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## Minority Dissent, Openness to Change and Group Creativity

Petru L. Curşeu<sup>a,b</sup>, Sandra G. L. Schruijer<sup>c</sup>, and Oana C. Fodor<sup>a</sup>

<sup>a</sup>“Babeş-Bolyai” University; <sup>b</sup>Open University of the Netherlands; <sup>c</sup>Utrecht School of Governance, Utrecht University

### ABSTRACT

We report the results of a quasi-experimental study that tests the interaction between minority dissent and organizational openness to change on group creativity. In a sample of 199 professionals, organized in 57 groups we have manipulated minority dissent (groups with or without a devil’s advocate) and openness to change (groups were informed that the company they work for IS versus it IS NOT open to change) and evaluated group creativity using two indicators: the creativity quotient and the peer-rated creativity on three dimensions (novelty, feasibility, and usefulness). Our results show that the minority dissent and openness to change have a positive impact on group creativity. However, the interaction effect of minority dissent and openness to change was only supported for peer-rated group creativity, rendering weak support for the moderating role of openness to change.

### ARTICLE HISTORY

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### Introduction

Group creativity is an important driver of innovation, as groups increasingly deal with innovation challenges in organizations (Hinsz, 2015; Oztop, Katsikopoulos, & Gummerum, 2018; Paulus & Nijstad, 2003). Literature to date shows that creativity processes unfolding in groups are influenced by group interaction processes (Barczak, Lassk, & Mulki, 2010; Reiter-Palmon & Paulus, 2019). As the generation of novel, useful and feasible products and services is highly contextual, several external factors have an impact on group creativity as well (Sarooghi, Libaers, & Burkemper, 2015; West, 2002). Extensive reviews on workplace creativity have pointed out that the interaction between group level factors and contextual variables is essential for explaining creativity (Anderson, Potočnik, & Zhou, 2014; Hunter, Bedell, & Mumford, 2007; Newman, Round, Wang, & Mount, 2020; Zhou & Hoever, 2014), as actors with high creative potential (individuals or groups) placed in unsupportive organizational contexts fail to realize their creative potential (Zhou & Hoever, 2014). Among the group interaction factors, minority dissent (MD) or the open expression of ideas that contradict the views held by majority (Martin & Hewstone, 2008) is among the most important indicators of the creative potential of groups. Minority dissent is however a double edged sword, as it can upset group harmony, generate relationship conflict (Curşeu, Schruijer, & Boroş, 2012) and reduce creativity. Therefore it

becomes important to understand the supportive contextual factors that make it beneficial for group creativity.

MD triggers individual level as well as group level cognitive changes as majority members engage in exploring the arguments supported by the dissenting minority (Nemeth, 1995; Nemeth, Connell, Rogers, & Brown, 2001a; Schulz-Hardt, Mojzisch, & Vogelgesang, 2008). At the individual level, studies on minority influence have shown that majority group members, when exposed to minority dissent, experience cognitive conflict by having their views challenged by the opinions expressed by minorities, engage in divergent thinking and in-depth information processing (Nemeth, 1995). At the group level, because it stimulates divergent thinking (Jetten & Hornsey, 2014), MD fosters group innovation (De Dreu, 2002; De Dreu & West, 2001), group creativity (De Dreu & Gelfand, 2007) and group cognitive complexity (Curşeu et al., 2012), especially when negative influences associated with MD are mitigated by an accepting social context (Curşeu, Schruijer, & Fodor, 2017). In other words, the positive effect of MD on group creativity is embedded in a supportive context for the open expression of divergent ideas.

Interactionist models of creativity emphasize the role of actor-context interactions as key determinants of creativity (Zhou & Hoever, 2014). Our study answers the call for more research on the group-organization interface (Anderson et al., 2014) and intends to explore

favorable organizational conditions for the full realization of the creative potential of MD in groups. Among the contextual (organizational) factors, organizational climate was extensively discussed as a key driver of group creativity (Hunter et al., 2005; Hunter et al., 2007). Anderson and West (1996) as well as West (2002) argue that organizational climates that are open for divergent idea generation and exchange foster team creativity. In line with these arguments, we consider MD as embedded in a larger (organizational) context that can be supportive or inhibitive for its beneficial role for group creativity. We argue that organizational contexts that are open to change create synergistic conditions for group creativity (Zhou & Hoever, 2014) and foster the positive effect of MD on group creativity. Although the theoretical models that summarize the antecedents of group creativity emphasize the relevance of both MD as well as openness to change (OC), little empirical research has addressed the interaction of these two factors, largely because MD was explored in psychological literature on group creativity (including experimental research), while contextual factors received more attention in management literature. The simultaneous exploration of MD and OC raises complications due to the complex nature of the designs that could combine the two, requiring data collection across different organizational contexts, using a uniform metric of group creativity, and including direct measures of MD. Although such grand designs would have great ecological validity as they explore group creativity as it emerges in real organizational groups, in such designs it is difficult to establish causal claims about the role of MD and OC. Therefore recent reviews on innovative climate in organizations have called for more research using experimental designs (Newman et al., 2020).

We set out to fill this gap in the literature by using a quasi-experimental vignette study in which we manipulate both MD and the OC of the organizational context and test their main and interactive effects on group creativity. In order to limit the drawbacks of using experimental designs with participants that are far removed from real organizational tasks (typically students) our study deploys participants who have work and teamwork experience. Further, in the vignettes we describe a case study derived from a real organizational issue that was familiar to all the participants.

