference for one or the other on a seven-point scale; higher scores indicated higher agreement with the exploration side of the item and lower scores indicate higher agreement with the exploitation side. The items were preceded by the statement "over the past half year, I have particularly . . . " and an example item pair was: "Worked on tasks that I am used to" vs. "Started new tasks that I have not been familiar with before". Reliability for the scale was high ($\alpha = .86$).

Outcome and process accountability

Since prior research on outcome and process accountability has almost exclusively been conducted in experimental settings, there were no available measures for outcome and process accountability (Hall et al., 2017). Therefore, we designed a measure specifically for this study. Three items were used for each type of accountability. We used separate scales for outcome and process accountability, as it is possible to feel both accountability foci at the same time. The wording was based on the items developed by Hall et al. (2009) and the items, including factor loadings, can be found in Appendix. The two-factor solution shows overall reasonable model fit ($\chi^2_{(8)} = 121.46$, $p < .01$, CFI = .910, SMSR = .087, RMSEA = .198, AIC = 4781.96, BIC = 4832.52). A comparison to a one-factor model ($\chi^2_{(9)} = 373.95$, $p < .01$, CFI = .709, SMSR = .156, RMSEA = .335, AIC = 5032.45, BIC = 5079.12), shows that the two-factor model has superior model fit (χ^2-difference = 252.49, $p < .01$). Both scales also showed good reliability ($\alpha_{OA} = .79$, $\alpha_{PA} = .87$).

Control variables

We included several personal and contextual characteristics that may explain variance in exploration orientation. First, we included *need for closure*, which refers to the trait-based need for clear answers, as opposed to ambiguity (Webster & Kruglanski, 1994). Individuals high in need for closure may prefer exploiting existing solutions more, regardless of accountability focus (Levin et al., 2000). We measured need for closure with 15 items ($\alpha = .86$) from Webster and Kruglanski (1994) and Roets and Van Hiel (2011). Second, *risk propensity* was included, as high risk-takers may be more prone

to exploration. We measured risk propensity using six items (α = .78) from the IPIP (International Personality Item Pool, 2001; see also Colquitt et al., 2006). An example item was "I enjoy being reckless" and participants rated each item on a five-point scale ("definitely false" to "definitely true"). Third, *job control* was included, as engaging in exploration presumably requires a certain level of control over how the job is executed. To measure job control, we included four items (α = .78) by Frese et al. (1996). An example item is "Can you determine how you do your work"? All items were rated on a five-point scale ("very little" to "very much"). Fourth, we included *workload*, as high workload may reduce the opportunities and motivation to focus on exploration (Gardner, 2012). We used three items (α = .85) from Van Yperen and Hagedoorn (2003) these items were as follows: "I have to work too fast", "I have too much work to do", and "I work under time pressure". Fifth, we included the *pervasiveness of norms* in the job, as high work norms could reduce exploration and increase the focus on exploiting current, normative, ways of working. Three items (α = .87) were adapted from Bacharach et al. (1990). The items were "We have procedures here for every task of situation", "We have clear rules about how a task should be done", and "I have to follow strict operating procedures at all times". Both for workload and norms, a five-point scale was used ranging from "Strongly disagree" to "strongly agree".

In addition, we also included several demographic variables, including participant age and gender, as well as descriptive job information. Specifically, the job level was included (0 = administrative/support function, 1 = management, 2 = professional role, recoded into two dummy variables), as well as the job type (0 = non-technical; 1 = technical).

Common-method bias

Because our variables are all based on survey responses from the same respondent, this may introduce common method bias. Therefore, we adopted several practices to reduce the chance of common method bias influencing our results and interpretations (Podsakoff et al., 2012). First, and most importantly, we also examined the hypotheses in an experiment (Study 2), where common method bias was not a factor. Second, we made sure the questions concerning the independent and dependent variables were in different parts of the survey. Third, the answering scales for the survey questions that measured the independent and dependent variables were very different. Fourth, we conducted two post-hoc statistical tests to assess impact of a common factor. Results of Harman's one factor test, including all study variables, resulted in one-factor accounting for only 13.32% of the variance. Considering the criticisms of this test (Podsakoff et al., 2012), we also conducted a common-latent factor test, which assesses the variance that is common to all items (Podsakoff et al., 2003). This test consists of including one latent common-method factor, and allowing all items to load on their theoretical constructs as well as on a latent common-method factor. The common variance is estimated as the square of the common factor of each path before standardization. This test suggested that common variance was 26%, again below the commonly applied heuristic of 50%. In addition, we compared our results against parallel analyses where we adjusted the latent factor estimates of our model variables for common method bias, and found that results were very similar (in fact, *p*-values for our significant effects tended to be smaller). In sum, we conclude that common-method bias was likely not an important issue in our data.

Results study 1

The means, standard deviations, and correlations of all study variables are presented in (Table 1). It shows that process accountability is significantly positively related to exploration (r = .22, p < .01), but outcome accountability is not (r = .10, p = .06). Among the control variables, only risk taking (r = .15, p < .01) and control (r = .20, p < .01) are significantly (and positively) related to our dependent variable. There is also a positive correlation between outcome and process accountability (r = .54, p < .01), suggesting that indeed these types of accountability often co-occur.

To test our hypotheses, we performed a series of regression analyses (see Table 2). Model 1 only contained the control variables, in model 2 the main effects of outcome and process accountability were added. With regards to the main effects, hypothesis 1 predicted a negative main effect of outcome accountability. The data did not show a significant relationship of outcome accountability with exploration (B = −.06, SE = .11, p = .594). Note that the 95% confidence interval for outcome accountability was relatively wide, with a distribution skewed towards negative effects (*ULCI* = −.285; *LLCI* = .163). However,

Table 1. Means, standard deviations, and correlations of study variables for study 1 (n = 361).

Variable	*M*	*SD*	1	2	3	4	5	6	7	8	9	10	11	12
1. Exploration	4.31	1.30												
2. Process accountability	3.62	0.97	.22**											
3. Outcome accountability	4.17	0.71	.10	.54**										
4. Need for closure	3.54	0.61	−.04	.11*	.14**									
5. Risk propensity	2.52	0.80	.15**	.05	.06	−.30**								
6. Control	3.54	0.85	.20**	.09	.04	−.03	.05							
7. Workload	3.23	1.07	.07	.24**	.24**	.06	.09	−.09						
8. Norms	3.29	1.08	.09	.39**	.29**	.12*	−.02	−.19**	.07					
9. Age	36.75	10.38	−.08	−.03	−.01	.03	−.31**	−.03	.04	−.02				
10. Gender[a]	0.55	0.50	.03	.11*	.09	.07	−.17**	.08	.00	.01	.07			
11. Job groups[b]	0.29	0.45	−.00	−.12*	.00	−.01	.06	.11*	−.04	−.13*	−.04	−.22**		
12. Job level: Management[c]	0.49	0.50	−.02	.09	.09	−.04	.11*	.27**	.08	.02	−.12*	−.03	−.10	
13. Job level: Professional[c]	0.27	0.44	.06	−.01	.06	−.04	−.02	−.04	.04	−.06	.03	.05	.22**	−.59**

* indicates p < .05. ** indicates p < .01.
[a]dummy variable where male = 0, female = 1; [b] dummy variable where 0 = non-technical, and 1 = technical; [c] reference category is "non-managerial admin/support function"

Table 2. Results of hierarchical regression analyses in study 1 (n = 361).

	Model 1	Model 2	Model 3
Intercept	4.424 ***	4.440 ***	4.385 ***
	(.168)	(.168)	(.169)
Need for closure	−.038	−0.055	−0.042
	(.116)	(.116)	(.116)
Risk taking	.205 *	.192 *	.201 *
	(.093)	(.093)	(.092)
Control	.393 ***	.352 ***	.338 ***
	(.085)	(.086)	(.085)
Workload	.097	.060	.058
	(.064)	(.065)	(.065)
Norms	.169 **	.099	.087
	(.063)	(.069)	(.069)
Age	−.006	−.006	−.007
	(.007)	(.007)	(.007)
Gender[a]	.067	.036	.038
	(.140)	(.139)	(.138)
Job groups[b]	−.071	−.030	−.038
	(.156)	(.156)	(.155)
Job level: Management[c]	−.296	−.307	−.320
	(.177)	(.176)	(.175)
Job level: Professional[c]	.046	.027	−.006
	(.194)	(.194)	(.193)
Process accountability		.234 **	.212 *
		(.087)	(.087)
Outcome accountability		−.061	.048
		(.114)	(.123)
Process × Outcome accountability			.195 *
			(.085)
R^2/Adjusted R^2	.097/.071	.117/.086	.130/.097
F Improvement of fit		3.949*	5.267*

Note: All continuous variables are mean-centred; Standard-errors in parentheses
[a]dummy variable where male = 0, female = 1; [b] dummy variable where 0 = non-technical, and 1 = technical; [c] reference category is "non-managerial admin/support function"
*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

these results did not support hypothesis 1. With regards to hypothesis 2, the results showed a significant positive main effect of process accountability (B = .23, SE = .09, p = .007). Hence, the data supported the second hypothesis. Because of the relatively high correlation between outcome and process accountability we also investigated potential multicollinearity issues of these variables. First, the variance inflation factors (VIF) was relatively low (VIF_{PA} = 1.65, VIF_{OA} = 1.52) and well below often used rules-of-thumb (O'Brien, 2007). In addition, we also ran separate regressions for outcome and process accountability, which showed consistent results. Hence, it appears multicollinearity did not meaningfully affect our results.

