Future Orientation and Team Performance in Creative Tasks[1]

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Abstract

Individuals differ in their perception of time. Time perspectives have been delineated as an explanatory factor for individual productivity and may also affect collaborative outcomes. In this study, we analyze the impact of variation in future orientation in dyads on their performance when confronted with a simple incentivized creative task. For this purpose, we applied a pre-experimental research design measuring team performance in terms of quantity and quality. Results indicate that a team's future orientation affects its performance positively.

Keywords

Future orientation, team performance, creative tasks, time perspectives

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1 Introduction

Finding a conducive composition of individuals in teams can be challenging. This especially applies when teams are not working on standardized routine tasks but need to collaborate to produce creative output (Pirola-Merlo & Mann, 2004; Taggar, 2001). Research on how creative processes can be fostered has identified the personal characteristics of team members as influential factors. In particular, the Big Five personality dimensions are commonly consulted to examine the effect regarding team members. On the team level, studies have outlined that the performance in a creative task improves when members are open-minded, as well as show moderate levels of extraversion and low levels of conscientiousness (Baer et al., 2008; Barry & Stewart, 1997; Bolin & Neuman, 2006; Buchanan, 1998; Robert & Cheung, 2010).

Extending this perspective, previous research points to a relation between time perspectives and the Big Five personality traits (Dunkel & Weber, 2010; Kairys & Liniauskaite, 2015; Kooij et al., 2018). McKay and Gutworth (2019) stress that the perception of time represents another explanatory factor for productivity in creative tasks when considered part of the personality. However, this relation has not been tested practically on a team level. In our study, we measure performance in creative tasks in a pre-experimental research design, capturing team performance instead of individual performance. In this context, we consider dyads as a specified team form since, generally, the same internal processes can usually be observed for dyads as for teams of three or more (Williams, 2010). Additionally, we draw on the time perspective theory introduced by Zimbardo and Boyd (1999) to capture the team's aggregated perception of time. According to this theory, individuals have different time perspectives (future, present, and past time perspectives) that affect their behavior. Previous studies on time perspectives stress that future orientation in particular is a significant predictor of performance. Future orientation leads to a higher valence to goals, a greater study effort, and an increased motivation to reach goals resulting in better overall academic performance (Phan, 2009; Shell & Husman, 2001). However, few studies have analyzed the effects of future orientation on team performance (Abrantes et al., 2020; Gupta & Bakker, 2020; Mohammed & Nadkarni, 2011), none of which have considered creative work.

A theoretical approach to understand requirements for successful team performance in creative tasks has been proposed by West (1990), who outlined four key demands to be fulfilled. Firstly, team members should be able to visualize the future potential and objectives related to the task. Secondly, they should have a common orientation toward a goal-related performance. Thirdly, team members should be open-minded regarding their expectations for innovative processes

and show support for ideas. Fourthly, they should demonstrate great focus and effort to the team to improve participation and collaboration for all members. Given that these factors foster collaboration on the team level, research by Taggar (2002) indicated that individual contributions need to be considered to design a more comprehensive multi-level model for predicting performance on creative outcomes. This approach has been further elaborated by Pirola-Merlo & Mann (2004), who highlighted the importance of the individual's contribution in their model for team performance in creative tasks. Depending on the task, the contributions of members can be of equal or unequal nature, determining how to evaluate the individual effort for the team performance.

Reflecting the proposed demands by West (1990) to enhance creative performance in teams, we detect extensive concordance to characteristics attributed to future-oriented individuals, such as goal-orientation, willingness to perform, commitment, and future-oriented thinking (Zimbardo & Boyd, 1999). If team members share high future orientation, the positive effects of these characteristics are likely to enhance team performance in creative tasks according to the proposed multi-level models. Hence, it is of interest to study if collaborative team members with a high future orientation can actually achieve better creative performance. Consequently, we seek to address this unexplored issue. For this purpose, we adapt the research design of Laske and Schröder (2017) to capture team performance in a creative task. More specifically, we aim at answering the following research question: Does future orientation predict team performance in creative task settings?

The remainder of the study is structured as follows. Firstly, we describe our approach to a creative task and review determinants when measuring performance in these tasks. Secondly, we outline how time relates to performance, drawing on the concept of time perspectives as proposed by Zimbardo and Boyd (1999). In particular, we present the effects of future orientation on performance indicators. Thirdly, we introduce and explain our study design, the key variables for our analysis, and the main results based on our regression models. We conclude by discussing the impact of future orientation and the significance of this study, relating it to existing insights into team performance in creative tasks.

2 Team performance in creative tasks

Creative processes ought to produce useful results that, additionally, entail features that are unexpected or extraordinary in the given context. The result can be of a physical or intangible nature (Sternberg & Lubart, 1996; Woodman et al., 1993). A prominent specification of creativity is bricolage which we will apply as a practical approach to examining creative

performance. Bricolage relates to an unexpected situation with an apparent problem that needs to be solved (Baker & Nelson, 2005). Baker and Nelson (2005) most prominently discussed and established bricolage as a concept in organizational research, describing it as "making do with whatever is at hand by reuse and recombination" (Baker & Nelson, 2005, p. 333). The definition implies that resources are limited and even seem useless or inappropriate for reuse. Yet, these resources can be recombined, deviating from their original purpose, to generate new value (Duymedijan & Rüling, 2010). We consider the setting of bricolage for our study since it constitutes an essential part of the innovation process in organizations that is commonly applied during the (re)formation of companies (Perkmann & Spicer, 2014).

Regarding the creative output, the performance of individuals and their interaction on the organizational level are the main determinants (Woodman et al., 1993). Across all domains, two basic aspects are relevant for organizations in a creative task setting. On the one hand, organizations care for the number and realization of ideas. On the other hand, it is important how much innovative potential these ideas contain (Kaufman & Sternberg, 2007; Runco & Jaeger, 2012). Runco and Jaeger (2012) assert that creative performance consists of the originality of the result and the efficiency of how it is realized. Similarly, Kaufman and Sternberg (2007) differentiate between the components of quantity, quality, and originality. Consequently, the assessment of performance in creative tasks needs to be differentiated. In this study, we focus on the quality and quantity of the results.[2]

Determinants of creative performance

Identifying predictors that foster creative thinking and processing is of managerial interest and has yielded a broad range of research. In its course, influential factors concerning personality and its composition in teams have been investigated (Baer et al., 2008; Barry & Stewart, 1997; Buchanan, 1998). These studies have drawn from the Big Five traits (extraversion, conscientiousness, neuroticism, openness, and agreeableness) based on the definitions of McCrae and Costa (1987) and the suggested effect on teamwork (Salas et al., 2005) to measure personality dimensions and test how they relate to the output of creative tasks (Feist, 1998). Their results suggest better creative performance if teams were composed of individuals scoring high on extraversion and openness but low on conscientiousness (Baer et al., 2008; Driskell et al., 1987). However, others came to negative or non-linear results for extraversion (Barry &

[2] In the original study design of Laske and Schröder (2017), they investigated individual performance in a creative task setting and measured the originality by giving the participants a free choice of terms they could create with the given materials. In our collaborative setting, this set-up would result in limited comparability between the teams if members were free to choose the terms for qualitative performance. Therefore, we predefined the terms and their order.

Stewart, 1997; Bolin & Neuman, 2006). Even neuroticism and agreeableness are suggested as important factors on the team level (Gelade, 1997). Moreover, the composition of members with homogeneous or heterogenous personality traits has also been discussed as an influential factor for team performance in previous studies (Mohammed & Angell, 2003). Here, again, results differ in creative tasks depending on the specific trait (Baer et al., 2008; den Hartog et al., 2020; Hunter & Cushenbery, 2015; Schilpzand et al., 2011).

3 Time perspective theory

Despite their prominence in scientific discourse on the relationship of personality and performance, the Big Five traits are not the only characteristics applied to predict performance. Scholars have also identified relationships between Big Five traits and time perspectives (Dunkel & Weber, 2010; Kairys & Liniauskaite, 2015; Kooij et al., 2018). This emphasizes the need to investigate how time perspectives relate to performance indicators. Psychologists argue that temporal orientation differs between individuals and may be relevant enough to justify inclusion as a personal trait (Gorman & Wessman, 1977). In previous research, time has been studied as an objective (e.g., geographical time) or subjective time (Levine & Norenzayan, 1999; Pentland et al., 1999). The subjective time relates to a psychological concept of time, i.e., how time is processed by the individual human mind (Gorman & Wessman, 1977). Part of this subjective paradigm is the notion of time perspectives that we consider in our study (Zimbardo & Boyd, 1999). Zimbardo and Boyd (1999) focus on a psychological time perspective theory by dividing the time orientation of individuals into five different time perspectives: future, present (present-hedonistic, present-fatalistic), and past (past-positive, past-negative) orientation. Thereby, they categorize individuals into particular types. They define time perspectives as "[…] the often non-conscious process whereby the continual flows of personal and social experiences are assigned to temporal categories, or time frames, that help to give order, coherence, and meaning to those events" (Zimbardo & Boyd, 1999, p. 1271). Therefore, time perspectives could be associated with cognitive processes.