### **Minority dissent and group creativity**

When divergent views are expressed in groups, individual members often engage in effortful information processing in order to scrutinize these divergent views, especially when they are expressed by only one member

or are supported by a minority of the group (Martin & Hewstone, 2008). As such, MD is conducive for better decision quality (Greitemeyer, Schulz-Hardt, & Frey, 2009; Nemeth et al., 2001a), more innovative group outcomes (De Dreu, 2002; De Dreu & West, 2001) and more complex collective cognitive representations (Curșeu et al., 2012, 2017). The cognitive conflict triggered by exposure to dissent is one of the most important sources of group creativity (De Dreu & Gelfand, 2007; West, Hirst, Richter, & Shipton, 2004). Nemeth and Nemeth-Brown (2003) summarize three mechanisms that explain the beneficial role of dissent for group creativity. First, MD reduces conformity pressures and when divergent points of views are openly expressed, group members feel more comfortable to authentically express their opinions even when these contradict the opinions of the majority. Second, MD stimulates divergent thought in groups, it generates constructive cognitive conflicts that ultimately unlock the creative processes in groups. Third, MD stimulates group members to be more engaged in group discussions, to be more critical about the views expressed by others and to spend more cognitive effort on the task (Nemeth & Nemeth-Brown, 2003).

To date, MD was explored, evaluated or manipulated in various ways: some studies evaluated the spontaneous emergence of MD in groups (Curșeu et al., 2017; De Dreu, 2002; De Dreu & West, 2001), others used MD manipulation with a confederate such that the other group members were not aware of this member being a confederate (Curșeu, Schrujijer & Boros, 2012), other studies used manipulation with a group member assigned the devil's advocate role with the other group members aware of this role in the group (Greitemeyer et al., 2009), or other studies even mixed manipulations with authentic and role play dissent combined (Nemeth, Brown, & Rogers, 2001; Nemeth, & Brown, et al., 2001a; Schulz-Hardt, Jochims, & Frey, 2002). Meta-analytic evidence suggests that a devil's advocate has stronger effects on the depth of information processing in groups and ultimately on group decision quality than using the expert method (groups rely on information received from experts) that does not directly trigger cognitive conflict (Schwenk, 1990). Studies that have compared authentic with contrived dissent show that authentic dissent has stronger effects on information elaboration and decision quality (Greitemeyer et al., 2009; Schulz-Hardt et al., 2002) and on creative performance in groups (Nemeth et al., 2001, 2001a). The studies on authentic dissent often have used the diversity of individual opinions as a proxy for dissent, in other words, they equated diversity with the dissent potential and used as

a manipulation check a generic index of disagreement by asking group members to evaluate how controversial the group discussion was (Schulz-Hardt et al., 2002) and not necessarily if the member having a different opinion disagreed with the rest. Moreover, Nemeth's studies on creative performance were based on gender biased samples, therefore, it is difficult to make simple generalizations concerning the superiority of authentic and contrived dissent for gender diverse groups that are likely to differ in their creative potential from gender homogeneous ones (Schrujijer & Mostert, 1997). To summarize, although the literature to date has made a distinction between authentic and contrived dissent, we believe that using a devil's advocate technique generates group interactions that capture the essence of MD. Our study sets out to test the effect of MD induced through a devil's advocate role on group creativity. We hypothesize the following:

H1: Minority dissent induced through a devil's advocate has a positive effect on group creativity.

### ***Openness to change and group creativity***

In Lewinian field theory applied to organizational change, an organizational climate that is open to change is associated with the unfreezing stage, with positive attitudes toward change and with motivation of the group members to embrace change (Lewin, 1951). During the unfreezing, organizational members embark on a "locomotion" with the changing organizational field toward another stable systemic state (Lewin, 1951). In other words, organizational climates that are open to change create a social context (a field characterized by forces that drive individual action) in which organizational members are likely to engage in proactive behaviors and interactions geared toward change (Hunter et al., 2007; Liu et al., 2021; Newman et al., 2020). Openness to change is one of the key dimensions of an organizational climate that supports creativity (Anderson et al., 2014) and it stimulates employees to engage in exploration, increases their readiness to act, search for news, and induces more innovative ways of performing their tasks (Ekvall, 1996). In line with the theoretical mechanisms that can explain the influence of organizational climate on creativity reviewed by Newman et al. (2020), we argue that openness to change shapes group creativity by (1) generating a collective promotion focus (motivation to strive for goal achievement and reaching ideals), (2) providing clear role expectations for creative behavior, and (3) generating strong situational constraints.

First, in line with Regulatory Focus Theory (RFT, Higgins, 1998), employees working in organizational climates that are open for innovation activate a promotion motivational focus stimulating employees to engage in creative endeavors, embrace risk and challenge the status quo (Johnson, Smith, Wallace, Hill, & Baron, 2015; Rietzschel, 2011; Wallace, Butts, Johnson, Stevens, & Smith, 2016). On the other hand, employees working in organizational climates that are not open to change tend to share a focus on prevention motives and such a collective prevention focus fosters safety rather than innovative performance (Lanaj, Chang, & Johnson, 2012). An organizational context that is open to change is also likely to generate a shared positive affective state concerning the future of the organization (Wanberg & Banas, 2000). Moreover, when people feel they can contribute to and participate in the organizational change, they develop more positive attitudes toward it and also more willingness to think along with (trustworthy) management concerning organizational change processes (Devos, Buelens, & Bouckennooghe, 2007). In her contextual model of group creativity, Hennessey (2003) argues that in organizational climates open to change, individuals and groups are stimulated to actively search for innovative ways of doing their jobs and to engage in creative endeavors. Therefore, we expect that an organizational climate open to change generates a collective promotion focus in teams and shared positive attitudes toward tasks that, in line with the arguments of the RFT, are expected to foster team creativity.