Model 3 shows the results of the interaction effect of outcome and process accountability, relating to hypothesis 3. The interaction was positive and significant (B = .20, SE = .09, p = .022) and the relationships are plotted in (Figure 1) to aid interpretation. A simple slopes analysis further showed that the positive relationship of process accountability is not significant when outcome accountability is low (B = .07, SE = .11, p = .501), but it is significant and positive when outcome accountability is medium (B = .21, SE = .09, p = .015) or high (B = .35, SE = .10, p < .001). Hence, this interaction effect is in line with hypothesis 3.

Study 2

The results of study 1 showed initial support for the differential effects of outcome and process accountability on individual exploration. The positive relationship of process accountability was confirmed (hypothesis 2), as was the interaction effect (hypothesis 3). The negative relationship of outcome accountability was not supported (hypothesis 1). A limitation that is inherent in the field survey, which may explain the lack of support for hypothesis 1, is that in real-life organizations, there are very few instances of "pure" outcome or process accountability. Rather, there are differences in *level* of the two foci, with the lowest focus not necessarily being zero. Hence, it may not be possible to examine "pure" outcome accountability in the absence of any process accountability. Because this is possible in experiments, and because experiments can better

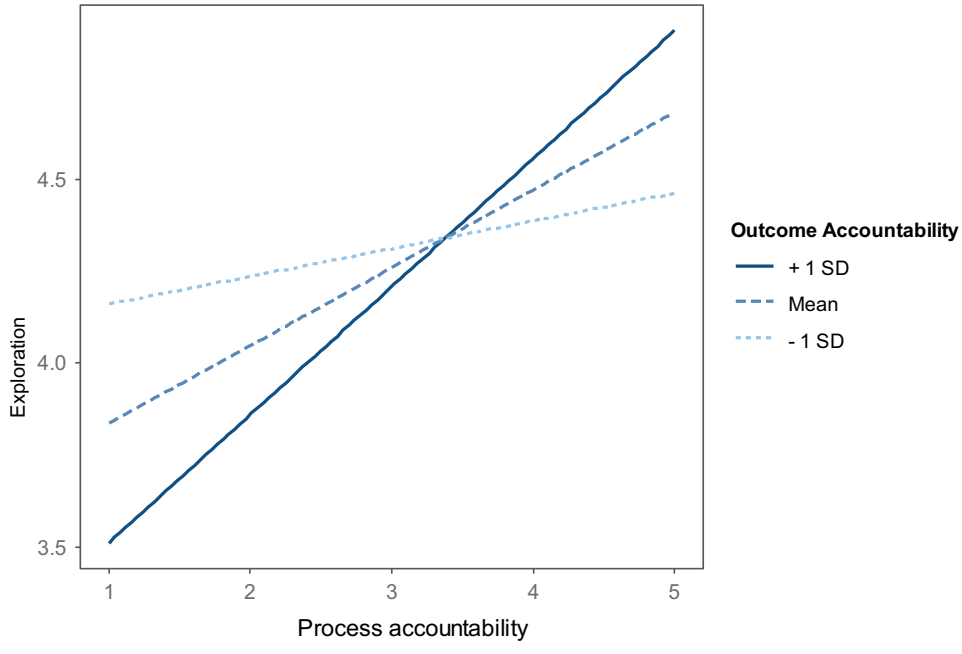

Figure 1. Interaction effect of process and outcome accountability (study 1).

establish the causal nature of the relationships and do not suffer from common method bias, we conducted a second study with an experimental design.

Sample, design, and procedure

We conducted an experiment with a sample of 227 students in business administration who participated in the study as part of a voluntary selection testing simulation. Their average age was 20.13 years (SD = 1.24) and 48.4% was female. Participants were randomly assigned to the conditions of a 2 (outcome accountability: yes/no) x 2 (process accountability: yes/no) experimental design, creating four condition: no accountability, (pure) outcome accountability, (pure) process accountability, and hybrid accountability. They were seated individually at a computer terminal and started by reading and signing the informed consent form. Next, they read the instructions for the task on-screen. After they finished the task, they were invited to go to another room where the aim and design of the experiment was explained and questions could be asked.

The task was adapted from Ederer and Manso (2013, also see the online appendix to their paper for task details). In this task, participants were put in charge of a virtual lemonade stand for twenty rounds. It was communicated that the goal of the task was to maximize total profit. In every round, they had to make decisions about a number of strategic parameters: location (three common street names), colour (green or pink), price, and percentage sugar and lemon in the drink. After every round, they instantly received feedback in the form of the profit for that round. Each time, they could decide to make changes to the parameters, in order to try to increase profit, or keep the parameters the same. After 20 rounds, participants completed a short post-task questionnaire and were debriefed in another room.

Consistent with the method used by Ederer and Manso (2013) the task instructions contained a letter ostensibly from the previous manager of the lemonade stand that explained how he set these parameters and that these settings made "around 90 §" (§ denoted the fictitious currency in the exercise). It was also made clear that the previous manager experimented with all parameters (price, sugar and lemon percentage, colour), except location of the lemonade stand, and that different strategies may be necessary at a different location.

Manipulations

The way of manipulating accountability was consistent with earlier experiments (e.g., Brtek & Motowidlo, 2002; Siegel-Jacobs & Yates, 1996). Participants in all accountability conditions were informed in the task instructions that they would need to justify their performance and/or actions to a researcher in another room (this part of the instructions was left out in the "no accountability condition"). After completing the task, participants actually went to that other room, but no justification was performed, only a general debriefing about the experiment. Accountability focus was manipulated by adding different instructions about what they would be asked to justify: *Process accountability*: "The researcher will ask you to justify the thinking process or strategy that you followed during the task. It will not be about the profits that you made, just about the strategy you followed"; *Outcome accountability*: "The researcher will ask you to justify your result, the total profit that you obtained over the 20 rounds. It will not be about how you approached the task, just about the result"; *Hybrid accountability*: "The researcher will ask you to justify the total profit, as well as the strategy that you followed in the task". Note that in this study we use the term "pure" outcome or process accountability (or hybrid), as opposed to in the other studies where outcome and process accountability are measured on a continuum.

Measures

Manipulation checks

Two items were included to test whether or not the manipulation was successful. Participants were asked to indicate to what extent two statements were true for them: "you will have to justify your results (profits) to a researcher" (outcome accountability) and "you will have to justify your strategy to a researcher" (process accountability). Participants used a seven-point scale from "Totally false" to "Totally true".

Exploration

Following Ederer and Manso (2013), an exploratory search round was defined as a round in which either (a) a new location was chosen, that was not the initial location, or (b) a significant change (more than 0.50, on a scale from 1 to 10, on the continuous variables) was made in the parameters while in a location that was *not* the initial location. Any round that did not contain significant changes or that contained changes within the initial location received a value of '0'. To test the predictions, we will both focus on the total amount of exploration and on the moment the last exploration round occurred for a participant.

Control variables

Given the experimental design, we did not include job-related variables as controls (e.g., autonomy, workload, job level), and given the sample of students, we did not include age. However, we did include four control variables that could help to explain differences in individuals tendency to engage in exploration/exploitation. First, *intrinsic motivation*, the extent to which someone enjoys the task for the sake of the task itself, plays a central role in creativity and innovation research (Amabile, 1996; Kauppila, 2018). In addition, it is possible that people under different accountability foci would perceive that task as more or less enjoyable. Therefore, intrinsic motivation was taken into account as a control variable. To measure intrinsic motivation, we used four items from Eisenberger and Aselage (2009). People were asked to indicate to which extent they believed the task to be enjoyable, interesting, boring, and unpleasant (last two items reversed) on a seven-point scale ("totally disagree" to "totally agree"). Reliability was adequate with $\alpha = .77$. Second, as in Study 1, we measured *risk propensity* as a stable individual difference in risk taking, but with a behavioural (rather than self-report) measure. We measured the propensity to take risks via the commonly used Holt-Laury instrument (Holt & Laury, 2002), where we use number of times

that an individual picks the high-reward option from a series of lotteries that vary in riskiness as a measure of individual risk propensity. We opted for this behavioural measure, because this was more aligned with our behavioural measure of exploration. Third, *need for closure*, which was measured with the same instrument as in study 1 (α = .82) . Lastly, we also included participant gender as a possible confounding variable, because earlier research has shown that there may be gender differences in innovative performance when confronted with performance pressure (Baer et al., 2013).

Results study 2

Manipulation check

We performed 2 (outcome accountability) x 2 (process accountability) ANOVAs on both manipulation check items. First, outcome accountability ratings were significantly higher in outcome accountability conditions (pure outcome and hybrid, $M = 3.30$, $SD = 1.28$) compared to the non-outcome accountability conditions ($M = 2.73$, $SD = 1.32$, $F_{(1, 223)} = 36.65$, $p < .001$). Second, participants reported higher expectations that they would have to justify their strategy under the process accountability conditions (pure process and hybrid, $M = 3.92$, $SD = 1.14$) compared to the non-process accountability conditions ($M = 2.99$, $SD = 1.34$, $F_{(1, 223)} = 32.01$, $p < .001$). These results support the effectiveness of the manipulations. However, closer analysis revealed that for some participants the manipulation did not work as intended. Specifically, fifteen individuals in the outcome accountability condition reported higher process accountability than outcome accountability and one participant in the process accountability condition showed a higher score for the outcome accountability manipulation check. To not invalidate the further analyses, these participants were dropped, resulting in a sample size of 211 and the distribution over conditions as in (Table 3).