However, only a few studies have considered the aspect of time in relation to creative performance (McKay & Gutworth, 2019). On the individual level, Zimbardo and Boyd (1999), as well as McKay and Gutworth (2019), identify positive relationships of future orientation on self-reported levels of creativity. However, team effects are not examined. According to the model of West (1990), creative performance in teams depends on a common goal-orientation, a vision for future demands, and supporting participation and collaboration for innovative ideas. All these factors correspond to the characteristics assigned to Zimbardo and Boyd's (1999)

concept of future orientation. Hence, if team members share a high future orientation, the positive effects of these characteristics are likely to improve team performance in creative tasks in addition to the individual contributions as outlined by Taggar (2002). In our study, we investigate the relationship between future orientation and creative performance and extend it to the team level.

Time perspectives and performance

According to Zimbardo and Boyd (1999), time perspectives can be distinguished in (1) past, (2) present, and (3) future orientation. (1) The past time perspective implies a history-oriented characteristic with a focus on traditions and the family. Individuals with a past orientation avoid change, are not open-minded regarding new cultures or experiences, and attempt to keep things running (Boniwell & Zimbardo, 2004; Zimbardo & Boyd, 1999). Past-positive-oriented individuals tend to have pleasurable, emotional, and nostalgic perspectives toward memories whereas past-negative-oriented individuals remember aversive and uneasy situations of the past (Boniwell & Zimbardo, 2004). (2) The present time perspective is divided into the present-hedonistic and the present-fatalistic orientation. Overall, present-oriented individuals are stimulus-driven (Zimbardo & Boyd, 1999). Present-fatalistic orientation is reflected by negative emotions, low self-esteem, the belief in fate, a proclivity for depression, and low consideration for future consequences (Stolarski et al., 2014). These individuals see hardly any relation between present and future (Zimbardo & Boyd, 1999). This emotional profile is rooted in an external focus of control and trained helplessness. Present-hedonistic-oriented individuals tend to have little concern for future consequences of their actions and are often less cooperative in reaching goals, as well as less receptive to future rewards (Zimbardo & Boyd, 1999; Zimbardo et al., 1997). Hedonists are associated with low consistency, low conscientiousness, and high demand for leisure activities (Boniwell & Zimbardo, 2004; Zimbardo & Boyd, 1999). (3) Future orientation consists of a general long-term orientation toward life. Future-oriented individuals are cooperative and dedicated to working for future goals by getting rewards. They think about the consequences and unexpected outcomes of their actions for the future, postpone present enjoyment, and avoid wasting time (Zimbardo & Boyd, 1999). In previous studies, the effect of a future time perspective on various outcomes was predominantly considered with regard to individuals (see Kooij et al., 2018 for a review and meta-analysis).

Most research focused on future orientation since this perspective has a straight-forward relationship to performance. Future-oriented individuals have a higher valance to goals, demonstrate a greater focus on their studies, as well as a higher motivation to reach goals, and thus obtain better academic performance (Phan, 2009; Shell & Husman, 2001). In a recent

review by Kooij et al. (2018), they outline the importance of the future time perspective as a significant indicator for several outcomes on the individual level, including performance measures. In particular, most of the studies previously conducted indicate a significant positive relationship between future orientation and student achievements (Adelabu, 2007; Barber et al., 2009; González et al., 2020; Zimbardo & Boyd, 1999).

In contrast, the relationship between team performance and future orientation is rather neglected in existing research. Firstly, Mohammed and Nadkarni (2011) conducted a field study focusing on an organizational context. They examined, among other factors, the relationship between employees' future time perspective and team performance using a scale for the consideration of future consequences. The authors gathered self-reported data from employees in teams of three to eight members with a defined leader. These teams were working on projects for a month in a business process outsourcing organization in India. Mohammed and Nadkarni found a significant negative effect on team performance for teams with a stronger future perspective. The researchers justify their results with the type of task and the organizational environment they investigated: "Rapid task accomplishment and conformity to client demands tend to be rewarded more than setting distal future goals" (Mohammed & Nadkarni, 2011, p. 501).

Secondly, Abrantes et al. (2020) executed an experimental study in the organizational context. In their design, full-time workers in banking were assigned to teams of three and had to conduct reproduction tasks over two rounds in a laboratory setting within five minutes. During the second part, teams were confronted with a disturbance and had to adapt in a short time while making as few mistakes as possible. Using the scale of Zimbardo and Boyd (1999) to capture time perspectives, they deduced that future-oriented teams are better equipped to deal with unpredictability and time restrictions. They further argue that future-oriented teams aim to achieve future goals and recognize that it is crucial to react immediately in case of unforeseen situations.

The third study to mention was a field study by Gupta and Bakker (2020) and set in an educational context. They audited a business management course at an Indian university, where teams of five students had to perform team activities in the class on three different occasions over three months. The authors collected data on the individual's future orientation using a variation of Zimbardo and Boyd's (1999) original scale and examined student engagement, team cohesion, and team performance. Their findings suggest that a higher future orientation of individual team members positively affects team performance, which is mediated by the

student's engagement. The authors propose that future-oriented individuals enhance their contribution to the team if the task itself is aligned with their motivation.

The studies introduced differ in context, task, team size, and processing time, highlighting the importance of the task setting. Our study seeks to further the field by providing insights into creative task settings regarding the effect of future orientation on team performance under temporal scarcity within small teams. Based on the previous findings regarding the positive effect of future orientation on performance parameters, we consequently propose the same effects for team performance in a creative task setting with the following hypotheses.

> ***Hypothesis 1 (H1):*** *Higher future orientation in teams is associated with a better quantitative team performance in a creative task.*
>
> ***Hypothesis 2 (H2):*** *Higher future orientation in teams is associated with a better qualitative team performance in a creative task.*
>
> ***Hypothesis 3 (H3):*** *Higher future orientation in teams is associated with a better overall team performance in a creative task.*

4 Method

The present design is based on the study of Laske and Schröder (2017). They investigated how monetary incentives affect the performance of individuals in a creative task. The participants were tasked with illustrating terms with the help of various given materials and asked to complete as many terms as possible. These were subsequently assessed by independent raters, who were incentivized to make appropriate ratings. In our study, we made several modifications to the design of Laske and Schröder (2017). Most prominently, we use dyads as a team specification instead of individuals.[3]

[3] This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the Ethics Committee of Paderborn University.

4.1 Sample

For our study, we considered 60 teams comprised of two individuals each, who participated voluntarily and were recruited through public advertisement. Table 1 depicts the main sample characteristics on the team level. We aggregated data for age, gender, and nationality. Regarding age, we take the mean of the team (M = 23.9; SD = 4.7). For gender, we create a variable to capture the three possible team constellations (male-only 18.33%, female-only 43.33%, and mixed team 38.33%). Nationality is coded as a binomial variable, meaning that we either have a German team (75%) or a team with one German subject and a member from another country (25%). These participants are exclusively foreign-exchange students with a German proficiency of no less than C1 level. The sixty teams show some heterogeneity in their demographic structure since the entrance to the study was not restricted to students. Nevertheless, they accounted for the majority of participants.

Table 1: Summary statistics for demographic data

Variable	*N*	Percentage	*M*	*SD*	*Min*	*Max*
Gender	60		1.2	0.7	0	2
0	11	18.33				
1	26	43.33				
2	23	38.33				
Age	60		23.9	4.7	16.5	43.5
Nationality	60		0.3	0.4	0	1
0	45	75.00				
1	15	25.00				

Note. Gender (0=male-only, 1=mixed gender, 2=female-only), Nationality (0=German only, 1=German member and member of another nationality).

4.2 Research design

Individuals were randomly assigned to teams. Each team was placed at a table, which were each equipped with a short version of the instruction, the payout scheme, a deck of cards with the terms on it, and the material for the task (Appendix Figure 3). The material consisted of a 30 cm long piece of string, two key rings, four wooden spades, and 10 different colored glass stones. Instructions were read out loud (see Appendix A for a translated version of the instructions). The participants were tasked with illustrating as many of the given terms as possible in high quality within 4 minutes. This time limit was determined based on a pre-test. The terms were given in the same order for all teams and contained only easily understandable words, such as key, airplane, or pig. A complete list of the terms to be illustrated in the respective order can be found in the appendix (Appendix Table 7).