Second, in line with social information processing arguments (Salancik & Pfeffer, 1978) organizational climates that are open for innovation offer employees unambiguous cues concerning their role expectations and as such stimulate innovative performance, while employees working in organizational climates that are not open for innovation are less engaged in innovative behaviors due to more ambiguous creative role expectations. Organizational teams that perceive that their tasks require creativity are ultimately more creative (Gilson & Shalley, 2004) and organizational contexts that favor innovation may support such a shared perception that creativity is important. Moreover, an innovative and change oriented organizational climate generates a sense of psychological empowerment as well as a felt responsibility for change that, in turn, stimulates employees to engage in change-oriented organizational citizenship behaviors (Choi, 2007). Creative role expectations generate creative self-expectations and ultimately impact employees' creative performance (Liu, Vriend, & Janssen, 2021).

Finally, the situational strength arguments (Mullins & Cummings, 1999) would suggest that an organizational climate open for change fosters innovation by providing clear cues that change is required and groups are stimulated to embark on creative endeavors. Such arguments are supported by empirical results showing that an innovation supportive organizational climate directly impacts individual and team innovation (Pirola-Merlo & Mann, 2004). To summarize, organizational climates open for innovation are social fields (Lewin, 1951) that foster group creativity by: (1) activating a promotion motivational focus, (2) providing clear role expectations for innovative behaviors and (3) creating strong situational constraints conducive for innovation (Newman et al., 2020). In line with these arguments and empirical results we hypothesize that:

H2: A company's openness to change has a positive effect on group creativity.

We build on interactionist models of creativity (Zhou & Hoever, 2014) to argue that organizational openness to change creates an environment in which groups can fully realize their creative potential created by MD. Openness to change is an innovation friendly organizational climate in which employees are stimulated to think how their ways of working can be improved, organizational processes optimized, and innovation effectuated (Devos et al., 2007). In a study among 96 healthcare teams, Somech and Drach-Zahavy (2013) showed that group creativity translates into innovation implementation only to the extent to which the organizational climate is supportive of innovation. There is meta-analytic evidence for the claim that perceived support for innovation is a robust positive antecedent for team innovation (Hülshager, Anderson, & Salgado, 2009): group creativity flourishes in organizations that are open to change, namely, with a climate that supports open expression of creative ideas and that values and rewards innovation initiatives. In such organizational climates, both managers and peers value MD and emphasize the value of being and thinking differently in order to stimulate innovative performance (Hülshager et al., 2009). Previous research showed that a divergent thinking manipulation, emphasizing a value of being different and thinking differently, fostered an intention to engage in minority dissent, especially in (west) European cultural contexts (Curșeu & Ten Brink, 2016). We argue that such a shared mind-set, namely, being open to develop and express divergent viewpoints, also accentuates the potential benefits of MD for group creativity. This argument is in line with the creativity-in-social-context perspective (Corazza & Glăveanu, 2020) stating that creative processes and

outcomes are embedded in a larger social context which shapes the engagement of individual members in creative initiatives. An organizational context that is open to change creates a potential for open dialogue and for expressing divergent views in groups, allowing therefore a full realization of the creative potential associated with MD (a synergistic condition for creativity, Zhou & Hoever, 2014). In such a context, MD could be seen as an integral part of change-related OCB (Choi, 2007) and engaging in MD will have a stronger positive influence on group creative outcomes. Therefore, we hypothesize the following:

H3: A company's openness to change accentuates the positive effect of minority dissent on group creativity.

## Methods

### Sample and procedure

The study was carried out as part of a group dynamics training in professional education programs. One hundred and ninety-nine professionals (69 women with an average age of 36.22 years old) participated in the study and were distributed across groups of three to four members. Participants were informed that they will participate in a group exercise aimed at exploring factors that influence group creativity. They were given a short (one page) case study description of a car manufacturing company that engaged in unethical software manipulation to improve the outcomes of a pollution test on their diesel cars and were asked to come up with as many plausible solutions to restore the public confidence in the brand. Groups had 50 minutes for this task, to record the solutions on a form and then present them in class. The solutions presented by each group were then evaluated by all participants in the session (ranging from 8 to 29 participants) on three dimensions: novelty, feasibility, and utility. Minority dissent was manipulated by asking 28 groups to select a member that would play the devil's advocate role and the remaining 29 groups were instructed to reach agreement on the solutions without a designated devil's advocate role. The instructions used as a manipulation for MD were in line with the instructions used in previous research using a devil's advocate as a manipulation for dissent (Greitemeyer et al., 2009; Nemeth et al., 2001) and are presented in the Appendix. Openness to change was manipulated by informing participants in 30 groups that the company is open to change and the participants in 27 groups were informed that the company is not open to change. The vignettes used in the study are presented in the Appendix.