Hypothesis tests

To tests hypotheses, two approaches were used. First, we examined the differences in total amount of exploration rounds in the different conditions. (Table 3) contains the means and standard deviations of the number of exploration rounds for every condition. A 2 × 2 ANOVA was run to test the effects of outcome and process accountability (two dummy variables), with gender, need for closure, and intrinsic motivation as covariates. (Figure 1) contains the different numbers of total exploration rounds (estimated marginal means) for the various conditions. Gender ($F_{(1, 197)} = 0.24$, $p = .63$), risk preference ($F_{(1, 197)} = 0.02$, $p = .51$), and need for closure ($F_{(1, 197)} = 1.26$, $p = .26$) did not yield significant effects on total exploration rounds, but intrinsic motivation had a significant positive effect ($F_{(1, 197)} = 7.07$, $p < .01$). Please note that results remained consistent without these control variables. With regards to the effects of accountability focus, consistent with predictions (hypothesis 2) there was a significant positive main effect of process accountability on the number of exploration rounds ($F_{(1,197)} = 5.67$, $p = .02$). Although the negative main effect of outcome accountability on exploration rounds was not significant ($F_{(1, 197)} = 0.44$, $p = .50$), a planned contrast comparing pure outcome accountability to pure process and no accountability (disregarding the hybrid condition) did show a significant negative effect of pure outcome accountability ($F_{(1,199)} = 5.18$, $p = .02$), consistent with hypothesis 1.

The interaction effect of process and outcome accountability (representing the hybrid accountability condition) just failed to reach significance ($F_{(1, 197)} = 3.31$, $p = .07$). (Figure 2), however, suggests that process accountability only has a positive effect when outcome accountability is present. Given our a priori and directional hypothesis 3, we performed a simple effects test (with Holm-Bonferroni adjustment for multiple comparisons) of the interaction. This test revealed no significant effect of process accountability when outcome accountability was not present (no accountability condition vs. pure process accountability, $F_{(1, 197)} = 0.26$, $p = .61$), but a significant (positive) effect when process accountability was combined with outcome accountability (pure outcome accountability vs. hybrid, $F_{(1, 197)} = 8.73$, $p < .01$). The difference between pure process accountability and no-accountability condition was not significant ($F_{(1, 197)} = 3.61$, $p = .12$). Overall, these findings provide tentative support for the interaction effect predicted in hypothesis 3.

A second conceptual approach to test the hypotheses did not focus on the number of exploration rounds, but on the "survival" of exploration throughout the twenty-round experiment. This operationalization of exploration required a survival analysis in which the focus was on examining the moment when participants decided to stop exploring. In other words, the last round in which exploration occurred for a specific participant was the outcome in this analysis. To analyse this, consistent with previous use of the experiment (Ederer & Manso, 2013), we used Cox's regression (Cox, 1972), which has the benefit of being able to deal with binary outcomes (exploration or not) over time. This type of regression computes the hazard rate as the dependent variable. The hazard rate (Exp [*B*]) can be interpreted as the overall risk that the event (here, last exploration round) will occur at a given moment, given that the end-of-exploration event has not already occurred (for a broader discussion on application in behavioural science, see Sims et al., 2005). We censored 63 participants for which the last round was an exploration round to conceptualize that their last exploration round was not recorded during the experiment. Note that censoring, in the context of survival analysis, does not mean participants are removed from analyses, but that they are explicitly coded as not having experienced the event in question (i.e., they engaged in exploration till the end of the task).

We started by examining a baseline model with only the control variables included. Results show that this model did not account for a significant amount of the variance in ($R^2 = .02$,

Table 3. Means and standard deviations of main variables for all conditions (study 2).

	Condition (n)			
	NA (55)	PA (57)	OA (41)	Hybrid (58)
Total exploration	8.82 (5.21)	9.68 (4.75)	6.80 (5.52)	9.86 (5.54)
Last exploration round	15.00 (6.17)	16.51 (5.39)	11.63 (7.72)	15.71 (6.01)

NA = No accountability condition, PA = (pure) process accountability condition, OA = (pure) outcome accountability condition, Hybrid = process and outcome accountability

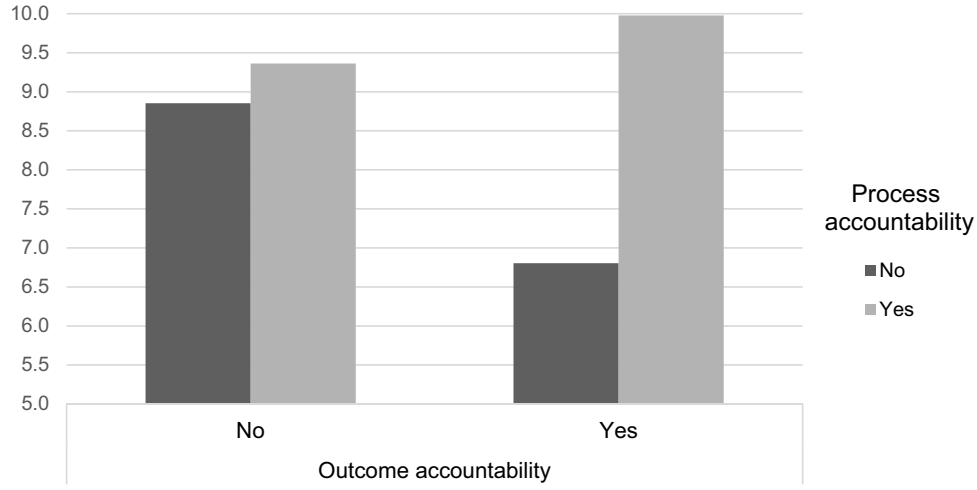

Figure 2. ANOVA results for outcome, process, and hybrid accountability (study 2). Note: estimated marginal means, controlling for gender, intrinsic motivation, risk preference and need for closure

likelihood ratio test$_{(df=4)}$ = 3.14, p = .50). Next, we included the different accountability conditions using two dummy variables and, in a next step, their interaction. The model with the main effects explained more variance (R^2 = .07, likelihood ratio test$_{(df = 6)}$ = 15.02, p = .02) and provided a significantly better model fit ($\chi^2_{(df = 2)}$ = 11.88, p < .01). The model with the interaction (R^2 = .07, likelihood ratio test$_{(df = 6)}$ = 15.57, p = .03) did not improve model fit ($\chi^2_{(df = 1)}$ = .56, p = .46). (Table 4) summarizes the results of this model.

(Table 4) shows that there is a significant main effect of both outcome and process accountability. Specifically, the results show that when participants were outcome accountable, they were 1.48 times (the hazard rate, Exp[B]) more likely to stop exploring at any given moment (B = .39, SE = .17, p = .02). Overall, the results therefore showed a negative main effect of outcome accountability on individual exploratory search. In addition, the planned contrast comparing pure outcome accountability to no accountability and pure process accountability was also significant (B = −.23, SE = .79, p < .01), in support of hypothesis 1. In contrast, under process accountability, participants had .61 times the chance of a particular round being their final exploration round (B = −.49, SE = .17, p < .01). Although the effect is small, this suggests that when the focus of accountability is on the process, there is a positive effect on individual exploration. Hence, the second hypothesis is also supported. After the main effects, the interaction of outcome and process accountability was included to test their joint, hybrid, effect (hypothesis 3). However, the results show no significant interaction (B = −.25, SE = .34, p = .46). Hence, following the survival analysis approach, hypothesis 3 is not supported.

Table 4. Estimates from the Cox Hazard rate model, reporting the hazard rates for ending exploration compared to the average hazard rate (study 2).

	Control variables		Main effects		Interaction	
	B (SE)	*Exp(B)*	*B (SE)*	*Exp(B)*	*B (SE)*	*Exp(B)*
Gender	−.01 (.17)	.99	.06 (.18)	1.07	.06 (.18)	1.07
Intrinsic motivation	−.14 (.15)	.87	−.14 (.15)	.87	−.14 (.15)	.87
Risk Preference	.07 (.05)	1.07	.08 (.05)	1.09	.08 (.05)	1.08
Need for closure	−.22 (.19)	.80	−.33† (.20)	.72	−.34† (.20)	.71
PA			−.49** (.17)	.61	−.37 (.24)	.69
OA			.39* (.17)	1.48	.52* (.24)	1.68
PA x OA					−.25 (.34)	.78
Pseudo-R^2	.02		.07**		.07**	

Significance levels: $^{\dagger}p$ < .10; *p < .05; **p < .01
N = 205
Note that positive coefficients indicate higher chance of stopping exploration

Study 3

The results of studies 1 and 2 show general support for the main (causal) effects of outcome and process accountability on individual exploration. The results also partially support the proposed interaction effect, suggesting that a combination of (high) outcome and process accountability results in highest levels of exploration.

A potential limitation of the previous studies, however, is that we conceptualized and measured exploration and exploitation as a unitary, bi-polar construct (with high exploration implying low exploitation and vice versa). Given that a manager's time and other resources are usually limited, this is a relevant way of looking at exploration, especially at the level of an individual manager (Kauppila, 2018). It should, however, be acknowledged that exploration and exploitation can also be conceptualized as two orthogonal dimensions that can vary independently from each other (e.g., Mom et al., 2009). Particularly when examining decision making of managers, who may have the opportunity to leverage efforts to pursue different activities at the same time or are able to plan different activities over time, this is also a relevant conceptualization.

Importantly, this conceptualization allows for a more detailed understanding of the effects of accountability on strategic decisions, because it can be examined whether outcome accountability increases exploitation or reduces exploration (or both) and whether process accountability increases exploration or reduces exploitation (or both). Therefore, we conducted

a third study in which we survey a sample of relatively senior employees (at least some management experience) who reported exploration and exploitation separately. In this study, we were able to examine the relationship between outcome and process accountability and exploration and exploitation separately, and examine any differential effects. Because outcome accountability will generally make employees work harder to satisfy demands but avoid risk in doing so, we expected outcome accountability to be positively related to exploitation but negatively to exploration (cf. Hypothesis 1). We expected process accountability to be positively related to exploration, because it stimulates systematic processing and the consideration of alternative ways of working (cf. Hypothesis 2). We did not necessarily expect a relation between process accountability and exploitation. However, because of disfluency, the positive effect of process accountability on exploration may be larger when outcome accountability is also high (cf. Hypothesis 3).

