The effects of group separation and variety on group performance and satisfaction

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Abstract: Research on group diversity, homogeneity and their influence on group performance and satisfaction proliferated in the last decade as groups received more attention from both researchers and human resource specialists. This study examined the influence of group diversity conceptualized as separation (differences on attitudes toward communism) and variety (information made available to participants to solve a task) on group performance and satisfaction. Data on a group's performance (operationalized as a group's cognitive complexity) was collected in 72 groups, consisting of four members, using a conceptual mapping technique. The technique used in this study is a holistic measure of group performance. Data regarding team satisfaction was also collected using an individual questionnaire. The results indicated no significant relationship of group diversity on performance or satisfaction. Implication, limits of this study and ideas for future research are discussed.
***Keywords*:** groups, heterogeneity, diversity, cognitive mapping, attitude toward communism

As we entered 21st century, the so called information age, workforce diversity has become an essential concern for organizations and a new way of making business. Diversity can be challenging, and this is the reason why both organizational leaders and researches struggled to get a closer look at what diversity really is. While leaders struggle to manage differences, researchers struggle to find new definitions, theories and practical implications of diversity. In some studies, diverse groups have been shown to outperform homogenous groups (Hoffman and Maier, 1961; Jackson, 1992) by bringing creativity (Triandis, Hall, & Ewen, 1965) and innovation (Page, 2009) to the group. In contrast, other studies have demonstrated that, by avoiding loss process loss, such as poor communication patterns and conflict, homogenous groups manage to outperform heterogeneous groups (O'Reilly & Flatt, 1989; Ancona & Caldwell, 1992).

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Due to the fact that groups are present in many organizations all over the world, diversity continues to be a reality in organizational settings. As for this, researchers are continuously working in order to extend the knowledge regarding the diversity of a group (Mannix & Neale, 2005; Williams & O'Reilly, 1998) by finding new theories, explanatory models and variables that moderate the relationship between diversity and possible outcomes.

Literature on diversity has the characteristic of being diverse itself. Even defining diversity is an ambiguous thing to do as, sometimes, differentiation between the social term of diversity and the one used in academic research is not made (Simons & Rowland, 2011). There are many definitions that authors have proposed for diversity, the most common defines diversity as being the difference between individuals on any attribute that may lead to perception that the other person is different from self (Jackson, 1992). Diversity is not the only term used when talking about differences. Diversity, heterogeneity, dissimilarity, dispersion, variation and disagreement are just some of the terms used by researches; sometimes interchangeably is referenced to diversity. Regarding this aspect - defining diversity - we agree with Harrison &Klein (2007) who suggest that the very construct of diversity requires close examination and refinement. In this present study, we used the taxonomy suggested by Harrison and Klein (2007).

The taxonomy suggested by Harrison & Klein (2007) is more recent and introduces a new typology, presenting diversity as being three different aspects: separation, variety and disparity. Before explaining each of the concepts mentioned above, it is important to mention that the substance, the patterns and the operationalization for each of them is different. As for this, diversity in an organizational setting can be an indicator of separation – when group members differ in their opinion, attitudes and beliefs (e.g. attitudes toward communism, opinions regarding a leader's charismatic personality). Such differences reflect disagreement or opposition – a horizontal distance along a single continuum representing dissimilarity in a particular attitude. Alternatively, diversity can be an indicator of variety – differences in the type of category, primarily when it comes to information, knowledge or experience (e.g. educational background, functional background) among group members. Finally, diversity may be an indicator of disparity - differences in concentration of valued social assets or resources (e.g. status or pay) (Harrison & Klein, 2007).

In this present study, separation and variety were the two aspects used to operationalize diversity.

To better understand the diversity phenomenon is important to review the two main theories that explain diversity. We also present the integrative model (CEM – Categorization Elaboration Model) suggested by

Knippenberg (2007) that gives another interpretation for the inconsistencies in diversity research results.