As indicators of group creativity we have used a round robin procedure with peer evaluations on the three dimensions mentioned earlier: novelty, feasibility, and usefulness. After all groups pitched their solutions, each participant evaluated the three creativity dimensions for each presenting group (including their own group). The item used to evaluate novelty was: “Please rate the novelty of the solutions presented by group (novelty refers to being new, fresh and interesting)”; for feasibility we have used: “Please rate the feasibility of the solutions presented by each group (feasibility refers to being easily done, possible to implement in reality)” and for usefulness: “Please rate the usefulness of the solutions.” Each of the three dimensions were rated on a 1 to 10 scale ranging from 1 = very low to 10 = very high. Cronbach’s alpha for the group level aggregated scores of the three dimensions is .79 and the omega index based on the results of factor analyses (Hayes & Coutts, 2020) is .81, all three items showing significant loading on the dominant factor (for novelty .68, for feasibility .55 and for usefulness .85). Given the clear scaling behavior of the three dimensions, we have computed the average score, further referred to as the peer-rated creativity index, by averaging the three items across all evaluators in each session. Moreover, because each group was evaluated on these three dimensions by several raters, we have used the within group agreement index (James, Demaree, & Wolf, 1993) to compute the extent to which the raters agree on their evaluations. The results are presented in Table 1 and the scores indicate a good level of overall agreement concerning the peer rated creativity scores. In line with the consensual evaluation of creativity, stating that a product is creative to the extent to which independent knowledgeable observers agree it is so (Amabile, 1982, p. 1001), we can state that the peer-rated creativity is an appropriate index of group creativity.

The task performed by the groups was similar to a divergent thinking task (Runco & Acar, 2012), therefore we have decided to use a composite score of creativity based on the combination of fluency (number of ideas generated) and flexibility (the

number of different categories of ideas). Following Snyder, Mitchell, Bossomaier, and Pallier (2004) we have used a heuristic procedure to cluster the solutions generated by the groups in five categories depending on their focus: solutions oriented toward organizational change (e.g., improve the internal audit, organize a company day to increase morale), solutions oriented toward the clients (e.g., buyback programs, fidelity programs), global solutions (e.g., invest in green energy research and solutions, donations to NGOs active in ecological projects), innovative projects (e.g., develop electric cars, develop cleaner technologies), no solutions (do nothing). All solutions generated by the groups could be included in one or more of these five categories and we have counted the number of solutions generated in each of the categories. Based on the relative distribution of solutions across these categories, we have computed the creativity quotient (CQ) using a procedure described in Snyder et al. (2004). The formula for the creativity quotient was:  $CQ = \sum \log_2(n_j + 1)$ . The CQ score is therefore an index of divergent thinking that includes both the capacity of generating many plausible solutions (fluency) as well as the spread of these solutions across different distinct categories (flexibility). Although the CQ is a reliable estimate of divergent thinking it should only be treated as a proxy and not as a true, unbiased estimate of creativity (Runco & Acar, 2012). As such, we have used two indices for group creativity, namely the CQ as well as the peer-rated creativity on the three relevant dimensions of novelty, feasibility, and usefulness.

### Randomization checks

Groups were randomly assigned to conditions (by pre-assigning conditions to breakout rooms) prior to the group formations. As the number of participants per session/round varied, we have tried to have a balanced distribution of groups over conditions for each session, yet a fully balanced distribution across the four experimental condition in each training session was not possible. The chi square for the distribution of the two experimental conditions across the sessions is significant, for MD  $\chi^2(13) = 25.16, p = .02$ , and for OC  $\chi^2(13) = 23.61, p = .04$ , showing significant differences in the way the experimental conditions were distributed over different sessions. In order to account for this failed randomization, we will control for training (application) round in the analyses.

**Table 1.** Results of the within group agreement index for novelty, feasibility and usefulness.

|             | Mean RWG (SD) | Range RWG   |
|-------------|---------------|-------------|
| Novelty     | .82 (.08)     | [.65, .95]  |
| Feasibility | .85 (.08)     | [.63, 1.00] |
| Usefulness  | .84 (.08)     | [.65, .97]  |

RWG = with in group agreement index, SD = standard deviation.

Participants were not randomly assigned to groups, we rather allowed them to select their own teammates, as participants within each session were acquainted with each other. Thus, a more similar situation compared to real organizational groups that have a relational history was created in our study. Groups with a relational history work more effectively with normative frameworks aimed at influencing group interactions than ad hoc groups (Curşeu & Schrujjer, 2012). We have carried out a randomization check by running two regression analyses with gender and age respectively as dependent variables and the two experimental conditions as predictors. For gender, the association with MD was not significant ( $\beta = -.15, p = .11$ ) and the association with OC was not significant either ( $\beta = -.08, p = .24$ ). Similarly, for age, the association with MD was not significant ( $\beta = -.01, p = .87$ ), nor was it for OC ( $\beta = .01, p = .94$ ). We can therefore conclude that with respect to gender and age failed randomization is not an issue.