Participants were also instructed to communicate with their respective team partners by whispering. Tables were arranged facing away from any other team to prevent any irritation. After each completed term, a photo of the result was taken, and the team continued with the next term. Finally, the participants were asked to remain seated to complete a questionnaire for the collection of demographic data and further variables. Participants received a show-up fee of 3.00€. Apart from that, their payoff was calculated based on the quantity (Appendix Table 8) and quality (Appendix Table 9) of the results. On average, teams earned an additional 4.68€. The best performing team amounted to a payout of 6.80€ while the worst-performing team earned only 2.40€.

4.3 Measures

Dependent variables

Since we are mainly interested in overall performance, we firstly apply payout as a dependent variable. Furthermore, we determine the quantitative and qualitative outputs as dependent variables in our setting. The interaction between these two sub-parameters is often discussed and might vary depending on the style of the task and the instructions given before the task (Gilliland & Landis, 1992).

Table 2 summarizes the characteristics of the dependent variables. The quantitative output is highly objective and measured on a continuous scale by the number of completed terms within the 4-minute time frame. The average number of completed terms is 5.5. Four teams reached only three terms as the lowest observed number of terms whereas the highest number of 10 terms was just accomplished once. Determining the qualitative output is less objective. Still, our chosen approach complies with the procedure applied by other scholars when evaluating the quality of a task (e.g., Kapadia & Melwani, 2020; Mumford et al., 2001). We assigned two independent student assistants as raters. They were not familiar with the concept of the study but were given the terms related to the respective pictures of each team. According to their personal perception, they were asked to evaluate each picture on a scale from 1 to 5 according to how well each term was illustrated, with 1 being the lowest and 5 the highest possible value. Afterward, a mean score of both raters over all pictures was calculated and rounded to determine the payout concerning quality. We used the median scores assessed on a continuous scale for the analysis since the last term was illustrated under noticeable time pressure and represents an outlier that would be captured by the mean. The quality scores for the teams range from 1 to 3.8 points and averages 1.9 points. Figure 1 illustrates an example of the quality assessment.

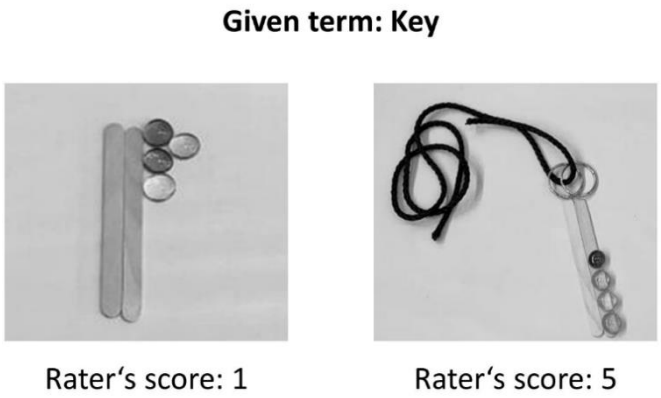


Figure 1: Example of a quality rating

To test the reliability of the quality measure, the interrater agreement was calculated using Cohen’s Kappa. Results suggest that the perceptions do not widely differ on a limited scale. Hence, scores are not given randomly by the raters. However, the interrater agreement calculation only shows an exact agreement of 37.35% (k=.17, p<.001). Therefore, we conducted another quality measure accounting for the clarity of the compiled terms. Similar to the procedure of Laske and Schröder (2017), we obtained another score for the recognition of the completed terms by uploading the pictures to an online survey to which several external unknown raters responded. These raters were incentivized with the possibility of winning gift cards. In this survey, the raters were given up to 10 pictures from different terms and teams. They had to guess the specific term related to each picture subsequently. As for the quality score, every picture was to be recognized twice by independent raters. A correct assignment was rated with 1 point. Afterward, the median for every team among all pictures was calculated, hence ranging on a continuous scale from 0 to 2 points. This measure was not relevant for the payout but was added as a further means to validate the quality of the task performance.

Next, we examined the correlations between these three sub-parameters, expecting a negative correlation between the quality measures and quantity measure since focusing on the quality of a picture is likely to result in a lower number of completed terms in the time given (Gilliland & Landis, 1992). However, there might also be general high- and low-performing teams in this setting, with quantity and quality going hand in hand, if certain criteria are met in a team (Mumford et al., 2001). Contrary, we expected a higher positive correlation for the quality and clarity measures since the ratings are both directed toward the general recognizability of the pictures. However, Table 2 shows no significant correlation between quantity and quality, $r(58)=-.06$, $p=.664$. Instead, there is a significant negative correlation between quantity and clarity $r(58)=-.27$, $p=.041$. Additionally, as anticipated, a significant positive correlation is found for the quality and clarity measure, $r(58)=.25$, $p=.054$.

Table 2: Summary statistics and correlations for dependent variables

Variable	*M*	*SD*	*Min*	*Max*	1	2	3
1. Quantity	5.5	1.7	3	10	1.00	-	-
2. Quality	1.9	0.8	1	3.8	-.06	1.00	-
3. Clarity	0.8	0.5	0	2	-.27*	.25†	1.00
4. Payout	4.7	0.9	2.4	6.8	-	-	-

Note. *N*=60. We use the standardized team mean of the aggregated time perspective scores to calculate correlations with Pearson's *r*. †*p*<.10. **p*<.05.

Independent variable – future orientation

Since we assume the possible existence of time-related personality traits beyond the scope of the Big Five dimensions that influence the team performance in this task, we included the inventory for time perspectives in our survey. For this, we used a German version of the Zimbardo Time Perspective Inventory (ZTPI) that resembles the version used by Reuschenbach et al. (2013).[4] The five time perspectives are differentiated by answering 56 items in total for every participant. Every item ranges from 1 (very untrue for me, translated) to 5 (very true for me, translated) with a small number of reverse-item scales that we recoded for the analysis. For our study design, we specifically focus on the future time perspective. This perspective amounts to 13 items (e.g., "I am able to resist temptations when I know that there is work to be done" or "It upsets me to be late for appointments"), and we received a mean value of 3.5 (*SD*=0.4, *Min*=2.7, and *Max*=4.2). Additionally, the individual scale for this time perspective was calculated using the mean over the respective items. Afterward, we took the mean of the scales of both individuals in the team and used the standardized values for the following analysis. Since this task provides a framework that enables each individual to contribute equal ideas and effort to complete the task, we consider the team mean an appropriate method to capture this work distribution (Bolin & Neuman, 2006; Steiner, 1972).[5]

Control variables

While focusing on future orientation, we included the other time perspectives in the team as control variables. Table 3 depicts a summary and the reliability statistics for the time perspectives. Every scale is tested for internal consistency using Cronbach's alpha. Results reveal overall strong indications for high reliability with values comparable to former studies

[4] The German translation of the ZTPI can be provided upon request.

[5] Results may differ not only depending on the task and the provided communicational means for team interaction (Mumford et al., 2001) but also based on how to regard individual contribution (Ikari, 2014). Besides focusing on single inputs of individuals and team processes (Bain et al., 2001; Scott & Bruce, 1994; Taggar, 2002), an aggregation of individual contributions has been argued to be effective in predicting team performance when the task allows for equal input opportunities (Pirola-Merlo & Mann, 2004).

(Zimbardo & Boyd, 1999). Moreover, we calculated correlations among each time perspective on the team level. Results suggest that the five scales are not mutually exclusive but can relate to time perspectives that align from a theoretical perspective.

Table 3: Summary statistics and correlations for time perspectives

Variable	*M*	*SD*	*Min*	*Max*	*Alpha*	1	2	3	4	5
1. Future orientation	3.5	0.4	2.7	4.2	.73	1.00	-	-	-	-
2. Present-hedonistic	3.6	0.3	2.8	4.4	.78	-.14	1.00	-	-	-
3. Present-fatalistic	2.5	0.4	1.7	3.3	.67	-.22*	.05	1.00	-	-
4. Past-positive	3.6	0.4	2.3	4.4	.74	-.18*	.32***	.15	1.00	-
5. Past-negative	2.9	0.5	2.0	4.0	.81	.03	-.00	-.43***	-.11	1.00

Note. *N*=60. We use the standardized team mean of the aggregated time perspective scores to calculate correlations with Pearson's *r*. Scale reliabilities are given by Cronbach's alpha. *p<.05. ***p<.001.