Sample

Similar to study 1, we recruited a sample via Prolific. The pre-screening conditions were similar to study 1 (i.e., English speaking, some managerial experience). Given that this study was conducted during the 2020 COVID-19 pandemic we added two more requirements. First, to make sure that people were working and living under the same kind of COVID-related containment measures, we only allowed people from one country (i.e., the United Kingdom). Second, we used the pre-screening option in prolific to only allow people who still worked "on site" at least part of their working time, because it may be the case that a sudden shift to remote work would make it harder for organizations to monitor how people perform their tasks and make it less likely they to experience process accountability. This also excluded participants who recently lost their job because the COVID-19 measures. We obtained a sample of 451 participants. Using the same approach as in study 1, we removed three participants that failed two attention checks. In addition, eight participants were removed because the indicated they were still students, and for two participants we did not have their age (a control variable). Hence, most analyses are based on a sample of 438 participants, but including all participants did not alter the pattern of results.

Participants' average age was 38.83 (SD = 11.69) and 224 (51%) were female. 92% had some kind of higher education and 55.3% were in a management position, while 24.6% occupied an expert role.

Measures

All the measures were the same as in study 1, expect for the measurement of exploration/exploitation and an additional control variable. For all overlapping measures, the references and example items can be found in the method section of study one. The reliabilities (Cronbach's alphas) are presented on the diagonal of the correlation table (Table 5). For our measure of process accountability, we did find in the exploratory factor analysis that the second item showed high cross loadings, loading about equally strong on both factors (see Appendix). Hence, we removed this item from further analyses.

In addition, we changed the time frame that people were asked to keep in mind when responding to the questions (6 months in study 1) to one month ("the past month"). We made this change to make sure that participants could think of specific activities that they had been engaged in, which may be more difficult with a longer time frame. Also, this ensured that people were asked to disregard the most turbulent period immediately following the outbreak of the COVID-19 pandemic (spring, 2020) and rather focus on a time frame when work activities had stabilized (September, 2020).

The new or altered measures were the following:

Exploration and exploitation

Instead of using a unidimensional (bi-polar) measure of exploration, we used two separate measures for exploration exploitation in this study. We used 14 items developed by Mom et al. (2009). Items were preceded by the stem "to what extent did you engage in work activities that can be characterized as follows" and participants used a seven-point scale ranging from "not at all", to "to a large extent". Example items are: "Searching

Table 5. Means, standard deviations, correlations & scale reliability Study 3.

Variable	*M*	*SD*	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Exploration	3.51	1.24	.84														
2. Exploitation	5.43	0.87	−.05	.77													
3. Process accountability	3.85	0.95	.13**	.10*	.89												
4. Outcome accountability	4.17	0.74	.03	.16**	.43**	.76											
5. Need for closure	3.35	0.63	−.06	.07	.09	.02	.87										
6. Risk taking	2.47	0.81	.24**	−.06	.05	.04	−.35**	.78									
7. Control	3.67	0.87	.25**	.15**	.15**	.06	−.01	.02	.79								
8. Workload	3.43	1.04	.16**	.03	.11*	.27**	.12*	−.00	−.15**	.82							
9. Norms	3.82	0.95	−.09	.11*	.24**	.14**	.11*	−.13**	−.03	−.06	.84						
10. Fear of evaluation	3.04	0.76	−.03	−.08	.08	.01	.39**	−.14**	−.13**	.18**	.00	.84					
11. Age	38.61	11.80	−.17**	.12**	.01	−.01	−.02	−.33**	.17**	−.11*	−.01	−.16**	/				
12. Gender[a]	0.49	0.50	.05	−.11*	−.02	−.03	−.17**	.19**	.00	.01	−.10*	−.30**	−.06	/			
13. Job type[b]	0.21	0.41	.12*	−.05	−.03	−.02	−.04	.05	.11*	.08	−.10*	−.03	−.06	.19**	/		
14. Level[c] (management)	0.55	0.50	.22**	.11*	.08	.01	−.03	.01	.28**	.00	−.13**	−.08	.04	.12*	.06	/	
15. Level[c] (professional)	0.25	0.43	−.11*	−.07	.02	.02	−.03	.02	−.03	.03	.07	.04	−.03	−.09*	.06	−.63**	/
16. Covid changes	2.70	1.02	.17**	−.02	.08	.09	.06	.05	.05	.13**	.02	.16**	−.05	−.04	−.06	.03	−.02

* indicates $p < .05$. ** indicates $p < .01$.
Reliabilities for multi-item scales (Cronbach's alpha) on the diagonal
[a]dummy variable where male = 0, female = 1; [b] dummy variable where 0 = non-technical, and 1 = technical; [c] reference category is "non-managerial admin/support function"

for new possibilities with respect to products/services, processes, or markets" (exploration) and "Activities of which a lot of experience has been accumulated by yourself" (exploitation). Reliabilities for both scales were acceptable ($\alpha_{Exploration}$ = .84 and $\alpha_{Exploitation}$ = .77).

Additional control variables

Individuals' reactions towards accountability may be very different (more potent) when they are innately more likely to experience such situations as stressful. To account for such possible trait differences in participants apprehensiveness towards being accountable, we also included a measure of fear of (negative) evaluation. We used the 12-item (short-form version) of the fear of negative evaluation scale developed by Leary (1983). Participants indicated to what degree a series of descriptions were characteristic of themselves, using a five-point scale (from "not at all characteristic of me" to "extremely characteristic of me"). An example item is "I worry about what other people will think of me even when I know it doesn't make any difference". Reliability was good with α = .84.

We also included a one-item measure to gauge the extent to which individuals jobs were affected by the COVID-19 pandemic. The items was "To what extent did the COVID-19 pandemic affect your working life during the last month (compared to pre-corona)" and participants rated this on a four-point scale ("not at all" to "to a great extent").

Common-method bias

We followed the same structural measures to minimize the influence of common-source bias than in study 1. Similar as in study 1, the Harman-single factor test (20.87%) and the common-latent factor test (14.90%) suggested relatively low levels of common-method bias. We also calculated common-method adjusted factor scores and found the same pattern of significant results (p-values were smaller for the significant effects) compared to the model with the mean scores.

Results study 3

Descriptive statistics and correlations (including Cronbach's alpha's for all multi-item scales) can be found in (Table 5). We found that exploration was significantly (positively) correlated with process accountability (r = .13, p = .007), but not with outcome accountability (r = .03, p = .620). Exploitation was significantly correlated to both process and outcome accountability (r = .10, p = .026; and r = .16, p < .001, respectively). Note that our measure to indicate changes in work environment because of the COVID-19 situation was positively correlated with exploration (r = .17, p < .001).

(Table 6) contains the results of two sets of regression analyses, with exploration and exploitation as the dependent variable, respectively, to test our hypotheses. With regards to the main effects of exploration (Table 6, model 2), the results showed a significant positive relationship with process accountability (B = .15, SE = .07, p = .02) and a non-significant negative, yet suggestive relationship with outcome accountability (B = −.15, SE = .08, p = .09). For exploitation, we found a significant positive relationship with outcome accountability (B = .14, SE = .06, p = .03), and no relationship with process accountability (B = −.00, SE = .05, p = .97). Overall, these results were consistent with our first and second hypotheses, as outcome accountability pushes decision-making towards high exploitation (cf. lower exploration in study 1) and process accountability related to higher exploration.

With regards to hypothesis 3, we did not find evidence for an interaction effect of outcome and process accountability on either exploration (B = −.02, SE = .07, p = .83) or exploitation (B = .04, SE = .06, p = .48). Hence, our data in study 3 was not in line with the hypothesized interaction effect.

Exploratively, we also examine the effects of outcome and process accountability on ambidexterity, which pertains to the balance between exploration and exploitation and which we operationalized as the product of both variables (Mom et al., 2009). Consistent with the results for exploration, we found a significant positive relationship with process accountability (B = .83, SE = .39, t = 2.14, p = .033) but no significant relationships with outcome accountability (B = −.25, SE = .51, t = −.50, p = .620).

Discussion

Discussion of results

In three studies, two field studies and an experiment, we examined the effects of two types of accountability (outcome and process) and their combination on strategic choices of managers. We expected that (pure) outcome accountability would increase a focus on exploitation activities at the expense of exploration activities, because this type of accountability would increase effort to obtain a positive evaluation, but would also lead to risk-averse behaviour. At the same time, we expected that process accountability would stimulate an increased focus on exploration activities (but not necessarily less exploitation). Regarding hybrid accountability – a combination of high outcome and high process accountability – predictions were less clear: we tentatively predicted that the uncertainty and disfluency that is created when both types of accountability are present would increase systematic information processing and therefore lead mainly to increased exploration.

With regards to the main effects of "pure" outcome and process accountability (hypotheses 1 and 2), we largely found support across our three studies. First, and most importantly, we found clear evidence for a positive relation between process accountability and exploration in all three studies, suggesting that asking managers to justify the "why" of their strategic choices induces a stronger focus on alternative ways of thinking and behaving. In Study 1, we found that process accountability was associated with a stronger focus on exploration (vs. exploitation). In the experiment (study 2), conditions with process accountability produced more (rate of exploration, ANOVA) and longer (last survival round, survival analysis) exploration compared to conditions without process accountability. In study 3, we found that process accountability was positively related to exploration, while having no relation with exploitation. The finding of a positive relation between process accountability and exploration resonates with earlier research on the effect of accountability focus, which has found

Table 6. Results of hierarchical regression analyses for study 3 (n = 438).