There are to competing theories of teamwork that examine the relationship between team diversity and performance. One comes from the social field (a) the similarity – attraction paradigm (Byrne, 1971) and the competing theory comes from the field of management (b) the cognitive resource theory (Cox & Blake, 1991). Although both theories predict that performance is based on team composition, their predictions are grounded in distinctively different assumptions (Horowitz, 2005). According to similarity – attraction paradigm, similarity in bio-demographic attributes such as age, gender and race/ethnicity leads to attraction among team members and then to a higher performance. Researchers favoring this paradigm argue that homogenous teams are likely to obtain a higher performance over heterogeneous teams because of the mutual attraction of team members with similar characteristics (Horowitz, 2005; Wiersema si Bantel, 1992) One the other hand, the cognitive resources diversity theory promoters argue that diversity has a positive impact on performance due to unique cognitive resources that members bring to the team (Cox & Blake, 1991). The underlying assumption of the "value-in-diversity hypothesis" (Cox, Label & McLeod, 1991) is that teams consisting of diverse members promote innovation, problem solving, creativity and more informed decisions (Horowitz, 2005). There is research that sustains both theories, but there are still many questions regarding diversity's influence on performance. In order to explain some of the inconsistencies, Knippenberg (2004) suggests an integrative model that brings new perspectives on work group and performance. As previous research has not been able to account for the positive and negative effects effect diversity has on performance, Knippenberg and his colleagues proposed the categorization – elaboration model (CEM). The CEM identifies important moderators underlying the positive effects of diversity, concluding that for enhancing potential benefits of diversity in a group, diversity management has to focus on task relevant information elaboration and diminish inter group conflicts (Van Knippenberg, De Dreu, & Homans, 2004).

There are many studies from researches that propose several diversity variables. One of the most well known taxonomies regarding diversity variables presents: bio - demographic attributes, job related attributes, educational background and organizational tenure (Bell & Villado, 2011). This study wants to bring something new into the area of diversity by focusing on differences regarding attitudes towards communism, as, earlier, diversity researchers focused more on functional and educational (Williams and O'Reilly, 1998). This year we celebrate 24 years since the communist system crashed and Romania still struggles with

finding its economic stability. Both hearing young voices claiming that „people lived better in the communist period" and statistics that sustain these words, have made us realize that „attitudes toward communism" might be an interesting variable to investigate when talking about group differences, group performance and satisfaction.

The second variable used in this present study is the pieces of information made available to the participants in order to solve the task – creating a cognitive map of "Ceauşescu - Romania's leader during the communist period". Concerning the fact that information is used differently by homogenous/ heterogeneous groups (Dahlin, Weingart, & Hinds, 2005) separation was operationalized as pieces of information made available to each participant, regarding the amount of leadership theories each group received in order to solve the task.

The present study

Regarding the theoretical grounding presented above, our first objective was to find out if differences in attitudes toward communism would have a negative impact on a group's performance.

The second objective of this present study was to see how the difference in information has an impact on a group's performance. Concerning the fact that the group had the task to create the cognitive map of Ceauşescu - a communist leader, we had groups receive one leadership theory to help them organize the cognitive map and groups receive three leadership theories in order to create the cognitive map.

Our third objective, focused on finding out the degree of satisfaction felt by the group's members in both homogenous and heterogeneous groups. According to similarity – attraction paradigm, similarity in bio-demographic attributes such as age, gender and race/ethnicity led to attraction among team members and further to higher satisfaction. Researchers favoring this paradigm argue that homogenous teams are likely to obtain a higher level of satisfaction than heterogeneous teams because of the mutual attraction of team members with similar characteristics. Considering the similarity – attraction paradigm we also hypothesed that homogenous groups would be more satisfied than members from heterogeneous groups.

Method

Participants

A sample of 288 students (from the following faculties: Faculty of Psychology, Faculty of Philosophy and Communication and Faculty of Business Administration; with an average age of 19-24year; women only) participated in the cognitive mapping session.