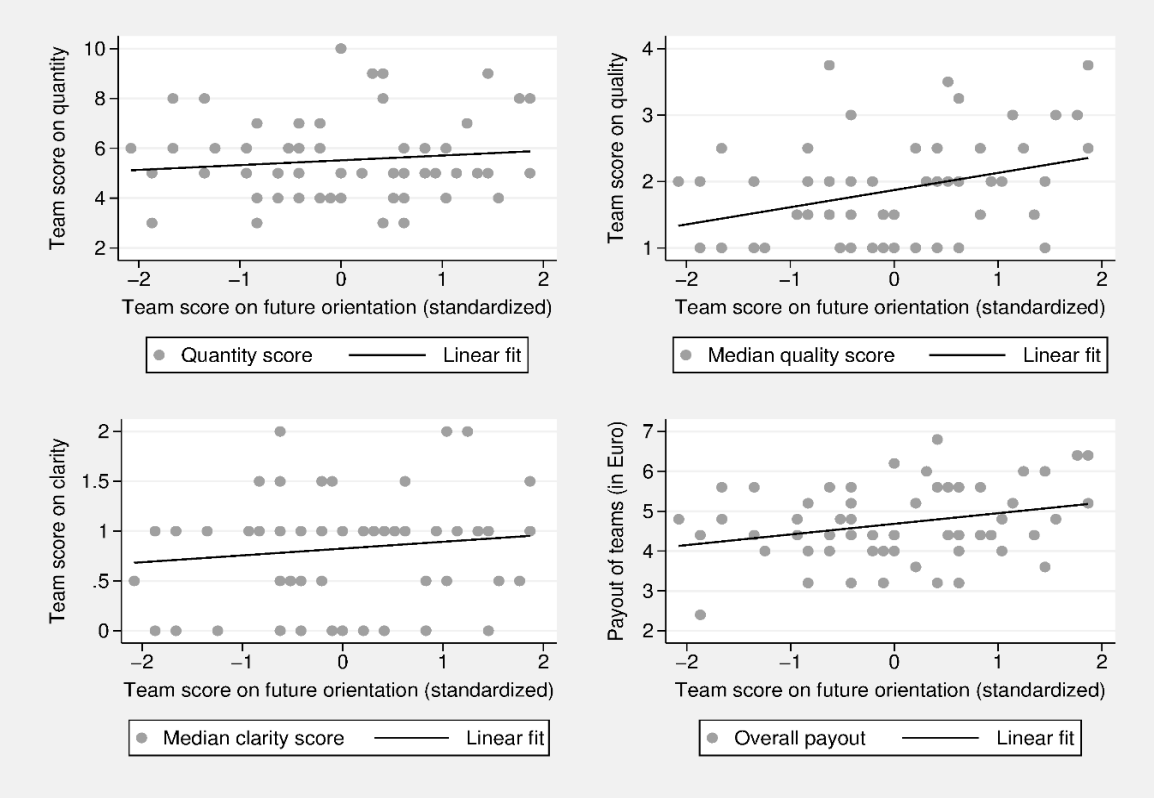
The same procedure is applied to the Big Five personality dimensions. Former studies have already highlighted that the proposed traits extraversion, openness, conscientiousness, neuroticism, and agreeableness predict creative performance for teams (Baer et al., 2008; Barry & Stewart, 1997; Bolin & Neuman, 2006; Buchanan, 1998). However, the beneficial traits of one individual might turn harmful when several team members show high indications of this trait, e.g., two individuals with a high level of extraversion (Barry & Stewart, 1997). To obtain scores for the Big Five traits, we applied a German version of the short Big-Five-Inventory-10 from Rammstedt et al. (2018).[6] Scales are composed of only two items with one reverse item for each scale. The item scale ranges from 1 (disagree strongly, translated) to 5 (agree strongly, translated). An overview of the summary statistics, correlations, and reliability measures for every dimension is given in the appendix (Appendix Table 10).

We included further covariates that cater to the variation of individuals in the respective sample. As previous studies show, gender (Baer & Kaufman, 2008; Runco et al., 2010), age (Massimiliano, 2015; Wu et al., 2005), and nationality (Maddux & Galinsky, 2009; Martins & Shalley, 2011) of individuals are relevant aspects that might influence the performance of a team in a creative task setting.

[6] Using this inventory might go along with some psychometric issues to conclude for five complete characteristics of an individual. However, former investigations have shown the validity and reliability of this and other short-scale measures on personality (Hahn et al., 2012; Rammstedt et al., 2018). Due to time constraints in the task setting, we have decided to use this shortened inventory. Our results mainly confirm former results on the relation of these dimensions (Baer et al., 2008).

5 Results

Regarding the assumption that a higher future orientation in a team leads to an increase in the team performance in a creative task, we plotted the z-transformed score on future orientation against the dependent variables (Figure 2). Separating the performance regarding the quantity and quality, we find that the same relationship applies to both measures albeit to a different degree. While the positive relation is stronger for quality, it is weaker for quantity. We also plotted the standardized z-score for future orientation against the additional clarity measure. In comparison to the quality score, in this case, the positive relation is weaker. Regarding the overall payout, we see that the amount earned rises with increasing future orientation in the team.



Note. The x-axis shows the z-standardized value for future orientation of the teams. A lower value indicates a lower level of future orientation in the team, while a higher value indicates a higher level of future orientation.

Figure 2: Scatter plots of future orientation against dependent variables

To investigate the effect of future orientation in teams more thoroughly, we employed regression models including the independent variable in the first place to predict the outcome of the dependent variables (Model 1 in Tables 4 to 6). We added demographics (Model 2), the Big Five personality traits (Model 3), and the present and past time perspectives (Model 4). Finally, we aggregated all covariates to the full model (Model 5). In this context, we utilized a linear regression model for the overall payout and Tobit regression models for quantity, quality, and clarity since we have previously determined an arbitrary upper boundary for these

measures. We tested for the assumptions to conduct these regressions and met them appropriately (Appendix Table 11). However, we also conducted robustness checks by applying both model specifications to all dependent variables and additionally used robust standard errors for our models. Consistently, we find corresponding effects for the independent variable and negligible deviations in the covariates that do not affect the general findings.

First, we examined the quantitative output (Table 4). We used a Tobit regression model because the dependent variable is censored and skewed. The results suggest that teams with higher future orientation also reach better quantitative performance. Yet, the effect is not statistically significant (p = .388). This non-significant effect persists throughout all our models. Hence, we need to reject hypothesis 1 (**H1**).

Table 4: Tobit regression models predicting the quantitative output of the teams

Dependent variable: **Quantity**	Models				
	(1)	(2)	(3)	(4)	(5)
Future orientation (standardized team mean)	0.19 (0.22)	0.25 (0.21)	0.14 (0.28)	0.20 (0.27)	0.30 (0.28)
Gender (in team) (Ref. = male only)					
Mixed gender		-0.25 (0.58)		-0.15 (0.62)	-0.09 (0.62)
Female only		-0.02 (0.60)		0.19 (0.64)	0.24 (0.64)
Age (team mean)		0.03 (0.05)		0.01 (0.05)	0.01 (0.05)
Nationality (in team) (Ref. = only German)		-0.75 (0.50)		-0.64 (0.50)	-0.78 (0.45)
Big Five (standardized team mean)					
Extraversion			0.23 (0.22)	0.21 (0.22)	0.30 (0.24)
Conscientiousness			0.15 (0.24)	0.12 (0.24)	0.04 (0.26)
Neuroticism			-0.06 (0.23)	-0.07 (0.24)	-0.16 (0.26)
Openness			0.06 (0.25)	-0.01 (0.25)	0.20 (0.26)
Agreeableness			0.14 (0.24)	0.12 (0.25)	0.26 (0.26)

Table 4. Continued

Time perspectives					
(standardized team mean)					
Present-hedonistic					-0.15
					(0.27)
Present-fatalistic					0.26
					(0.25)
Past-positive					-0.37
					(0.24)
Past-negative					0.08
					(0.26)
Constant	5.52***	5.20***	5.52***	5.33***	5.49***
	(0.21)	(1.20)	(0.21)	(1.19)	(1.21)
N	60	60	60	60	60
Pseudo R^2	.00	.02	.02	.03	.05

Note. Time perspectives and Big Five personality traits are measured on a team level by combining the individual values to a team mean. Means are standardized using z-transformation afterward. All further covariates are also considered on the team level. Standard errors are in parentheses. ***p < .001.

In the next step, we looked at the predictive outcomes for the quality (Table 5). We again used Tobit regression models, since the dependent variable is censored and skewed, and found that teams with a higher future orientation reach a significantly better qualitative performance throughout all five models. Adding covariates even leads to larger coefficients. Thus, we see in the full model that an increase of 1 standard deviation in future orientation leads to an increase of 0.45 in the qualitative outcome of the team. This is statistically significant ($p < .001$) and accounts for a medium effect size when calculating the partial effect for future orientation ($f^2 = .28$). Accordingly, future orientation explains 28% of the total variance in the qualitative performance among teams. We can, therefore, confirm hypothesis 2 (**H2**). Furthermore, we find significant effects for the traits extraversion, conscientiousness, openness, and agreeableness to predict the qualitative performance in a team. Teams with a higher indication for openness and agreeableness also reach a better qualitative performance. Contrarily, higher extraversion and conscientiousness in the team lead to worse qualitative performance.