	DV = Exploration			DV = Exploitation		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
(Intercept)	3.383 ***	3.419 ***	3.423 ***	5.475 ***	5.472 ***	5.462 ***
	(0.137)	(0.137)	(0.138)	(0.102)	(0.102)	(0.103)
Need for closure	−0.066	−0.080	−0.080	0.135	0.134	0.134
	(0.099)	(0.099)	(0.099)	(0.074)	(0.074)	(0.074)
Risk taking	0.265 ***	0.251 **	0.251 **	0.030	0.023	0.022
	(0.077)	(0.078)	(0.078)	(0.058)	(0.058)	(0.058)
Control	0.339 ***	0.328 ***	0.329 ***	0.119 *	0.106 *	0.105 *
	(0.069)	(0.069)	(0.070)	(0.052)	(0.052)	(0.052)
Workload	0.191 ***	0.203 ***	0.203 ***	0.071	0.041	0.041
	(0.054)	(0.056)	(0.056)	(0.040)	(0.042)	(0.042)
Norms	−0.046	−0.070	−0.071	0.092 *	0.074	0.076
	(0.058)	(0.061)	(0.061)	(0.043)	(0.045)	(0.045)
Fear of evaluation	−0.057	−0.078	−0.075	−0.124 *	−0.120	−0.127 *
	(0.083)	(0.083)	(0.084)	(0.062)	(0.062)	(0.063)
Age	−0.015 **	−0.015 **	−0.015 **	0.008 *	0.008 *	0.008 *
	(0.005)	(0.005)	(0.005)	(0.004)	(0.004)	(0.004)
Gender	−0.105	−0.119	−0.118	−0.230 **	−0.227 *	−0.229 **
	(0.118)	(0.117)	(0.118)	(0.088)	(0.088)	(0.088)
Job type	0.200	0.206	0.205	−0.045	−0.038	−0.035
	(0.136)	(0.135)	(0.136)	(0.102)	(0.101)	(0.102)
Job level: Management	0.294	0.252	0.252	0.142	0.142	0.141
	(0.151)	(0.151)	(0.151)	(0.113)	(0.113)	(0.113)
Job level: Professional	−0.130	−0.162	−0.161	−0.051	−0.053	−0.057
	(0.166)	(0.166)	(0.166)	(0.124)	(0.124)	(0.124)
Covid impact	0.174 **	0.176 **	0.176 **	−0.028	−0.031	−0.032
	(0.054)	(0.054)	(0.054)	(0.041)	(0.041)	(0.041)
Process accountability		0.150 *	0.151 *		−0.002	−0.004
		(0.065)	(0.066)		(0.049)	(0.049)
Outcome accountability		−0.141†	−0.146†		0.137 *	0.148 *
		(0.083)	(0.086)		(0.062)	(0.064)
Process × outcome accountability			−0.016			0.039
			(0.073)			(0.055)
R^2	0.218	0.229	0.229	0.086	0.098	0.099
Adjusted R^2	0.196	0.204	0.202	0.060	0.068	0.067
F Improvement of fit		3.056 *	0.046		2.784†	0.508

All continuous variables are mean-centred; Standard-errors in parentheses

[a]dummy variable where male = 0, female = 1; [b] dummy variable where 0 = non-technical, and 1 = technical; [c] reference category is "non-managerial admin/support function"

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$, † $p < .10$

consistent positive effects of process accountability on the amount of systematic information processing (De Langhe et al., 2011) and reduced path dependency (Simonson & Staw, 1992). This finding is thus consistent with the hypothesis, based on the social contingency model, that actors engage in more effortful and less habitual processing (e.g., exploration), when their task process or strategy is under scrutiny. It also suggest, that not all types of scrutiny increase performance or evaluation pressure and therefore reduce exploration: clearly, making people accountable for the process has opposite effects.

The effect of outcome accountability was also confirmed in the experiment (study 2) and in study 3, but not in study 1. In study 1, the negative relation between outcome accountability and exploration (vs. exploitation) was observed only in situations where process accountability was low, suggesting that (at times) process accountability may mitigate this negative relations between outcome accountability and exploration. In the experiment, some evidence was found that outcome accountability reduced overall exploration behaviour (or increased exploitation), but (again) only when process accountability was lacking (i.e., in the "pure" outcome accountability situation, but not in the hybrid situation with both outcome and process accountability). Furthermore, the survival analysis, focusing on the last exploration rounds, concentrated on the temporal nature of the exploration-exploitation trade-off. At some point, actors stop exploring and start exploiting the insights gained from exploration. The results showed that the inflection point at which exploitation becomes favourable comes sooner for actors working under (pure) outcome accountability. In study 3, where we measured exploration separate from exploitation, we did find a significant positive effect of outcome accountability on exploitation and a negative effect on exploration that approached significance. This positive relationship with exploitation, combined with a negative trend towards exploration, is consistent with the idea that outcome accountability relates to a tendency to prefer exploitation over exploration. In all, and consistent with earlier work (e.g., Gardner, 2012), we tentatively conclude that outcome accountability tends to be associated with (more) exploitation.

Importantly, with regards to effects of "hybrid" accountability (hypothesis 3), combining an outcome and process focus, the results are less consistent. On the one hand, study 1 showed support for a positive interaction of outcome and process accountability, indicating that exploration was higher when both were high. This is consistent with our argument that combining both types of accountability may create conflict and disfluency, leading to more careful processing and exploration. However, the interaction of outcome and process

accountability on exploration was not replicated in study 3. In addition, the results of the experiment were mixed, as they showed that the positive effect of process accountability was higher when combined with higher outcome accountability, yet the interaction was not significant in the analyses focusing on length of exploration (i.e., the survival analyses).

There may be several reasons why results regarding hybrid accountability were not fully consistent across studies. First, as we noted in the theory section, there are potential downsides to hybrid accountability, such as cognitive overload and confusion or "analysis paralysis." As only study 1 finds unambiguous support for a positive interaction, on balance, our results indicate that there is validity to the argument that cognitive overload or confusion may have occurred as a result of the mixed signals that outcome and process accountability send (Dickerson & Kemeny, 2004). This may have been especially important in the experiment, where decisions have to be made within a short time frame, with less time to think about ways to deal with conflicting demands. In addition, in study 3, the COVID-19 situation may have caused a higher baseline level of cognitive pressure or work overload, making it harder to balance conflicting types of accountability. On a related note, we also found that when participants' jobs were more strongly impacted by the pandemic, exploration was higher (regardless of the accountability level or type). This suggests that the changes and uncertainty associated with the pandemic created opportunities (or the necessity) to explore.

Second, exploration/exploitation was measured in a different way in study 3 (as two separate dimensions) as compared to study 1 and 2 (as one bi-polar dimension). It may be the case, for example, that results are influenced by the salience of the trade-off between exploitation and exploration, which is likely higher when they are measured on one continuum as compared to separate dimensions. Hybrid accountability may make people choose exploration more when the exploration-exploitation trade-off is more salient (or when exploration necessarily goes at the expense of exploitation), but people may choose to focus on *both* exploration and exploitation when this trade-off is less salient or less inevitable (e.g., when time and other resources are less scarce). In addition, our measure of exploration (and exploitation) in study 3 asked participants to focus on a much shorter time frame (one months) than in study 1 (6 months). This shorter time frame may increase the chance that conflicting demands are experienced as cognitively taxing, similar to in the experiment.

Implications for theory and practice

The presented studies contribute to the growing accountability literature and have implications for theory on human resources management practices in their relationship with innovation. It answers the call of accountability scholars by examining accountability as a complex, non-unitary construct, that can have different foci (Hall et al., 2017). The results not only provide additional support for the differential effects of outcome and process accountability (e.g., De Langhe et al., 2011), it constitutes also a rare case where the interaction of the two forms, hybrid accountability, is theoretically and empirically examined. With regards to hybrid accountability, the results partially support the positive effects of disfluency on overcoming entrenched ideas (e.g., Alter, 2013), although it is important to note that we did not replicate this finding in all studies.

With regards to management control mechanisms, this paper calls into question the focus of classical control theory (Eisenhardt, 1985; Ouchi, 1979) on *controllability*. This work suggests that if the desired *outcome* is known and measurable, the control mechanism should control the outcome; and if the desired *process* is known and measurable, the control mechanism should control the process (Ouchi, 1979; Turner & Makhija, 2006). However, empirical results on the effect of different types of control mechanisms on innovation have produced inconsistent results (Cardinal et al., 2017). The social contingency model (Tetlock, 1992), however, provides and alternative view, by focusing on the type of *accountability* that is induced by a control mechanism. The model predicts individuals' reactions by examining what task strategy would be the easiest way to cope with particular types of accountability. Contrary to control theory, this implies that holding individuals accountable for something that is unknown (and perhaps unknowable; i.e., the process or strategy that will lead to the best result), or partly unknown (hybrid accountability) leads to more engaged and systematic processing and, hence, more exploration.

The exploration-exploitation dilemma is increasingly studied at the individual level (Kauppila, 2018; Lee & Meyer-Doyle, 2017; Schnellbächer et al., 2019), which answers the call for increased attention to the micro-foundations of organizational innovation (e.g., Eisenhardt et al., 2010). By its focus on accountability, the present paper contributes to an understanding of how company-level HRM policies, such as reward and evaluation policies, can affect company outcomes by influencing behaviour of actors at lower levels. One may predict, for example, that pay-for-performance reward policies will increase outcome accountability and will reduce individual-level exploration and eventually company-level innovation (see also Lee & Meyer-Doyle, 2017). The present results suggest, however, that this may not happen when at the same time process accountability is high.

These findings are thus important for practitioners, as they suggest that relying on purely outcome-based accountability mechanism will not result in more exploration. Rather, managers should consider using process accountability, perhaps in combination with outcome accountability, if they want their employees to show more exploration behaviour. This may, especially in the longer run and especially for jobs that are relatively complex, be a better strategy than, for example, pay-for-performance schemes or purely output based job evaluations.