### Manipulation checks

The manipulation of MD was evaluated using the following item: “One of the group members consistently challenged the views expressed by the other members.” Answers were recorded on a five-points Likert scale (1 = strongly disagree to 5 = strongly agree). The effect of MD on this score was significant ( $F(1,195) = 17.73$  ( $p < .001$ ),  $\eta^2 = .08, \pi = .99$ ), showing that the manipulation was successful. However, also the effect of OC on this item was significant ( $F(1,195) = 11.22$  ( $p = .001$ ),  $\eta^2 = .05, \pi = .92$ ), showing that the two manipulations were not orthogonal, that is, the manipulation of OC also influenced the tendency to engage in MD in groups. The OC manipulation was evaluated with the following item: “Please rate the extent to which you perceived in the case that the company is open to change.” The answers were also recorded on a five-points Likert scale (1 = fully disagree to 5 = fully agree). The effect of the OC manipulation was significant ( $F(1,195) = 45.35$  ( $p < .001$ ),  $\eta^2 = .19, \pi = 1.00$ ) showing that the manipulation was successful. However, as said,

MD also had a significant effect ( $F(1,195) = 4.26$  ( $p = .04$ ),  $\eta^2 = .02, \pi = .54$ ) on OC, showing that the two manipulations were not orthogonal. Although not ideal for an experimental design, non-orthogonal manipulations could be explained by similar mechanisms that were activated in participants. For example, task engagement may have been stimulated by both MD and perceived OC.

### Results

The means, standard deviations and correlations among the variables included in the study are presented in Table 2.

We have used ANCOVA to analyze our results. We have used group size and gender diversity as control variables as they are expected to positively impact group creativity and innovation (Hülsheger et al., 2009; Schrujjer & Mostert, 1997). We first ran an analysis with the main and interaction effects of MD and OC without any control variables. Minority dissent had a marginally significant effect on the creativity quotient CQ ( $F(1,53) = 3.81$  ( $p = .05$ ),  $\eta^2 = .06, \pi = .48$ ) and a significant effect on peer-rated creativity ( $F(1,53) = 4.71$  ( $p = .03$ ),  $\eta^2 = .08, \pi = .56$ ). Moreover, OC had a significant effect on the CQ ( $F(1,53) = 9.73$  ( $p = .003$ ),  $\eta^2 = .15, \pi = .86$ ) and a marginally significant effect on peer-rated creativity ( $F(1,53) = 3.98$  ( $p = .05$ ),  $\eta^2 = .07, \pi = .50$ ). The interaction effect of MD and OC was only significant for the peer-rated creativity ( $F(1,53) = 6.63$  ( $p = .01$ ),  $\eta^2 = .11, \pi = .71$ ). In a second set of analyses, we have added group size, gender diversity and application round (session number) as control variables. Minority dissent had a significant effect on the CQ ( $F(1,53) = 4.15$  ( $p = .04$ ),  $\eta^2 = .07, \pi = .51$ ) as well as on the peer-rated creativity ( $F(1,53) = 4.14$  ( $p = .04$ ),  $\eta^2 = .07, \pi = .51$ ). These results show that groups in the MD condition had higher creativity (for the CQ  $M = 5.80, SD = 1.97$ , for peer rated creativity  $M = 7.35, SD = .90$ ) than control groups (for the CQ  $M = 4.95, SD = 1.25$ , for peer-rated creativity  $M = 6.92, SD = .54$ ). For OC, the effect on the CQ was significant ( $F(1,53) = 10.87$  ( $p = .002$ ),  $\eta^2 = .17, \pi = .89$ ), yet the effect on peer-rated creativity was not

**Table 2.** Means, standard deviations and correlations among the study variables.

|                           | Mean | SD   | 1     | 2     | 3      | 4      | 5      | 6      |
|---------------------------|------|------|-------|-------|--------|--------|--------|--------|
| (1) Group size            | 3.49 | .60  |       |       |        |        |        |        |
| (2) Gender diversity      | .54  | .22  | .127  |       |        |        |        |        |
| (3) Novelty               | 7.08 | .99  | .035  | -.075 |        |        |        |        |
| (4) Feasibility           | 7.10 | .88  | .022  | -.049 | .436** |        |        |        |
| (5) Usefulness            | 7.23 | .88  | -.006 | -.092 | .669** | .609** |        |        |
| (6) Peer rated creativity | 7.14 | .77  | .021  | -.086 | .844** | .795** | .895** |        |
| (7) CQ                    | 5.37 | 1.69 | -.009 | .057  | .529** | .418** | .522** | .581** |

CQ = creativity quotient; \* $p < .05$ , \*\* $p < .01$

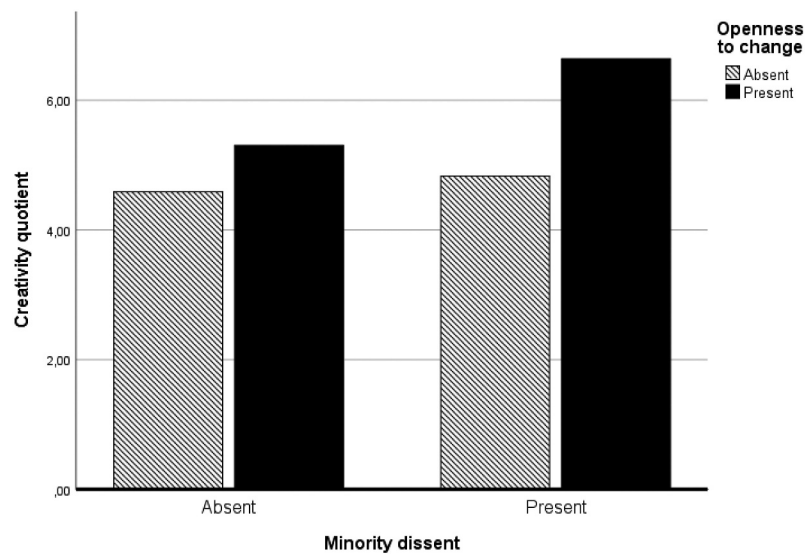


Figure 1. Interaction effect of MD and OC on the creativity quotient.