Table 5: Tobit regression models predicting the qualitative output of the teams

Dependent variables: **Quality / Clarity**	Models for Quality					Model for Clarity
	(1)	(2)	(3)	(4)	(5)	(6)
Future orientation (standardized team mean)	0.26** (0.09)	0.25** (0.09)	0.45*** (0.11)	0.45*** (0.11)	0.45*** (0.11)	0.15† (0.09)
Gender (in team) (Ref. = male only)						
Mixed gender		0.16 (0.25)		0.08 (0.24)	0.09 (0.24)	0.04 (0.19)
Female only		0.35 (0.25)		0.32 (0.25)	0.28 (0.25)	0.16 (0.20)
Age (team mean)		-0.00 (0.02)		-0.01 (0.02)	-0.01 (0.02)	0.01 (0.01)
Nationality (in team) (Ref. = only German)		0.09 (0.21)		0.17 (0.20)	0.12 (0.19)	0.17 (0.15)
Big Five (standardized team mean)						
Extraversion			-0.12 (0.09)	-0.10 (0.09)	-0.16† (0.09)	-0.06 (0.07)
Conscientiousness			-0.16 (0.10)	-0.16† (0.09)	-0.18† (0.10)	-0.02 (0.08)
Neuroticism			-0.07 (0.09)	-0.08 (0.09)	-0.01 (0.10)	-0.02 (0.08)
Openness			0.27** (0.10)	0.27** (0.10)	0.22* (0.10)	0.06 (0.08)
Agreeableness			0.19† (0.09)	0.23* (0.10)	0.25* (0.10)	-0.03 (0.08)
Time perspectives (standardized team mean)						
Present-hedonistic					0.09 (0.11)	0.10 (0.08)
Present-fatalistic					0.00 (0.10)	0.10 (0.08)
Past-positive					-0.09 (0.09)	0.12 (0.07)
Past-negative					-0.19† (0.10)	0.02 (0.08)
Constant	1.87*** (0.09)	1.71** (0.51)	1.87*** (0.08)	1.82*** (0.47)	1.85*** (0.47)	0.38 (0.37)
N	60	60	60	60	60	60
Pseudo R^2	.06	.07	.14	.16	.19	.15

Note. Time perspectives and Big Five personality traits are measured on the team level by combining the individual values to a team mean. Means are standardized using z-transformation afterward. All further covariates are also considered on the team level. Standard errors are in parentheses.
†$p < 10$. *$p < .05$. **$p < .01$. ***$p < .001$.

To consolidate the results of the qualitative output, we also considered the clarity of the created figures (Model 6 in Table 5). Here, the results suggest that teams with a higher future orientation illustrate the terms in a more recognizable way (p=.089, f^2=.05).

Regarding the payout as the overall performance measure, it becomes apparent at first glance (Table 6, Model 1) that future orientation has a significant positive effect on the payout. Adding more covariates (Model 2-4), we can observe that the coefficient rises for future orientation. In the full model (Model 5), an increase of 1 standard deviation in future orientation leads to an increase of 0.47 units in the payout. This effect is significant (p = .008) and has a medium effect size (f^2 = .16). Hence, we can also confirm hypothesis 3 (**H3**). More strikingly, none of the other covariates show significant effects to predict the payout except for the agreeableness score in the team indicating a positive influence (p=.046, f^2=.10).

Table 6: Linear regression models predicting the payout of the teams

Dependent variable: **Payout**	Models				
	(1)	(2)	(3)	(4)	(5)
Future orientation	0.27*	0.29*	0.40*	0.43**	0.47**
(standardized team mean)	(0.12)	(0.12)	(0.15)	(0.16)	(0.17)
Gender (in team)					
(Ref. = male only)					
Mixed gender		-0.11		-0.12	-0.12
		(0.33)		(0.36)	(0.38)
Female only		0.12		0.21	0.20
		(0.34)		(0.37)	(0.39)
Age (team mean)		0.02		0.01	0.01
		(0.03)		(0.03)	(0.03)
Nationality (in team)		-0.20		-0.11	-0.20
(Ref. = only German)					
		(0.28)		(0.29)	(0.30)
Big Five					
(standardized team mean)					
Extraversion			-0.06	-0.06	-0.07
			(0.13)	(0.13)	(0.15)
Conscientiousness			-0.02	-0.05	-0.07
			(0.14)	(0.14)	(0.16)
Neuroticism			-0.13	-0.15	-0.16
			(0.13)	(0.14)	(0.16)
Openness			0.17	0.15	0.20
			(0.14)	(0.14)	(0.16)
Agreeableness			0.26†	0.27†	0.32*
			(0.13)	(0.14)	(0.16)

Table 6. Continued

Time perspectives					
(standardized team mean)					
Present-hedonistic					0.02
					(0.17)
Present-fatalistic					0.13
					(0.15)
Past-positive					-0.19
					(0.16)
Past-negative					-0.06
					(0.15)
Constant	4.68***	4.26***	4.68***	4.43***	4.57***
	(0.12)	(0.68)	(0.12)	(0.69)	(0.74)
N	60	60	60	60	60
R^2	.08	.12	.16	.20	.23

Note. Time perspectives and Big Five personality traits are measured on a team level by combining the individual values to a team mean. Means are standardized using z-transformation afterward. All further covariates are also considered on the team level. Standard errors are in parentheses. †p<.10. *p<.05. **p<.01. ***p<.001.

6 Discussion

Our results suggest that considering the future orientation of members in a team serves as a significant indicator to predict team performance. In this study, we aimed to extend existing research on the positive effect of future-oriented teams to creative task settings and differentiate the team performance into qualitative and quantitative outcomes. The results obtained align with the findings of Abrantes et al. (2020), as well as Gupta and Bakker (2020), who used performance-oriented task settings with different types of working teams in varying contexts. They found positive effects on team performance for teams with highly future-oriented members. Additionally, our findings concur with those of Abrantes et al. (2020) regarding the task design under time pressure. Results suggest that future-oriented teams perform better in environments with time scarcity since they are more focused on future goals, thus avoiding any waste of time to achieve these goals. However, other studies have identified a negative effect on performance in teams with a higher future perspective (Mohammed & Nadkarni, 2011). Mohammed and Nadkarni (2011) made these findings when investigating an organizational context. In their study, employees had to accomplish project assignments in teams that did not accentuate long-term goals but rather focused on rapid task accomplishment. The authors argue that thinking about future consequences would lower team performance in this context. In our study, the subjects had to work for rewards that they received personally and that were partially assessed in the future in terms of quality. Hence, the task setting is a key determinant when making suggestions about the effect of future orientation on team performance.

Besides a comparison to existing results of future orientation on team performance, we extend the scientific discourse by focusing on a creative task setting. Prior research on team performance in creative tasks delineated the issue of a conducive composition of characteristics (Buchanan, 1998; Ikari, 2014). Positive results for a characteristic on the individual level might not be maintained on the team level, and variance in personalities can concur with different outcomes as some scholars have examined (Baer et al., 2008; Barry & Stewart, 1997; den Hartog et al., 2020). Generally, our results regarding future orientation indicate that the aggregated positive effect of more future-oriented individuals fosters performance on the team level in a creative task setting. The higher the common future orientation in the team, the better is the team's overall performance. This positive effect can be explained when we consider the mindset and behavior assigned to individuals with a strong future orientation. They are deemed cooperative, tend to work enthusiastically if a reward is promised, and try to avoid any waste of time to complete a task (Zimbardo & Boyd, 1999). These are valuable requirements for a team task that relies on incentivized performance goals as suggested by the model of West (1990) for successful creative performance in teams. According to Taggar (2002), individuals contribute equally to team performance in the presence of team processes. In this study, he examines the effect of the Big Five traits on individual creative performance and the beneficial team processes that ultimately determine team performance. In our study, we controlled for the Big Five characteristics in teams and found that future orientation explains most of the variance in team performance. This corresponds to the results of Stolarski and Matthews (2016), who also find that future orientation explains more of the variance regarding life satisfaction of individuals, even when controlling for the Big Five traits. Our findings confirm that time perspectives should not be neglected as a relevant indicator to evaluate personality differences on several outcomes.