Limitations and directions for future research

The important findings notwithstanding, there are also limitations to the present study that need to be addressed and that can inspire future research efforts. Firstly, both field studies suffer from methodological drawbacks, including an inability to draw causal conclusions due to the cross-sectional design and the potential that common method bias may have affected results. These concerns are mitigated to a large degree by our study 2, which provided experimental evidence for causality

and did not suffer from common method bias. In addition, as Spector (2019) has pointed out, a cross-sectionally designed study can still be appropriate when the aim is to explore a new relationship between two important concepts, both of which are traditionally meased via self-report measures and do not imply a necessary time gap between them. Nonetheless, future field studies could employ longitudinal designs to track exploration and exploitation over time and use multi-source data. For example, rather than using self-evaluations, direct supervisors or colleagues could be asked to report on the exploration and exploitation behaviours of certain individuals.

Secondly, a limitation of the current study is that, while the combination of an experiment and a field study provides support for the causal relationship between accountability and exploration *and* its external validity, it does not provide much evidence for the underlying psychological mechanisms. Earlier, scholars have suggested that different accountability foci lead to different levels of performance pressure and that this explains differences in information processing (Siegel-Jacobs & Yates, 1996). Different levels of performance pressure, in turn, are the result of differences in perceived controllability of the accountability situation (cf. conflict theory, Janis & Mann, 1977), with process accountability being under more direct control compared to outcome accountability, resulting in higher performance pressure under the latter. Higher performance pressure can explain decision-making that moves away from exploration, as high pressure is known to lead to reduced risk taking (Kahneman & Lovallo, 1993) and lowered systematic information processing (A. B. Markman et al., 2006). Although this explanation fits with the current literature and our findings, to our knowledge, there has been no direct examination of performance pressure as a mediating variable between accountability focus and actors' decision-making, and doing so would present a clear opportunity for future research.

Third, the current paper focuses on the effects of outcome and process accountability on individual exploration and exploitation, but does not examine any boundary conditions of these effects. Nevertheless, it is clear that different task characteristics may very well lead to different effects of outcome and process accountability. Specifically, as mentioned earlier, the positive effect of process accountability on exploration is possibly not found when there is a salient norm available about how to do a certain task. If there is such a norm, process accountability may lead people to blindly following it (Doney & Armstrong, 1996; Slaughter et al., 2006), and may hence lead to reduced exploration (Patil et al., 2014). In addition, characteristics of the focal actor may interact with accountability focus. Prior research has found that several personality factors become more influential in driving behaviour under accountability compared to when there is no accountability (e.g., Frink & Ferris, 1999), and it may be that outcome and process accountability differently inhibit or facilitate specific dispositional inclinations (cfr. Trait activation theory, Tett & Burnett, 2003). For instance, individuals high in openness to experience or creative personality may feel that process accountability enables their natural preference for trying out new things whereas outcome accountability stifles it. These and other potential moderating variables should be examined directly in future research.

Future research should employ field-based methods, not only to study the effects of accountability on individual decision-making, but also the mediating role of accountability in the relationship between management practices (e.g., control mechanisms) and actor behaviour and decision-making, something that has received remarkably little attention in previous accountability research (Hall et al., 2017). In particular, (quasi) field experiments could be especially powerful in establishing long-term effects on individual exploration and exploitation in decision-making, as well as other related behavioural outcomes (e.g., creative idea generation, escalation of commitment).

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References

Ahmadi, S., Khanagha, S., Berchicci, L., & Jansen, J. J. P. (2017). Are managers motivated to explore in the face of a new technological change? The role of regulatory focus, fit, and complexity of decision-making. *Journal of Management Studies*, *54*(2), 209–237. https://doi.org/10.1111/joms.12257

Alter, A. L. (2013). The benefits of cognitive disfluency. *Current Directions in Psychological Science*, *22*(6), 437–442. https://doi.org/10.1177/0963721413498894

Alter, A. L., & Oppenheimer, D. M. (2008). Effects of fluency on psychological distance and mental construal (or why New York is a Large City, but New York is a civilized jungle). *Psychological Science*, *19*(2), 161–167. https://doi.org/10.1111/j.1467-9280.2008.02062.x

Alter, A. L., Oppenheimer, D. M., Epley, N., & Eyre, R. N. (2007). Overcoming intuition: Metacognitive difficulty activates analytic reasoning. *Journal of Experimental Psychology. General*, *136*(4), 569–576. https://doi.org/10.1037/0096-3445.136.4.569

Amabile, T. M. (1996). *Creativity in context: Update to "the social psychology of creativity*. Westview Press.

Audia, P. G., & Goncalo, J. A. (2007). Past success and creativity over time: A study of inventors in the hard disk drive industry. *Management Science*, *53*(1), 1–15. https://doi.org/10.1287/mnsc.1060.0593

Audia, P. G., Locke, E. A., & Smith, K. G. (2000). The paradox of success: An archival and a laboratory study of strategic persistence following radical environmental change. *Academy of Management Journal*, *43(5)*, 837–853. https://doi.org/10.5465/1556413

Bacharach, S. B., Bamberger, P. A., & Conley, S. C. (1990). Work processes, role conflict, and role overload the case of nurses and engineers in the public sector. *Work and Occupations*, *17*(2), 199–228. https://doi.org/10.1177/073088490017002004

Baer, M., Vadera, A. K., Leenders, R. T. A. J., & Oldham, G. R. (2013). Intergroup competition as a double-edged sword: How sex composition regulates the effects of competition on group creativity. *Organization Science*, *25*(3), 892–908. https://doi.org/10.1287/orsc.2013.0878

Benner, M. J., & Tushman, M. L. (2003). Exploitation, exploration, and process management: The productivity dilemma revisited. *Academy of Management Review*, *28*(2), 238–256. https://doi.org/10.5465/AMR.2003.9416096

Bledow, R., Frese, M., Anderson, N., Erez, M., & Farr, J. (2009). A dialectic perspective on innovation: Conflicting demands, multiple pathways, and ambidexterity. *Industrial and Organizational Psychology*, *2*(3), 305–337. https://doi.org/10.1111/j.1754-9434.2009.01154.x

Bonesso, S., Gerli, F., & Scapolan, A. (2014). The individual side of ambidexterity: Do individuals' perceptions match actual behaviors in reconciling the exploration and exploitation trade-off? *European Management Journal*, *32*(3), 392–405. https://doi.org/10.1016/j.emj.2013.07.003

Brown, C. L. (1999). "Do the right thing:" Diverging effects of accountability in a managerial context. *Marketing Science*, *18*(3), 230–246. https://doi.org/10.1287/mksc.18.3.230

Brtek, M. D., & Motowidlo, S. J. (2002). Effects of procedure and outcome accountability on interview validity. *Journal of Applied Psychology*, *87*(1), 185–191. https://doi.org/10.1037/0021-9010.87.1.185

Byron, K., Khazanchi, S., & Nazarian, D. (2010). The relationship between stressors and creativity: A meta-analysis examining competing theoretical models. *Journal of Applied Psychology*, *95*(1), 201–212. https://doi.org/10.1037/a0017868

Cao, Q., Gedajlovic, E., & Zhang, H. (2009). Unpacking organizational ambidexterity: Dimensions, contingencies, and synergistic effects. *Organization Science*, *20*(4), 781–796. https://doi.org/10.1287/orsc.1090.0426

Cardinal, L. B., Kreutzer, M., & Miller, C. C. (2017). An aspirational view of organizational control research: Re-invigorating empirical work to better meet the challenges of 21st century organizations. *Academy of Management Annals*, *11*(2), 559–592. https://doi.org/10.5465/annals.2014.0086

Chang, L. J., Cheng, M. M., & Trotman, K. T. (2013). The effect of outcome and process accountability on customer–supplier negotiations. *Accounting, Organizations and Society*, *38*(2), 93–107. https://doi.org/10.1016/j.aos.2012.12.002

Chang, W., Atanasov, P., Patil, S. V., Mellers, B. A., & Tetlock, P. E. (2017). Accountability and adaptive performance under uncertainty: A long-term view. *Judgement and Decision Making*, *12(6)*, 610–626. http://journal.sjdm.org/17/17630/jdm17630.html

Colquitt, J. A., Scott, B. A., Judge, T. A., & Shaw, J. C. (2006). Justice and personality: Using integrative theories to derive moderators of justice effects. *Organizational Behavior and Human Decision Processes*, *100*(1), 110–127. https://doi.org/10.1016/J.OBHDP.2005.09.001

Cox, D. R. (1972). Regression models and life-tables. *Journal of the Royal Statistical Society. Series B (Methodological)*, *34*(2), 187–220. https://doi.org/10.2307/2985181

Dalla Via, N., Perego, P., & Van Rinsum, M. (2019). How accountability type influences information search processes and decision quality. *Accounting, Organizations and Society*, *75*, 79–91. https://doi.org/10.1016/j.aos.2018.10.001

De Langhe, B., Van Osselaer, S. M. J., & Wierenga, B. (2011). The effects of process and outcome accountability on judgment process and performance. *Organizational Behavior and Human Decision Processes*, *115*(2), 238–252. https://doi.org/10.1016/j.obhdp.211.02.003

Dickerson, S. S., & Kemeny, M. E. (2004). Acute stressors and cortisol responses: A theoretical integration and synthesis of laboratory research. *Psychological Bulletin*, *130*(3), 355–391. https://doi.org/10.1037/0033-2909.130.3.355

Doney, P. M., & Armstrong, G. M. (1996). Effects of accountability on symbolic information search and information analysis by organizational buyers. *Journal of the Academy of Marketing Science*, *24*(1), 57–65. https://doi.org/10.1007/BF02893937

Ederer, F., & Manso, G. (2013). Is pay for performance detrimental to innovation? *Management Science*, *59*(7), 1496–1513. https://doi.org/10.1287/mnsc.1120.1683