Design

A 3 x 2 quasi-experimental design was proposed for this present study. Diversity was operationalized using Harrison's and Klein's taxonomy as separation (inter-group differences regarding attitudes toward: pro communism, contra communism and mixed group) and disparity (intra-group differences regarding information given to solve the given cognitive task).

Measures

Measuring performance

Curşeu, Schruijer, & Boroş (2007) argue that the quality of interpersonal interaction in a group is central for the integration of individual knowledge structures into a group knowledge structure and that the quality of teamwork moderates the relation between the average individual's cognitive complexity and group cognitive complexity. In this present study we will refer to performance as the group's cognitive complexity. As Curşeu, (2006) did, we will also use this term to define the richness of the collective knowledge structures that emerge as a team-level phenomenon from the integration of individual's specialized knowledge through interpersonal interactions. A relation between group cognitive elaboration and performance – as the elaboration of task relevant information – was previously discussed (Van Knippenberg et al., 2004). We note that a clear operationalization has not been made. In this present study, a group's cognitive complexity is operationalized as the number of independent concepts used by the group to define (represent) a particular situation or knowledge domain and number of connections among these concepts (Curşeu & Rus, 2005). In order to assess a group's cognitive complexity we choose a holistic measurement – cognitive mapping. Concerning the fact that group cognition is a group – level phenomenon, instruments or evaluation methods have to meet the following criteria: (a) address the group as a whole, (b) demonstrate that results discriminate across groups, (c) demonstrate group members agreement with regard to the evaluated construct, and (d) reflect group interaction processes (Curşeu, Schruijer, & Boroş, 2007). As we mentioned before, group cognitive complexity is a group level phenomenon, as for this an aggregation of individual's mental model does not satisfy all four criteria. Cognitive mapping/a concept map can be adapted to meet the four criteria.

Concept maps are graphical tools for organizing and representing knowledge. They include concepts that are organized using a cart sorting technique and relationships between concepts indicated by a connecting line linking two concepts. Another important aspect refers to the type of links that the participants create (Novak & Canas, 2008). In this present study, a cognitive map is a network. In a conceptual map, nodes represent the concept in the knowledge domain, and the strings represent the links between these concepts. As suggested by Gomez, Moreno, Pazos and Sierra-Alonso (2000) there are several types of relations among concepts in a conceptual map (e.g., casual, association, equivalence, topological, structural, and chronological). Graphical representations of these concepts and the relations between, result in different types of cognitive maps/conceptual networks (Curşeu, Schalk, Schruijer, 2010). We can conclude that the sum of individual representation is not equivalent with collective representation. The collective representation emerges from group interaction processes that are vital for group cognitive complexity.

Measuring group satisfaction

Group member's satisfaction within the research is perceived as equal participation to the group's outcome, and team quality (collaboration, organizing, conflict and process efficiency) were evaluated after the group's cognitive mapping session.

Satisfaction was evaluated using two items ("How satisfied are you with the outcome of the group's process? and "How satisfied are you with the outcome of the group), rated on a 5-point Likert scale. Alpha Cronbach coefficient for this scale is 0.83. (Curseu, Schruijer, Boros, 2007).

Measuring attitudes toward communism

As there was no previous questionnaire meant to measure attitudes toward communism, one of the most important aspects of this study was to build a questionnaire aimed at measuring the participant's attitudes towards diversity. The free association technique was used as a first step in creating the questionnaire. 100 students were first asked to write down five words that come to their mind when thinking about communism. Using the data collected an initial 13 item questionnaire was built and validated on a 148 student sample. The final form had 9 items (e.g.: In my opinion, the communist regime was better than the actual government). The questionnaire uses a five point Likert scale and has a homogeneity coefficient of 0.75.