Lastly, we also need to separate the effect of future orientation on performance regarding quality and quantity. Previous research argues that quality and quantity in a team task do not go hand in hand (Gilliland & Landis, 1992). However, there might also exist outstanding teams with overall better performance in both measures (Mumford et al., 2001). Concerning our study design, we find that teams with higher future orientation focus more on a better qualitative performance and achieve a significantly better outcome than less future-oriented working teams. This applies even though our research design incentivized quantitative performance considerably higher than qualitative performance. We suggest that the focus on the quality of future-oriented teams is driven by the fact that we used a rating process that was conducted after the task to determine the quality of the team's performance. Hence, higher future-oriented

teams put more effort into the qualitative performance, which is in line with the characterization of future-oriented individuals as being dedicated to working for future goals by getting rewards (Zimbardo & Boyd, 1999). However, teams with a higher future orientation also performed better concerning the quantitative outcome, even though this effect is not statistically significant. Still, our results regarding creative task setting are consistent with the assertion of Mumford et al. (2001) that teams can perform better in terms of both quantity and quality.

Implications

Relating our results to practice, we can now transpose positive effects of higher future orientation to a domain that is highly relevant for organizations. Studies on the individual level have mainly investigated outcomes related to personal issues, such as health or academic achievement (Adelabu, 2007; Barber et al., 2009; Zimbardo & Boyd, 1999). However, for the organizational level, it might be more relevant to focus on task performance and collaboration. Therefore, we focused on the specific issue of team performance in a creative task with limited time and resources. The task setting in our study is specified such that it resembles the concept of bricolage, which has been outlined as an important practice in organizations to distinguish themselves from others and increase the possibility to survive on the market (Baker & Nelson, 2005). A bricolage task is especially useful to examine because it relates to times of crisis. Most recently, the aspects of bricolage relate highly to the processes that were initiated in some organizations during the COVID-19 pandemic. Organizations had to adapt their strategies and products to new demands and limitations precipitated by the crisis. Using their given resources, they had to create new products high in demand (e.g., face masks, shields, ventilation systems). In this specific situation, certain time perspectives might be revealed even stronger regarding a present-fatalistic, present-hedonistic, or future orientation. In tasks of bricolage, our study demonstrates that teams with a higher future orientation especially deliver a better qualitative output.

Limitations and future research directions

Since our study limits the operationalization of creative performance to quantity and quality, it neglects the originality measure as a further indicator for performance in a creative task setting (Kaufman & Sternberg, 2007; Runco & Jaeger, 2012). A valid way to capture originality in this creative task could complement the analysis and may yield further insights into the performance of future-oriented teams.

Furthermore, we have considered a particular team setting. In our study design, the teams were working only for 4 minutes and in pairs on the creative task. Future research could investigate

how the effect develops when teams are working together for a longer time or even for several periods. Moreover, an examination of teams with more than two members could reveal different performance levels related to increasing diversity within the team. Capturing the diversity of time perspectives in a team by the number of the individual's highest score on a time perspective instead of aggregating the scores could be another approach to measure the impact of different time perspectives on the team performance. This approach would align more with the findings of Gupta et al. (2012), who state that individuals are showing clear preferences for a single time perspective. Finally, concerning the COVID-19 pandemic, we deem linking the level of future orientation or other time perspectives to the survival rate or productivity of organizations in times of crisis not only useful for identifying another indicator of organizational success but also for furthering research on time perspectives with a relevant practical implication. We aimed to pave the way in this direction by showing practically that teams with a higher future orientation can contribute more when creative thinking and creative realization are demanded.

References

Abrantes, A. C. M., Passos, A. M., Pina e Cunha, M., & Miner, A. S. (2020). Managing the unforeseen when time is scarce: How temporal personality and team improvised adaptation can foster team performance. *Group Dynamics: Theory, Research, and Practice, 24*(1), 42-58. https://doi.org/10.1037/gdn0000113

Adelabu, D. H. (2007). Time perspective and school membership as correlates to academic achievement among African American adolescents. *Adolescence, 42*(167), 525-538. https://search.proquest.com/scholarly-journals/time-perspective-school-membership-as-correlates/docview/195937251/se-2?accountid=13049

Baer, J., & Kaufman, J. C. (2008). Gender differences in creativity. *The Journal of Creative Behavior, 42*(2), 75-105. https://doi.org/10.1002/j.2162-6057.2008.tb01289.x

Baer, M., Oldham, G. R., Jacobsohn, G. C., & Hollingshead, A. B. (2008). The personality composition of teams and creativity: The moderating role of team creative confidence. *The Journal of Creative Behavior*, *42*(4), 255-282. https://doi.org/10.1002/j.2162-6057.2008.tb01299.x

Bain, P., Mann, L., & Pirola-Merlo, A. (2001). The innovation imperative: the relationships between team climate, innovation, and performance in research and development teams. *Small Group Research*, *32*(1), 55–73. https://doi.org/10.1177%2F104649640103200103

Baker, T., & Nelson, R. E. (2005). Creating something from nothing: Resource construction through entrepreneurial bricolage. *Administrative Science Quarterly*, *50*(3), 329-366. https://doi.org/10.2189%2Fasqu.2005.50.3.329

Barber, L. K., Munz, D. C., Bagsby, P. G., & Grawitch, M. J. (2009). When does time perspective matter? Self-control as a moderator between time perspective and academic achievement. *Personality and Individual Differences*, *46*(2), 250-253. https://doi.org/10.1016/j.paid.2008.10.007

Barry, B., & Stewart, G. L. (1997). Composition, process, and performance in self-managed groups: The role of personality. *Journal of Applied Psychology*, *82*(1), 62-78. https://doi.org/10.1037/0021-9010.82.1.62

Bolin, A. U., & Neuman, G. A. (2006). Personality, process, and performance in interactive brainstorming groups. *Journal of Business and Psychology*, *20*(4), 565-585. https://doi.org/10.1007/s10869-005-9000-7

Boniwell, I., & Zimbardo, P. G. (2004). Balancing time perspective in pursuit of optimal functioning. In P.A. Linley, & S. Joseph (Eds.), *Positive psychology in practice: Promoting human flourishing in work, health, education, and everyday life* (Vol. 2, pp. 165–178). Wiley, New Jersey. https://doi.org/10.1002/9781118996874.ch13

Buchanan, L. B. (1998). *The impact of big five personality characteristics on group cohesion and creative task performance.* Unpublished Doctoral Dissertation. Virginia Polytechnic Institute and State University, Blacksburg. http://hdl.handle.net/10919/30415

den Hartog, S. C., Runge, J. M., Reindl, G., & Lang, J. W. (2020). Linking personality trait variance in self-managed teams to team innovation. *Small Group Research*, *51*(2), 265-295. https://doi.org/10.1177%2F1046496419865325

Driskell, J. E., Hogan, R., & Salas, E. (1987). Personality and group performance. In C. Hendrick (Ed.), *Review of personality and social psychology. Group processes and intergroup relations* (Vol. 9, pp. 91-112). Sage, Newbury Park.

Dunkel, C. S., & Weber, J. L. (2010). Using three levels of personality to predict time perspective. *Current Psychology, 29*(2), 95-103.

Duymedjian, R., & Rüling, C. C. (2010). Towards a foundation of bricolage in organization and management theory. *Organization Studies*, *31*(2), 133-151. https://doi.org/10.1177%2F0170840609347051

Feist, G. J. (1998). A meta-analysis of personality in scientific and artistic creativity. *Personality and Social Psychology Review*, *2*(4), 290-309. https://doi.org/10.1207%2Fs15327957pspr0204_5

Gelade, G. A. (1997). Creativity in conflict: The personality of the commercial creative. *The Journal of Genetic Psychology*, *158*(1), 67-78. https://doi.org/10.1080/00221329709596653

Gilliland, S. W., & Landis, R. S. (1992). Quality and quantity goals in a complex decision task: Strategies and outcomes. *Journal of Applied Psychology*, *77*(5), 672-681. https://doi.org/10.1037/0021-9010.77.5.672

González, M. D., Talavera-Velasco, B., & Gutiérrez, S. U. (2020). The role of engagement and temporal perspective in the academic performance of postgraduate students. *Physiology & Behavior*, *224*, 113054. https://doi.org/10.1016/j.physbeh.2020.113054

Gorman, B. S., & Wessman, A. E. (1977). Images, values, and concepts of time in psychological research. In B. S. Gorman, & A. E. Wessman (Eds.), *The personal experience of time. Emotions, personality, and psychotherapy* (pp. 215-263). Springer, Boston. https://doi.org/10.1007/978-1-4613-4163-5_7

Gupta, M., & Bakker, A. B. (2020). Future time perspective and group performance among students. *Journal of Applied Research in Higher Education*, *Vol. ahead-of-print* (No. ahead-of-print). https://doi.org/10.1108/JARHE-05-2019-0128

Gupta, R., Hershey, D. A., & Gaur, J. (2012). Time perspective and procrastination in the workplace: An empirical investigation. *Current Psychology*, *31*(2), 195-211. https://doi.org/10.1007/s12144-012-9136-3

Hahn, E., Gottschling, J., & Spinath, F. M. (2012). Short measurements of personality - Validity and reliability of the GSOEP Big Five Inventory (BFI-S). *Journal of Research in Personality*, *46*(3), 355-359. https://doi.org/10.1016/j.jrp.2012.03.008

Hunter, S. T., & Cushenbery, L. (2015). Is being a jerk necessary for originality? Examining the role of disagreeableness in the sharing and utilization of original ideas. *Journal of Business and Psychology*, *30*(4), 621-639. https://doi.org/10.1007/s10869-014-9386-1

Ikari, K. (2014). The relationship between individual and group creative behaviors. *The International Journal of Accounting and Business Society*, *22*(1), 113-121. https://ijabs.ub.ac.id/index.php/ijabs/article/view/247/173

Kairys, A., & Liniauskaite, A. (2015). Time perspective and personality. In Time perspective theory; review, research and application (pp. 99-113). Springer, Cham.