Eisenberger, R., & Aselage, J. (2009). Incremental effects of reward on experienced performance pressure: Positive outcomes for intrinsic interest and creativity. *Journal of Organizational Behavior*, *30*(1), 95–117. https://doi.org/10.1002/job.543

Eisenhardt, K. M. (1985). Control: Organizational and economic approaches. *Management Science*, *31*(2), 134–149. https://doi.org/10.1287/mnsc.31.2.134

Eisenhardt, K. M., Furr, N. R., & Bingham, C. B. (2010). CROSSROADS—microfoundations of performance: Balancing efficiency and flexibility in dynamic environments. *Organization Science*, *21*(6), 1263–1273. https://doi.org/10.1287/orsc.1100.0564

Ethiraj, S. K., & Levinthal, D. (2009). Hoping for A to Z while rewarding only A: Complex organizations and multiple goals. *Organization Science*, *20*(1), 4–21. https://doi.org/10.1287/orsc.1080.0358

Frese, M., Kring, W., Soose, A., & Zempel, J. (1996). Personal initiative at work: Differences between East and West Germany. *Academy of Management Journal*, *39(1)*, 37–63. https://doi.org/10.2307/256630

Frink, D. D., & Ferris, G. R. (1999). The moderating effects of accountability on the conscientiousness-performance relationship. *Journal of Business and Psychology*, *13*(4), 515–524. https://doi.org/10.1023/A:1022918904256

Frink, D. D., & Klimoski, R. J. (1998). Toward a theory of accountability in organizations and human resource management. In G. R. Ferris (Ed.), *Research in personnel and human resources* (pp. 1–51). Elsevier Science/JAI Press

Gardner, H. K. (2012). Performance pressure as a double-edged sword enhancing team motivation but undermining the use of team knowledge. *Administrative Science Quarterly*, *57*(1), 1–46. https://doi.org/10.1177/0001839212446454

Goodman, J. K., Cryder, C. E., & Cheema, A. (2013). Data Collection in a flat world: The strengths and weaknesses of mechanical turk samples. *Journal of Behavioral Decision Making*, *26*(3), 213–224. https://doi.org/10.1002/bdm.1753

Gupta, A., Smith, K., & Shalley, C. (2006). The interplay between exploration and exploitation. *Academy of Management Journal*, *49*(4), 693–706. https://doi.org/10.5465/AMJ.2006.22083026

Hall, A. T., Bowen, M. G., Ferris, G. R., Royle, M. T., & Fitzgibbons, D. E. (2007). The accountability lens: A new way to view management issues. *Business Horizons*, *50*(5), 405–413. https://doi.org/10.1016/j.bushor.2007.04.005

Hall, A. T., Frink, D. D., & Buckley, M. R. (2017). An accountability account: A review and synthesis of the theoretical and empirical research on felt accountability. *Journal of Organizational Behavior*, *38*(2), 204–224. https://doi.org/10.1002/job.2052

Hall, A. T., Royle, M. T., Brymer, R. A., Perrewé, P. L., Ferris, G. R., & Hochwarter, W. A. (2006). Relationships between felt accountability as a stressor and strain reactions: The neutralizing role of autonomy across two studies. *Journal of Occupational Health Psychology*, *11*(1), 87–99. https://doi.org/10.1037/1076-8998.11.1.87

Hall, A. T., Zinko, R., Perryman, A. A., & Ferris, G. R. (2009). Organizational citizenship behavior and reputation. Mediators in the relationship between accountability and job performance and satisfaction. *Journal of Leadership and Organizational Studies*, *15*(4), 381–392. https://doi.org/10.1177/1548051809331504

Hernandez, I., & Preston, J. L. (2013). Disfluency disrupts the confirmation bias. *Journal of Experimental Social Psychology*, *49*(1), 178–182. https://doi.org/10.1016/J.JESP.2012.08.010

Hobfoll, S. E. (1989). Conservation of resources: A new attempt at conceptualizing stress. *American Psychologist*, *44*(3), 513. https://doi.org/10.1037/0003-066X.44.3.513

Holt, C. A., & Laury, S. K. (2002). Risk aversion and incentive effects. In *The american economic review* 92(5), 1644–1655. American Economic Association. https://doi.org/10.2307/3083270

International Personality Item Pool. (2001). *A scientific collaboratory for the development of advanced measures of personality traits and other individual differences*. http://ipip.ori.org

Janis, I. L., & Mann, L. (1977). *Decision making: A psychological analysis of conflict, choice, and commitment*. Free Press.

Junni, P., Sarala, R., Taras, V., & Tarba, S. (2013). Organizational ambidexterity and performance: A meta-analysis. *Academy of Management Perspectives*, *27*(4), 299–312. https://doi.org/10.5465/amp.2012.0015

Kahneman, D., & Lovallo, D. (1993). Timid choices and bold forecasts: A cognitive perspective on risk taking. *Management Science*, *39*(1), 17–31. https://doi.org/10.1287/mnsc.39.1.17

Katila, R., & Ahuja, G. (2002). Something old, something new: A longitudinal study of search behavior and new product introduction. *Academy of Management Journal*, *45(6)*, 1183–1194. https://doi.org/10.2307/3069433

Kauppila, O.-P. (2018). How does it feel and how does it look? The role of employee motivation in organizational learning type. *Journal of Organizational Behavior*, *39*(8), 941–955. https://doi.org/10.1002/job.2270

Laird, M. D., Perryman, A. A., Hochwarter, W. A., Ferris, G. R., & Zinko, R. (2009). The moderating effects of personal reputation on accountability-strain relationships. *Journal of Occupational Health Psychology*, *14*(1), 70–83. https://doi.org/10.1037/a0012567

Laureiro-Martínez, D., Brusoni, S., Canessa, N., & Maurizio, Z. (2015). Understanding the exploration–exploitation dilemma: An fMRI study of attention control and decision-making performance. *Strategic Management Journal*, *36*(3), 319–338. https://doi.org/10.1002/smj.2221

Lavie, D., Stettner, U., & Tushman, M. (2010). Exploration and exploitation within and across organizations. *The Academy of Management Annals*, *4*(1), 109–155. https://doi.org/10.1080/19416521003691287

Leary, M. R. (1983). A brief version of the fear of negative evaluation scale. *Personality & Social Psychology Bulletin*, *9*(3), 371–375. https://doi.org/10.1177/0146167283093007

Lee, S., & Meyer-Doyle, P. (2017). How performance incentives shape individual exploration and exploitation: Evidence from microdata. *Organization Science*, *28*(1), 19–38. https://doi.org/10.1287/orsc.2016.1104

Lerner, J., & Tetlock, P. E. (1999). Accounting for the effects of accountability. *Psychological Bulletin*, *125*(2), 255–275. https://doi.org/10.1037/0033-2909.125.2.255

Levin, I. P., Huneke, M. E., & Jasper, J. D. (2000). Information processing at successive stages of decision making: Need for cognition and inclusion–exclusion effects. *Organizational Behavior and Human Decision Processes*, *82*(2), 171–193. https://doi.org/10.1006/obhd.2000.2881

Levinthal, D., & March, J. (1993). The myopia of learning. *Strategic Management Journal*, *14*(S2), 95–112. https://doi.org/10.1002/smj.4250141009

Levinthal, D., & Rerup, C. (2006). Crossing an apparent chasm: Bridging mindful and less-mindful perspectives on organizational learning. *Organization Science*, *17*(4), 502–513. https://doi.org/10.1287/orsc.1060.0197

Levinthal, D., & Warglien, M. (1999). Landscape design: Designing for local action in complex worlds. *Organization Science*, *10*(3), 342–357. https://doi.org/10.1287/orsc.10.3.342

Lu, J. G., Akinola, M., & Mason, M. F. (2017). "Switching On" creativity: Task switching can increase creativity by reducing cognitive fixation. *Organizational Behavior and Human Decision Processes*, *139*, 63–75. https://doi.org/10.1016/j.obhdp.2017.01.005

March, J. G. (1991). Exploration and exploitation in organizational learning. *Organization Science*, *2*(1), 71–87. https://doi.org/10.1287/orsc.2.1.71

March, J. G. (2006). Rationality, foolishness, and adaptive intelligence. *Strategic Management Journal*, *27*(3), 201–214. https://doi.org/10.1002/smj.515

Markman, A. B., Maddox, W. T., & Worthy, D. A. (2006). Choking and excelling under pressure. *Psychological Science*, *17*(11), 944–948. https://doi.org/10.1111/j.1467-9280.2006.01809.x

Markman, K. D., & Tetlock, P. E. (2000). Accountability and close-call counterfactuals: The loser who nearly won and the winner who nearly lost. *Personality & Social Psychology Bulletin*, *26*(10), 1213–1224. https://doi.org/10.1177/0146167200262004

Mom, T. J. M., Van Den Bosch, F. A. J., & Volberda, H. W. (2007). Investigating managers' exploration and exploitation activities: The influence of top-down, bottom-up, and horizontal knowledge inflows. *Journal of Management Studies*, *44*(6), 910–931. https://doi.org/10.1111/j.1467-6486.2007.00697.x

Mom, T. J. M., Van Den Bosch, F. A. J., & Volberda, H. W. (2009). Understanding variation in managers' ambidexterity: Investigating direct and interaction effects of formal structural and personal coordination mechanisms. *Organization Science*, *20*(4), 812–828. https://doi.org/10.1287/orsc.1090.0427

O'Brien, R. M. (2007). A caution regarding rules of thumb for variance inflation factors. *Quality & Quantity*, *41*(5), 673–690. https://doi.org/10.1007/s11135-006-9018-6

O'Reilly, C. A., & Tushman, M. L. (2004). The ambidextrous organization. *Harvard Business Review*, *82*(4), 74–81. https://hbr.org/2004/04/the-ambidextrous-organization