Procedure

First, the students were asked to individually fill in the Attitude toward Communism Questionnaire. This first step was important in order to assure randomized distribution in the future working groups. After measuring the student's attitude toward communism, they were grouped in

72 groups with the following characteristics: a) homogenous one theory (12 "pro communism" groups that received only one leadership theory as additional information to solve the task and 12 "contra communism" groups that received only one leadership theory as additional information to solve the task); b) homogenous three theories (12 "pro communism" groups that received three leadership theories as additional information to solve the task, and 12 "contra communism" groups that received only three leadership theories as additional information to solve the task) and c) heterogeneous (12 "mixed groups" (two members being pro communism and the other two against communism) that received only one leadership theory as additional information to solve the task and 12 "mixed groups" groups that received three leadership theories as additional information to solve the task. Each of these groups had four members each. The second step consisted of asking the members to elaborate the cognitive map of "Ceauşescu - Romania's leader during the period of communism. In order to elaborate the cognitive map, the participants had to select from 40 concepts – those concepts that, according to them, were connected with Ceauşescu and subsequently to organize them in a way that makes sense to all the four members of the team. The final faze of the experiment consisted in asking the participant to fill in a questionnaire evaluating satisfaction.

In order to obtain the concepts to be used in the conceptual mapping, we asked three PhD students to write down short characterizations of Ceauşescu. We also used a free association technique to elicit the main concept related to Ceauşescu – a communist leader- from an independent sample of 100 students (students from this sample presented the same characteristics as the participants that worked to create the cognitive maps). Using these techniques we made sure that we extracted the most relevant concepts for this particular group (students). The concepts we used are listed in a document that can be found in Appendix A. In order to elaborat the cognitive map, the participants received an envelope with the 40 concepts inside, each of them written on a different card; also included were an A3 blank sheet of paper and some glue. The respondents were instructed to use only those terms thought to describe Ceauşescu, to distribute the concepts in a way that they thought to be related and to draw connections among the concepts. For elaboration of maps, the participants had 40 minutes. The complexity of the 72 group cognitive maps was evaluated using the following indicators: a) the number of concepts used in the map, b) map connectivity – counting the number of links established between the concepts and c) map diversity – counting the distinct types of relations established between the concepts. Map complexity index based on the formula: complexity = (connectivity*diversity)/number of concepts (Curşeu, 2007).

Results

The results of this study are reported at two levels of analysis. Hypotheses 1 and 2 concerned the group level of analysis, while hypotheses 3 concerned variables evaluated at the individual level of analysis (satisfaction). In order to bring the last variable to a collective level, we had to aggregate the individual data.

To test hypothesis 1, we conducted an Independent Sample T –test (the results are presented in table 1). The hypothesis was infirmed; task information separation has no influence on a group's cognitive complexity. Groups that received three leadership theories in order to create the cognitive map did not obtain a higher performance when compared with groups that received a single leadership theory in order to complete the task ($t(70) = -0.86$, $p=0.39 >0.05$.).

Variable	N	M	SD	T	df	p
Connectivity				-0.86	70	0.39
1 Theory	36	1577.44	1482.25			
3 Theories	36	1873,.02	1434.70			

Table 1. Independent sample T-test - number of leadership theories

Cognitive complexity as described by Curşeu, Schruijer, Boroş (2007) is seen as the product of connectivity, comprehensibility and diversity. We tested the all three sub dimensions and no significant results were found.

In order to see if group differences regarding attitudes toward communism have a negative impact on group performance (hypothesis 1) we conducted the non parametric version of One Way ANOVA – Kruskal Wallis, since the dependent variable was not normally distributed.

Hypothesis 2 was infirmed. Differences in attitudes toward communism do not have a negative impact on group performance $H (2) = 2.129$, $p = 0.345$ as the results from the Kruskal Wallis Test show.