Kapadia, C., & Melwani, S. (2020). More tasks, more ideas: The positive spillover effects of multitasking on subsequent creativity. *Journal of Applied Psychology.* Advance online publication. https://doi:10.1037/apl0000506

Kaufman, J. C., & Sternberg, R. J. (2007). Creativity. *Change: The Magazine of Higher Learning*, *39*(4), 55-60. https://doi.org/10.3200/CHNG.39.4.55-C4

Kooij, D. T. A. M., Kanfer, R., Betts, M., & Rudolph, C. W. (2018). Future time perspective: A systematic review and meta-analysis. *Journal of Applied Psychology, 103*(8), 867-893. https://doi.org/10.1037/apl0000306

Laske, K., & Schröder, M. (2017). *Quantity, quality and originality: The effects of incentives on creativity* [Conference Paper]. Beiträge zur Jahrestagung des Vereins für Socialpolitik 2017: Alternative Geld- und Finanzarchitekturen, Wien. http://hdl.handle.net/10419/168151

Levine, R. V., & Norenzayan, A. (1999). The pace of life in 31 countries. *Journal of Cross-cultural Psychology, 30*(2), 178-205. https://doi.org/10.1177%2F0022022199030002003

Maddux, W. W., & Galinsky, A. D. (2009). Cultural borders and mental barriers: The relationship between living abroad and creativity. *Journal of Personality and Social Psychology*, *96*(5), 1047-1061. https://doi.org/10.1037/a0014861

Martins, L. L., & Shalley, C. E. (2011). Creativity in virtual work: Effects of demographic differences. *Small Group Research, 42*(5), 536-561. https://doi.org/10.1177%2F1046496410397382

Massimiliano, P. (2015). The effects of age on divergent thinking and creative objects production: a cross-sectional study. *High Ability Studies*, *26*(1), 93-104. https://doi.org/10.1080/13598139.2015.1029117

McCrae, R. R., & Costa, P. T. (1987). Validation of the five-factor model of personality across instruments and observers. *Journal of Personality and Social Psychology*, *52*(1), 81-90. https://doi.org/10.1037/0022-3514.52.1.81

McKay, A. S., & Gutworth, M. B. (2019). Temporal individual differences and creativity: An exploratory investigation. *Psychology of Aesthetics, Creativity, and the Arts*. Advance online publication. https://doi.org/10.1037/aca0000292

Mohammed, S., & Angell, L. C. (2003). Personality heterogeneity in teams: Which differences make a difference for team performance?. *Small Group Research*, *34*(6), 651-677. https://doi.org/10.1177%2F1046496403257228

Mohammed, S., & Nadkarni, S. (2011). Temporal diversity and team performance: The moderating role of team temporal leadership. *Academy of Management Journal*, *54*(3), 489-508. https://doi.org/10.5465/amj.2011.61967991

Mumford, M. D., Feldman, J. M., Hein, M. B., & Nagao, D. J. (2001). Tradeoffs between ideas and structure: Individual versus group performance in creative problem solving. *Journal of Creative Behavior, 35*(1), 1-23. https://doi.org/10.1002/j.2162-6057.2001.tb01218.x

Pentland, W. E., Harvey, A. S., Lawton, M. P., & McColl, M. A. (1999). *Time use research in the social sciences*. Kluwer Academic, New York.

Perkmann, M., & Spicer, A. (2014). How emerging organizations take form: The role of imprinting and values in organizational bricolage. *Organization Science*, *25*(6), 1785-1806. https://doi.org/10.1287/orsc.2014.0916

Phan, H. (2009). Amalgamation of future time orientation, epistemological beliefs, achievement goals and study strategies: Empirical evidence established. *British Journal of Educational Psychology, 79*, 155-173. https://doi.org/10.1348/000709908X306864

Pirola-Merlo, A., & Mann, L. (2004). The relationship between individual creativity and team creativity: Aggregating across people and time. *Journal of Organizational Behavior*, *25*(2), 235-257. https://doi.org/10.1002/job.240

Rammstedt, B., Danner, D., Soto, C. J., & John, O. P. (2018). Validation of the short and extra-short forms of the Big Five Inventory-2 (BFI-2) and their German adaptations. *European Journal of Psychological Assessment*, *36*(1), 149-161. https://doi.org/10.1027/1015-5759/a000481

Reuschenbach, B., Funke, J., Drevensek, A., & Ziegler, N. (2013). Testing a German version of the Zimbardo Time Perspective Inventory (ZTPI). *Annales Universitatis Paedagogicae Cracoviensis. Studia Psychologica*, *6*, 16-29. http://cejsh.icm.edu.pl/cejsh/element/bwmeta1.element.desklight-96ea3aef-6845-4273-b8a4-f77b2731d166

Robert, C., & Cheung, Y. H. (2010). An examination of the relationship between conscientiousness and group performance on a creative task. *Journal of Research in Personality*, *44*(2), 222-231. https://doi.org/10.1016/j.jrp.2010.01.005

Runco, M. A., Cramond, B., & Pagnani, A. R. (2010). Gender and creativity. In J. C. Chrisler, & D. R. McCreary (Eds.), *Handbook of gender research in psychology* (pp. 343-357). Springer, New York. https://doi.org/10.1007/978-1-4419-1465-1_17

Runco, M. A., & Jaeger, G. J. (2012). The standard definition of creativity. *Creativity Research Journal*, *24*(1), 92-96. https://doi.org/10.1080/10400419.2012.650092

Salas, E., Sims, D. E., & Burke, C. S. (2005). Is there a "big five" in teamwork?. *Small Group Research*, *36*(5), 555-599. https://doi.org/10.1177%2F1046496405277134

Schilpzand, M. C., Herold, D. M., & Shalley, C. E. (2011). Members' openness to experience and teams' creative performance. *Small Group Research*, *42*(1), 55-76. https://doi.org/10.1177%2F1046496410377509

Scott, S. G., & Bruce, R. A. (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/10.5465/256701

Shell, D. F., & Husman, J. (2001). The multivariate dimensionality of personal control and future time perspective beliefs in achievement and self-regulation. *Contemporary Educational Psychology, 26*(4), 481-506. https://doi.org/10.1006/ceps.2000.1073

Steiner, I. D. (1972). *Group process and productivity*. Academic press, New York.

Sternberg, R. J., & Lubart, T. I. (1996). Investing in creativity. *American Psychologist*, *51*(7), 677-688. https://doi.org/10.1037/0003-066X.51.7.677

Stolarski, M., Matthews, G., Postek, S., Zimbardo, P. G., & Bitner, J. (2014). How we feel is a matter of time: Relationships between time perspectives and mood. *Journal of Happiness Studies*, *15*(4), 809-827. https://doi.org/10.1007/s10902-013-9450-y

Stolarski, M., & Matthews, G. (2016). Time perspectives predict mood states and satisfaction with life over and above personality. *Current Psychology*, *35*(4), 516-526.

Taggar, S. (2001). Group composition, creative synergy, and group performance. *The Journal of Creative Behavior*, *35*(4), 261-286. https://doi.org/10.1002/j.2162-6057.2001.tb01050.x

Taggar, S. (2002). Individual creativity and group ability to utilize individual creative resources: a multilevel model. *Academy of Management Journal, 45*(2), 315-330. https://doi.org/10.5465/3069349

West, M. A. (1990). The social psychology of innovation in groups. In M. A. West & J. L. Farr (Eds.), *Innovation and creativity at work: Psychological and Organizational Strategies* (pp. 309–333). John Wiley & Sons.