O'Reilly, C. A., & Tushman, M. L. (2013). Organizational ambidexterity: Past, present, and future. *Academy of Management Perspectives*, *27*(4), 324–338. https://doi.org/10.5465/amp.2013.0025

Oppenheimer, D. M. (2008). The secret life of fluency. *Trends in Cognitive Sciences*, *12*(6), 237–241. https://doi.org/10.1016/j.tics.2008.02.014

Ouchi, W. G. (1979). A conceptual framework for the design of organizational control mechanisms. *Management Science*, *25*(9), 833–848. https://doi.org/10.1287/mnsc.25.9.833

Patil, S. V., & Tetlock, P. E. (2014). Punctuated incongruity: A new approach to managing trade-offs between conformity and deviation. *Research in Organizational Behavior*, *34*, 155–171. https://doi.org/10.1016/j.riob.2014.08.002

Patil, S. V., Tetlock, P. E., & Mellers, B. A. (2017). Accountability systems and group norms: Balancing the risks of mindless conformity and reckless deviation. *Journal of Behavioral Decision Making*, *30*(2), 282–303. https://doi.org/10.1002/bdm.1933

Patil, S. V., Vieider, F., & Tetlock, P. E. (2014). Process and outcome accountability. In M. Bovens, R. E. Goodin, & T. Schillemans (Eds.), *The oxford handbook of public accountability* (pp. 69–90). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780199641253.013.0002

Pitesa, M., & Thau, S. (2013). Masters of the universe: How power and accountability influence self-serving decisions under moral hazard. *Journal of Applied Psychology*, *98*(3), 550–558. https://doi.org/10.1037/a0031697

Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, *88*(5), 879. https://doi.org/10.1037/0021-9010.88.5.879

Podsakoff, P. M., MacKenzie, S. B., & Podsakoff, N. P. (2012). Sources of method bias in social science research and recommendations on how to control it. *Annual Review of Psychology*, *63*(1), 539–569. https://doi.org/10.1146/annurev-psych-120710-100452

Quigley, N. R., Tesluk, P. E., Locke, E. A., & Bartol, K. M. (2007). A multilevel investigation of the motivational mechanisms underlying knowledge sharing and performance. *Organization Science*, *18*(1), 71–88. https://doi.org/10.1287/orsc.1060.0223

Raisch, S., & Birkinshaw, J. (2008). Organizational ambidexterity: Antecedents, outcomes, and moderators. *Journal of Management*, *34*(3), 375–409. https://doi.org/10.1177/0149206308316058

Raisch, S., Birkinshaw, J., Probst, G., & Tushman, M. L. (2009). Organizational ambidexterity: Balancing exploitation and exploration for sustained performance. *Organization Science*, *20*(4), 685–695. https://doi.org/10.1287/orsc.1090.0428

Roets, A., & Van Hiel, A. (2011). Item selection and validation of a brief, 15-item version of the need for closure scale. *Personality and Individual Differences*, *50*(1), 90–94. https://doi.org/10.1016/J.PAID.2010.09.004

Rogan, M., & Mors, M. (2014). A network perspective on individual-level ambidexterity in organizations. *Organization Science*, *25*(6), 1860–1877. https://doi.org/10.1287/orsc.2014.0901

Rosing, K., & Zacher, H. (2017). Individual ambidexterity: The duality of exploration and exploitation and its relationship with innovative performance. *European Journal of Work and Organizational Psychology*, *26*(5), 694–709. https://doi.org/10.1080/1359432X.2016.1238358

Schnellbächer, B., Heidenreich, S., & Wald, A. (2019). Antecedents and effects of individual ambidexterity – A cross-level investigation of exploration and exploitation activities at the employee level. *European Management Journal*, *37*(4), 442–454. https://doi.org/10.1016/j.emj.2019.02.002

Scholten, L., van Knippenberg, D., Nijstad, B. A., & De Dreu, C. K. W. (2007). Motivated information processing and group decision-making: Effects of process accountability on information processing and decision quality. *Journal of Experimental Social Psychology*, *43*(4), 539–552. https://doi.org/10.1016/j.jesp.2006.05.010

Scott, S., & Bruce, R. (1994). Determinants of innovative behavior: A path model of individual innovation in the workplace. *Academy of Management Journal*, *37(3)*, 580–607. https://doi.org/10.2307/256701

Sedikides, C., Herbst, K. C., Hardin, D. P., & Dardis, G. J. (2002). Accountability as a deterrent to self-enhancement: The search for mechanisms. *Journal of Personality and Social Psychology*, *83*(3), 592–605. https://doi.org/10.1037/0022-3514.83.3.592

Siegel-Jacobs, K., & Yates, J. F. (1996). Effects of procedural and outcome accountability on judgment quality. *Organizational Behavior and Human Decision Processes*, *65*(1), 1–17. https://doi.org/10.1006/obhd.1996.0001

Sihag, V., & Rijsdijk, S. A. (2019). Organizational controls and performance outcomes: A meta-analytic assessment and extension. *Journal of Management Studies*, *56*(1), 91–133. https://doi.org/10.1111/joms.12342

Simonson, I., & Staw, B. M. (1992). Deescalation strategies: A comparison of techniques for reducing commitment to losing courses of action. *Journal of Applied Psychology*, *77*(4), 419. https://doi.org/10.1037/0021-9010.77.4.419

Sims, C. S., Drasgow, F., & Fitzgerald, L. F. (2005). The effects of sexual harassment on turnover in the military: Time-dependent modeling. *Journal of Applied Psychology*, *90*(6), 1141–1152. https://doi.org/10.1037/0021-9010.90.6.1141

Slaughter, J. E., Bagger, J., & Li, A. (2006). Context effects on group-based employee selection decisions. *Organizational Behavior and Human Decision Processes*, *100*(1), 47–59. https://doi.org/10.1016/j.obhdp.2006.01.003

Spector, P. E. (2019). Do not cross me: Optimizing the use of cross-sectional designs. *Journal of Business and Psychology*, *34*(2), 125–137. https://doi.org/10.1007/s10869-018-09613-8

Tetlock, P. E. (1983). Accountability and complexity of thought. *Journal of Personality and Social Psychology*, *45*(1), 74–83. https://doi.org/10.1037/0022-3514.45.1.74

Tetlock, P. E. (1992). The impact of accountability on judgment and choice: Toward a social contingency model. *Advances in Experimental Social Psychology*, *25*, 331–376. https://doi.org/10.1016/S0065-2601(08)60287-7

Tetlock, P. E., Skitka, L., & Boettger, R. (1989). Social and cognitive strategies for coping with accountability: Conformity, complexity, and bolstering. *Journal of Personality and Social Psychology*, *57*(4), 632–640. https://doi.org/10.1037/0022-3514.57.4.632

Tett, R., & Burnett, D. (2003). A personality trait-based interactionist model of job performance. *Journal of Applied Psychology*, *88*(3), 500–517. https://doi.org/10.1037/0021-9010.88.3.500

Tuncdogan, A., Boon, A., Mom, T., Van Den Bosch, F., & Volberda, H. (2017). Management teams' regulatory foci and organizational units' exploratory innovation: The mediating role of coordination mechanisms. *Long Range Planning*, *50*(5), 621–635. https://doi.org/10.1016/J.LRP.2016.11.002

Turner, K. L., & Makhija, M. V. (2006). The role of organizational control in managing knowledge. *Academy of Management Review*, *31*(1), 197–217. https://doi.org/10.5465/AMR.2006.19379631

van der Borgh, M., & Schepers, J. J. L. (2014). Do retailers really profit from ambidextrous managers? The impact of frontline mechanisms on new and existing product selling performance. *Journal of Product Innovation Management*, *31*(4), 710–727. https://doi.org/10.1111/jpim.12158

Van Yperen, N. W., & Hagedoorn, M. (2003). Do high job demands increase intrinsic motivation or fatigue or both? The role of job control and job social support. *Academy of Management Journal*, *46(3)*, 339–348. https://doi.org/10.5465/30040627

Webster, D. M., & Kruglanski, A. W. (1994). Individual differences in need for cognitive closure. *Journal of Personality and Social Psychology*, *67*(6), 1049–1062. https://doi.org/10.1037/0022-3514.67.6.1049

Weigold, M. F., & Schlenker, B. R. (1991). Accountability and risk taking. *Personality & Social Psychology Bulletin*, *17*(1), 25–29. https://doi.org/10.1177/0146167291171004

Zhang, Y., & Mittal, V. (2005). Decision difficulty: Effects of procedural and outcome accountability. *Journal of Consumer Research*, *32*(3), 465–472. https://doi.org/10.1086/497558

Zollo, M., & Winter, S. G. (2002). Deliberate learning and the evolution of dynamic capabilities. *Organization Science*, *13*(3), 339–351. https://doi.org/10.1287/orsc.13.3.339.2780

Appendix. Items for Outcome and Process Accountability (Study 1/study 3)

Item	Factor 1: Outcome accountability	Factor 2: Process accountability
I am held accountable for my work output/results.	.81/.76	
My superior(s) hold(s) me accountable for my work output/results.	.87/.85	
If I don't achieve the results that are considered appropriate, I will hear about it from my superior(s).	.77/.79	
I am held accountable for my work processes or strategies.		.91/.93
My superior(s) hold(s) me accountable for my work processes or strategies.		.93/.89
If I don't use a work process or strategy that is considered appropriate, I will hear about it from my superior(s).	/.44	.71/.58
Explained variance (rotated)	39.29/36.54	37.37/35.10

Note: Factor loadings are based on a principal component analysis with varimax rotation; Only cross-loadings > .40 are presented;

Study 1: Kaiser-Meyer-Olkin: .74, Approximate Chi-Square$_{(df = 15)}$ = 1256.39, $p < .000$

Study 3: Kaiser-Meyer-Olkin: .71, Approximate Chi-Square$_{(df = 15)}$ = 1196.56, $p < .000$