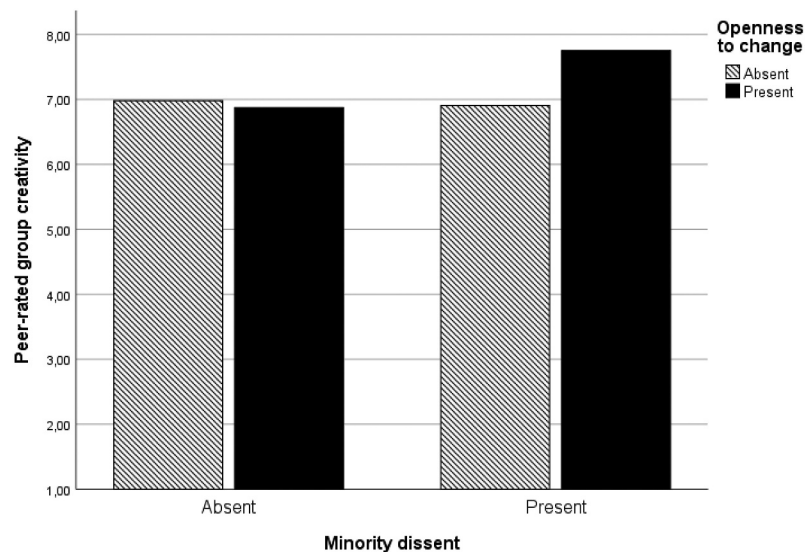


Figure 2. Interaction effect of MD and OC on peer-rated creativity.

significant ( $F(1,53) = 3.25$  ( $p = .07$ ),  $\eta^2 = .06$ ,  $\pi = .42$ ). The results show that groups in the high OC condition had a higher creativity (for the CQ,  $M = 5.97$ ,  $SD = 1.62$  and for peer-rated creativity  $M = 7.31$ ,  $SD = .83$ ) than groups in the low OC condition (for the CQ  $M = 4.70$ ,  $SD = 1.52$  and for peer-rated creativity  $M = 6.94$ ,  $SD = .66$ ). Similar to the results with no control variables, the interaction effect was only significant for the peer-rated creativity ( $F(1,53) = 6.22$  ( $p = .01$ ),  $\eta^2 = .11$ ,  $\pi = .68$ ). The results presenting the main and interaction effects are presented in Figures 1 and Figure 2.

As additional analyses, we analyzed the effects of MD and OC on the three separate dimensions of creativity as rated by peers. The results show that MD had

a significant effect on novelty  $F(1,53) = 7.17$  ( $p = .01$ ),  $\eta^2 = .12$ ,  $\pi = .75$  (groups with MD had higher scores for novelty  $M = 7.42$ ,  $SD = .68$  than groups without MD  $M = 6.76$ ,  $SD = .82$ ) and usefulness ( $F(1,53) = 6.38$  ( $p = .02$ ),  $\eta^2 = .11$ ,  $\pi = .70$ ) (groups with MD had higher scores for usefulness  $M = 7.73$ ,  $SD = .83$  than groups without MD,  $M = 6.95$ ,  $SD = .74$ ). Moreover, OC had a significant effect only on novelty  $F(1,53) = 5.84$  ( $p = .02$ ),  $\eta^2 = .10$ ,  $\pi = .66$  (groups in the OC condition had higher scores for novelty  $M = 7.34$ ,  $SD = .99$  than groups in the non OC condition  $M = 6.80$ ,  $SD = .91$ ). The interaction effect between MD and OC was significant for novelty  $F(1,53) = 8.63$  ( $p = .005$ ),  $\eta^2 = .14$ ,  $\pi = .82$  and was not significant for usefulness  $F$



**Table 3.** Results of the separate ANOVA analyses for novelty feasibility and usefulness.

| Independent variable | Novelty   | Feasibility   | Usefulness  |
|----------------------|---|---|---|
| MD                   | F(1,53) = 7.17<br>( $p = .01$ ),<br>$\eta^2 = .12$ , $\pi = .75$  | F(1,53) = .05<br>( $p = .82$ ),<br>$\eta^2 = .001$ ,<br>$\pi = .06$ | F(1,53) = 6.38<br>( $p = .02$ ),<br>$\eta^2 = .11$ ,<br>$\pi = .70$ |
| OC                   | F(1,53) = 5.84<br>( $p = .02$ ),<br>$\eta^2 = .10$ , $\pi = .66$  | F(1,53) = 1.81<br>( $p = .18$ ),<br>$\eta^2 = .03$ ,<br>$\pi = .26$ | F(1,53) = 1.35<br>( $p = .25$ ),<br>$\eta^2 = .03$ ,<br>$\pi = .21$ |
| MDxOC                | F(1,53) = 8.63<br>( $p = .005$ ),<br>$\eta^2 = .14$ , $\pi = .82$ | F(1,53) = 2.31<br>( $p = .14$ ),<br>$\eta^2 = .04$ ,<br>$\pi = .32$ | F(1,53) = 3.69<br>( $p = .06$ ),<br>$\eta^2 = .06$ ,<br>$\pi = .47$ |

The results presented in the table are based on ANOVA without control variables and when gender, gender diversity and application day included as covariates the pattern of (significant) results remain the same.