Williams, K. D. (2010). Dyads can be groups (and often are). *Small Group Research*, *41*(2), 268-274. https://doi.org/10.1177/1046496409358619

Woodman, R. W., Sawyer, J. E., & Griffin, R. W. (1993). Toward a theory of organizational creativity. *The Academy of Management Review, 18*(2), 293-321. https://doi.org/10.5465/amr.1993.3997517

Wu, C. H., Cheng, Y., Ip, H. M., & McBride-Chang, C. (2005). Age differences in creativity: Task structure and knowledge base. *Creativity Research Journal*, *17*(4), 321-326. https://doi.org/10.1207/s15326934crj1704_3

Zimbardo, P. G., Keough, K. A., & Boyd, J. N. (1997). Present time perspective as a predictor of risky driving. *Personality and Individual Differences, 23(6),* 1007-1023. https://doi.org/10.1016/S0191-8869(97)00113-X

Zimbardo, P., & Boyd, J. (1999). Putting time in perspective: A valid, reliable individual-differences metric. *Journal of Personality and Social Psychology*, 77(6), 1271-1288. https://doi.org/10.1007/978-3-319-07368-2_2

Appendix

Appendix A

Additional material on the execution of the study: Instructions for the participants (translated from German to English).

Dear participants,

Welcome to our study. We will now read the instructions and ask you to listen carefully. During the study, there is no possibility for further questions. However, after reading the instructions, we can clarify open questions. If there is something you did not understand, please contact me, and I will come to you.

From now on, please do not speak anymore, turn your mobile device to silent and put it in your pocket or on the floor. Otherwise, you are not allowed to have any objects of your own on or at the table. The study is performed in teams of two. You can earn money in the process. We will now first explain your task and then how the amount of your payout is determined. You have exactly 4 minutes to execute the task. Please perform the task together with your team partner. You have already received a participant ID. Please place this ID in the spaces provided on the top left and right of the white sheet in front of you. During the entire study, we ask you to be as quiet as possible and only communicate with your team member at whisper volume.

About the task:

You have different materials in front of you. These are:

- an 80 cm long piece of string;
- two key rings;
- four wooden spatulas;
- 10 glass stones.

Your task is to illustrate given terms with the help of these materials. You have 4 minutes to illustrate as many terms as possible in the highest quality possible.

The procedure is as follows.

In front of you is a stack of sheets with terms, which are numbered. You must illustrate these terms using the materials in the respective order. You are not allowed to omit any of the terms. After the start signal, uncover the first term and start illustrating it with the materials. You may discuss with your partner at whisper volume. When you both think you are finished, place the piece of paper with the term in the space provided and cross your arms in front of your body. Your assistant will then take a photo of your result. When the photo is taken, uncover the next piece of paper and illustrate the next term. Repeat this procedure until the 4 minutes are over.

You will be informed 30 seconds before the time runs out. For the last result to be included in the evaluation, you must have everything ready and both arms crossed in front of your body before the four minutes have expired.

Please keep the following aspects in mind while working on the task.

1. It is not necessary to use all materials for every term.
2. The materials are not allowed to be changed. This means, for example, that the key rings must not be opened. Furthermore, the string should not be cut or knotted.
3. The photos of your results are taken in black and white. The color of the glass stones is therefore not important - the illustrations have to be clear without consideration of the colors.

About the payout:

You will receive a fixed amount of 3.00€ for your participation in this study. In addition, you will receive two payouts based on your results in the study. Your payout depends on the quantity, thus the number of illustrated terms. For the first four terms, you will receive 0.40€ per term. For the fifth to the ninth term, you will receive 0.20€ per term, and for all additional terms, you will receive 0.10€ per term. In addition, you will receive a payout that depends on the quality, thus the recognizability of your results. For this purpose, the photos of your results taken by your assistant will be presented to an independent and neutral jury. The jury evaluates your results on a scale from one to five. From all single ratings of the pictures the final rating for the quality is determined by taking the average. With a rating of 5, you will receive an amount of 1.60€ for the task. With a rating of 4, you will receive 1.20€, with a rating of 3, you will receive 0.80€, and with a rating of 2, you will receive 0.40€. With a rating of 1, you will not receive a quality-dependent payout. You will receive information about the payout procedure after the study. Besides, after completing the task, a short questionnaire must be filled out. Therefore, we ask you to remain seated after this task and maintain absolute silence.

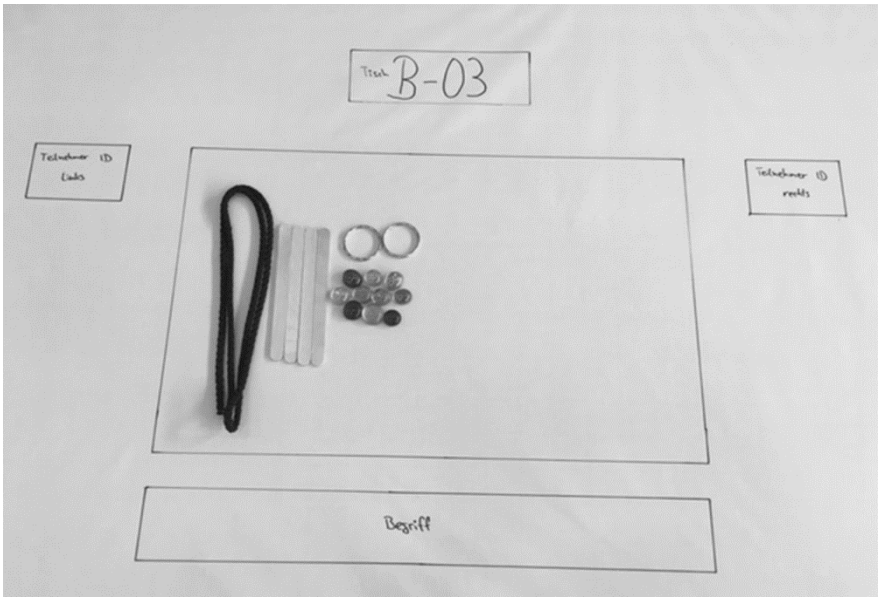


Figure 3: View on the table of the teams before the start of the study

Table 7: List of terms in the given order used in the study

Terms
Key
Traffic light
Giraffe
Necklace
Pig
Rabbit
Sailing boat
Chair
Airplane
Bus
Bird
Gift
Smartphone

Table 8: Payout scheme for the quantitative output

Terms (Quantity)	Payout per term
Term 1 to 4	0.40€
Term 5 to 9	0.20€
Terms from 10 onwards	0.10€

Table 9: Payout scheme for the qualitative output

Rating (Quality)	Payout per term
5	1.60€
4	1.20€
3	0.80€
2	0.40€
1	0€

Appendix B

Additional tables on statistical calculations

Table 10: Summary statistics and correlations for the Big Five personality dimensions

Variable	*M*	*SD*	*Min*	*Max*	*Alpha*	1	2	3	4	5
1. Extraversion	3.6	0.7	1.8	5.0	.75	1.00	-	-	-	-
2. Conscientiousness	3.5	0.6	2.5	5.0	.36	.14	1.00	-	-	-
3. Neuroticism	2.9	0.7	1.3	4.3	.53	-.22*	.15	1.00	-	-
4. Openness	3.6	0.7	1.5	5.0	.64	.09	.12	-.12	1.00	-
5. Agreeableness	3.3	0.6	2.3	4.5	.12	.19*	-.00	.15†	-.10	1.00

Note. $N = 60$. We use the standardized team mean of the aggregated personality dimensions to calculate correlations with Pearson's r. Scale reliabilities are given by Cronbach's alpha. †$p < .10$. *$p < .05$.

Table 11: Assumptions for full regression models

Dependent variables	Normality of residuals[a]	Heteroscedasticity of residuals[b]	Multicollinearity (*VIF*)[c]
Quantity (Tobit)	.15	.62	-
Quality (Tobit)	.37	.77	-
Clarity (Tobit)	.30	.95	-
Payout (linear)	.84	.35	1.70

Note. We test the assumptions of normality and heteroscedasticity of the residuals in the linear regression model for the overall payout and in the Tobit regression models for quantity, quality, and clarity. In addition, the collinearity assumption is tested for the linear regression on the overall payout.

[a] We use the Shapiro-Wilk test for normality and show the p-values in the table. A p-value above the threshold of .05 suggests not to reject the null-hypothesis of normally distributed residuals. Thus, the assumption of a normal distribution is met with $p > .05$.

[b] We use the Breusch-Pagan test for heteroscedasticity in the linear regression model respectively Tobit multplicative heteroscedasticity regressions and show the p-values in the table. A p-value above the threshold of .05 suggests not to reject the null-hypothesis of homogenous variance of the residuals. Thus, the assumption of a homogenous variance of the residuals is met with $p > .05$.

[c] We use the variance inflation factor analysis to test for multicollinearity among the explanatory variables and show the mean value in the table. Any value below five suggests no problem with multicollinearity in the model. Thus, the assumption of no multicollinearity is met.