In order to test our third hypotheses we needed to aggregate our data. If we want to make inferences from a group level after assessing an individual level characteristic, one of the possibilities is to aggregate data. This type of analysis has several steps. The first step when we have a data base with data collected at an individual level is to calculate a new index for each group. By doing this, the data base will have a new variable (we called

it group identity) for each of the 72 groups that participated in this present research. Further, we have to calculate the mean of the satisfaction scale, obtaining the mean of the satisfaction scale for each of the 72 groups. Step three in calculating the aggregation index is to calculate the standard deviation of the 72 groups. We further want to make group level inferences. In order to do so we calculated the Statistical Index of Agreement using the following formula [it_satisf (1-sdsatisfaction/2/ (it_satisf x(1-sdsatisfaction/2) + (sdsatisfaction/2)) where it_satisf represents the number of items the satisfaction scale has and the satisfaction represents the standard deviation of each group. Values over .70 represent high agreement. Further more, in order to see what group has a higher level of satisfaction – homogenous or heterogeneous, we performed the non parametric version of One Way ANOVA – Kruskal Wallis. As $H(2) = 1.413$, $p = 0.493$. The results suggest no significant data; homogenous groups are not more satisfied than heterogeneous groups.

As none of the three hypotheses was confirmed, we propose further psychological explanations.

Discussion

This study examines the implication of group diversity and task information on a group's performance and member's level of satisfaction. More specifically, we examined to what extend group diversity (as separation) and task information explained the group's performance. In order to measure performance we choose a holistic method that satisfies all four criteria proposed by Bar-Tal (1990) – cognitive mapping. Concerning group diversity, we started from a taxonomy introduced by Harrison and Klein (2007) that presents diversity as separation, variety and disparity.

We argued that separation (participant attitudes toward communism) has a negative impact on group performance and satisfaction. We also argued that task relevant information will improve performance for groups that were given a three leadership theories set. None on the hypothesis was supported by the data.

As all our hypotheses were infirmed, we struggled to find psychological information that explained our results. First, and most important, we want to explain why attitudes toward communism have no significance on group performance. Our present data might be explained by Harrison's and et. all taxonomy that present attitudes (toward communism) as a deep level attribute. As O'Reilly (1992) presents, deep level attributes are unlikely to come to the surface in a single interaction, and this might explain the nonexistent effects of group separation on a group's performance. Furthermore, another aspect that might influence the results obtained in this present study is the variable itself – as the attitude toward

communism might be an attribute that group members would consider as being slightly important in order to differentiate one from the other.

We also argued that separation would have a negative impact on the members' level of satisfaction. Again, there was no significant impact of group separation on a member's level of satisfaction. To explain the results we argue that attitude toward communism was not an important subject for our participant and was likely to trigger conflict and poor communication in the groups. Furthermore, the fact that the participant worked in groups that were familiar led us to obtain no significant data.

Task relevant information, was considered to help the participants to perform better. To test this hypothesis we gave the participants a three leadership theory set or a single leadership theory. Again, no significant data was found. We can explain these results by arguing that the participants were not attentive to the information we gave even if this aspect was mentioned for each group that participated in the experiment. Furthermore, when explaining the results of this current study we must note the limits of the study. First, the set of limits of the present study comes from the instrument we used to measure the groups' performance. The cognitive mapping technique we used in order to assess performance involved creating the cognitive map of "Ceuşescu – a leader in the communist political party" using 40 concepts.. Were those concepts the most relevant? This is a question that would need further research. Furthermore, deeper analysis of the cognitive maps is necessary as we did not take into consideration the centrality of the concepts used. Another important limit comes from the convenient lot we used. We already know students groups do satisfy the criteria in order to be considered as a group, but student groups can be very different from organizational groups. Another inconvenience the research has regarding the participants' lot is the fact that the participants knew each other. Because the participants where faculty colleagues, there is a slight chance for conflict to appear when solving a 30 minute task.

Further research should consider a longitudinal research. Longitudinal research can offer the opportunity to observe members' behavior along group developmental stages. Another aspect that future research can take into account is another operationalization of group performance.

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