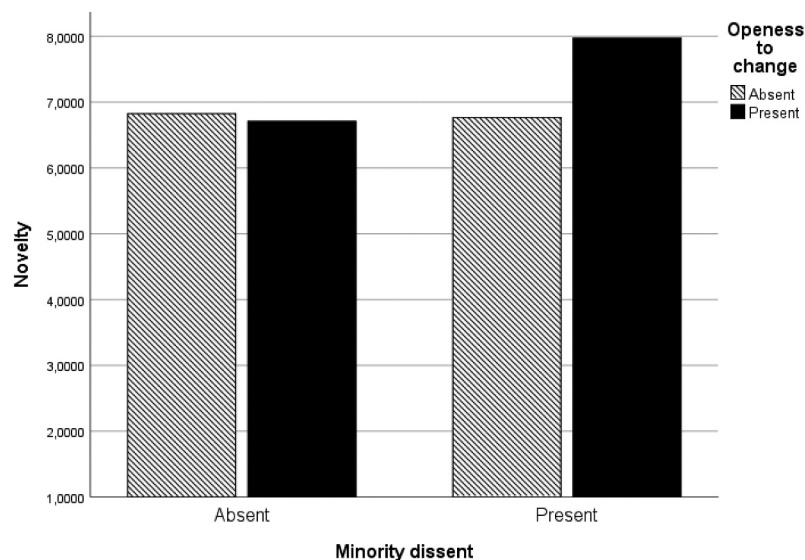
(1,53) = 3.69 ( $p = .06$ ),  $\eta^2 = .06$ ,  $\pi = .47$ . The overall results are presented in Table 3 and the significant interaction effect between MD and OC is presented in Figure 3.

## Discussion

Our study answers the call for research using vignette experiments in the field of innovation climate (Newman et al., 2020) and the call for interactionist perspectives on group creativity (Zhou & Hoever, 2014), especially research that explores group-organization interface (Anderson et al., 2014), by exploring the interaction effect between MD and the OC on group creativity. The results partially support this interaction effect, while both hypothesized main

effects are supported by the data. Our results add to the empirical evidence supporting the beneficial influence of MD for group innovative outcomes (De Dreu, 2002; De Dreu & West, 2001) by using a quasi-experimental design that tests the causal association between MD and group creativity. Our results fully support the positive effect of MD on the CQ, an index based on the fluency and flexibility of ideas generated by groups that captures prolific divergent thinking, an important dimension of creativity. Such divergent idea generation is likely to trigger constructive conflict that at moderate levels is beneficial for group creativity (De Dreu & Gelfand, 2007; Farh, Lee, & Farh, 2010). Our study however, did not explicitly assess cognitive conflict and future research could further explore this mechanism.

Similar to the CQ, the main effect of MD on peer-rated creativity is positive and significant. Using both indicators, namely the CQ as a divergent thinking metric as well as the peer-rated creativity on three relevant dimensions, adds to the robustness of our findings. Among the three creativity dimensions, MD impacts novelty and usefulness while OC only impacts novelty. These results open new venues for further exploring the three dimensions of creativity in groups. For individual creativity, studies have shown that the creativity dimensions have different motivational antecedents (Miron-Spektor & Beenen, 2015) while an organizational culture open to innovation fosters the recognition of novelty and usefulness (Zhou, Wang, Song, & Wu, 2017). However, little research has explored the group level antecedents of the three dimensions of creativity, in

**Figure 3.** Interaction effect of MD and OC on peer-rated novelty.

different organizational contexts. It is not unreasonable to argue that processes related to divergent thinking patterns primarily have an impact on novelty, while group processes related to integration and convergent thinking primarily have an impact on usefulness and feasibility. Future research could further explore this differential impact. Moreover, such group processes are always embedded in organizational contexts that may vary to the extent in which they value creativity and innovation. As indicated by our results, an organizational climate open to innovation fosters novelty, while one could argue that more conservative organizational climates may favor usefulness and feasibility over novelty. As the organizational climate moderates the extent to which group creativity translates into innovation (Somech & Drach-Zahavy, 2013), another avenue for future research is to explore this moderation effect separately for the three dimensions of creativity.

Our results also contribute to contextual models (Hennessey, 2003) and interactionist perspectives on group creativity (Zhou & Hoever, 2014) by showing that organizational openness to change is an important antecedent of group creativity. Group creativity emerges in a context in which social forces shape the creative potential and creative actions of groups (Somech & Drach-Zahavy, 2013; West, 2002). Given the consistent evidence for the beneficial effect of MD on group creativity, we can state that MD is an integral part of the creative potential of groups because (a) it reduces conformity pressures experienced by group members, (b) it stimulates divergent idea generation, and (c) it generates a more in-depth analysis of the ideas through constructive cognitive conflict (Nemeth & Nemeth-Brown, 2003). As stated in Field Theory (Lewin, 1951) individuals and groups act in wider social contexts or fields that often steer the collective outcomes with little agency left to the actor. Future research could continue the exploration of contextual variables that facilitate or inhibit the full realization of the creative potential of groups (Newman et al., 2020). The organizational context that embraces or rejects change can, according to our results, nuance the role MD plays in the creative outcomes of groups (especially novelty).

In our study we have manipulated MD using a devil's advocate procedure. As the group members were aware of the fact that this role was played by one of their team mates, another plausible explanation for the positive effect of MD on group creativity stems from the Situational Congruence Model (Muchinsky & Monahan, 1987). Derived from general person-environment fit theories, the complementary congruence model states that individuals perform best when

their skills, talents and competencies match the needs of the environment they operate in (Muchinsky & Monahan, 1987). The specific role descriptions for the devil's advocate match the requirements of organizations that are open to change, therefore MD might have been more successful under conditions of high rather than low OC because the devil's advocate performed their role more conscientiously. Moreover, because the other group members were aware of the devil's advocate role, their acceptance and engagement with the critical views expressed was higher when OC was high rather than low. In other words, the interaction effect between MD and OC could also be explained using the situational congruence model (Muchinsky & Monahan, 1987). Similarly, one could argue that the lower creativity of groups that operated under the low OC condition could also support an alternative explanation derived from the Situational Congruency Model. Because in the vignette, the company asks the groups to solve creatively a situation generated by the company's unethical behavior, it could be that participants underperform when they are informed that the company is not actually open to change because they perceive a misfit between the creative task assignment and the organizational climate in which they operate. Future research could use alternative tasks in order to disentangle the possible confound of the ethical nature of the task.

### **Limitations**

Our study has several limitations. First, as this was a quasi-experimental study, we could not fully randomize groups across the experimental conditions in various sessions. This could have implications for our research findings. On top of this, the generalizability of experimental findings is low, so future research could attempt to replicate these findings using different tasks and settings, possibly focusing on real organizational groups engaged in creative tasks. Second, the sample is rather limited in size and being an underpowered study, results could have been biased toward false positive claims. The number of hypotheses is however limited to three (two main effects and an interaction) and the results are reported with and without control variables rendering some support for the robustness of our findings. Third, our results have used ad hoc groups formed during educational activities and although participants were familiar with their team mates, we cannot claim that the relational climate in the studied groups fully matched the relational landscape existing in real organizational teams. We believe our study combines the benefits of directly manipulating (instead of observing) the independent

variables in an experimental design with the benefits of forming groups of participants with substantial work and teamwork experience (as opposed to using students as participants). Fourth, we have used a devil's advocate as a MD manipulation and although we acknowledge that authentic dissent may have stronger effects on group creativity than the procedure we have used (Greitemeyer et al., 2009; Nemeth, Brown, et al., 2001a), we believe that the procedure used is aligned with the nature of MD as a minority's open disagreement to the position held by the majority. We also have to take into account the fact that the devil's advocate was an assigned role the other members were aware of. As such, their acceptance of the input generated by the devil's advocate could have been influenced by this role acceptance. Fifth, for the peer rated group creativity we have asked the participants to rate each group after all pitches were finished and we cannot exclude the possibility that other factors may have impacted their creativity ratings. However, given the substantial within group agreement among raters, in line with Amabile (1982), we can argue that these evaluations are accurate consensual ratings of creative performance. Sixth, the experimental condition in which participants were informed that the organization is not open to change, implies that the company may persist in unethical conduct and this implicit assumption could have affected the manipulation of the organizational climate perception. Moreover, we have used a reference to leadership in the openness to change manipulation (given that leadership is a key driver of climate see Newman et al., 2020), a fact that could have influenced the intended manipulation. Future research should try to make manipulations more distinct. Finally, in our study we did not collect data on the innovative performance of the individual group members. This is a limitation, as the organizational climate (e.g., openness to innovation) could also have an impact on individual creativity – group creativity indices conflate the effects of OC at the individual level with its effect on group interactions (Pirola-Merlo & Mann, 2004). Therefore, although the randomization with respect to gender and age was not problematic in our study, we cannot exclude the plausible influences of individual creative potential on group creativity. Future studies could evaluate both individual and group creativity and explore the association between OC and the creative performance of individuals and groups.

### Practical implications

Our results have important implications for stimulating group creativity. First, we show that using devil's advocacy has beneficial effects for group creativity. Previous

research has shown that authentic dissent has more beneficial effects than devil's advocacy in groups (Nemeth et al., 2001), yet the implementation of a role system in which the devil's advocate role is rotated among the group members could yield benefits for innovative group performance. Second, our results support the positive influence of a change-friendly organizational climate. Managers and supervisors have to find ways to build an organizational climate open to change in order to foster the full realization of the creative potential of organizational groups.

### Disclosure statement

No potential conflict of interest was reported by the author(s).

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## Appendix

### Minority dissent manipulation

As agreement on plausible solutions is not easy, your group is to follow a number of procedures in order to achieve consensus on the solutions to be listed:

- (1) One of the group members will have to record all ideas generated by the group while he/she will have to play the **devil's advocate role**.
- (2) The task of the devil's advocate is to identify all disadvantages of **each** alternative generated by the group and checks the group's proposal for possible mistakes and false assumptions.
- (3) The devil's advocate presents his/her criticism to the other group members.
- (4) The group analyzes together all additional pieces of information generated by the devil's advocate and on the basis of this analysis, a final group decision is made on whether to record a particular solution or not.
- (5) After all group members agree on a solution, the devil's advocate records that solution on the group answer sheet.

### Versus

All group members should agree on the list of plausible solutions generated by the group and after all group members agree on a solution, one of the group members records that solution on the group answer sheet.

*Openness to change manipulation*

Your group is asked to generate as many ideas as possible and **you know the company is really open and willing to change** its ways of operating and the leaders are preoccupied with restoring the public's confidence in the brand.

## Versus

Although your task is clear, **you know the company is not really open and willing to change** its ways of operating and the leaders are preoccupied with keeping their jobs rather than engaging in change.