Group Creative Problem Solving: The Role of Creative Personality, Process and Creative Ability

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ABSTRACT

Purpose: Team creativity is an important factor in developing new ideas for organisations. In spite of years of creativity research, little is known about various team aspects and their affect on team creativity. This study looks at the incremental explanatory value that team creative personality and divergent thinking skill processes have on team creativity.

Methodology/Approach: Individual personality, creative personality, and divergent thinking skills were collected from 349 students at a large public university in the southeast US. These students were then randomly assigned to 105 teams where they developed a novel product. Individual attributes were averaged to create team attributes that were used to determine correlations with the product creativity. Hierarchical regression was used to evaluate incremental explanatory values for each of the independent variables.

Findings: Group creative personality adds approximately 36 percent more explanatory power than cognitive ability and traditional personality measures in predicting team creativity. Creative processes, like team divergent thinking ability, further increased the R^2 of our model from 0.54 to 0.65 demonstrating that team processes affect team creativity.

Research Limitation/implication: The task used in this study was not as complex as problems being considered by organizations. However, the results are expected to be indicative of the process used for more complex problems. It is also difficult to assign causality since correlations were used to verify some of our hypothesis.

Originality/Value of paper: This research expands the findings of team creativity by identifying factors that increase team creativity.

Category: Research paper

Keywords: innovation; creativity; group creativity; team creativity

1 INTRODUCTION

Organizations must quickly adapt in today's constantly changing, globally competitive environment. Yesterday's winning ideas are rarely valid today. Therefore, creativity and innovation have become critical to the performance, growth, and survival of organizations (Mumford, Hester and Robledo, 2011; Vnoučková, 2018). However, single individuals do not possess the creative skills and knowledge necessary to solve these complex organization problems (Reiter-Palmon, Wigert and De Vreede, 2011). Organizations have subsequently focused on teams to solve these problems (Kozlowski and Bell, 2008).

Much has been learned about the role of personality (Robert and Cheung, 2010) and individual processes (Bendickson et al., 2017) on individual creativity and yet team-level creativity remains under-researched (Amabile and Pratt, 2016; Kurtzberg and Amabile, 2001; West, 2002). One study shows that despite the calls for increased team research, little has occurred to address this issue (James and Drown, 2011). The need therefore still exists for researchers to unravel how individual traits and skills are combined with group processes to arrange the perfect cast of participants for creative problem solving teams.

The purpose of this study is address this gap in the literature by examining how individual personality and creative ability are used in a group setting to develop creative products. We base our research on Amabile's (1996) componential theory of creativity and refinement of this model (Amabile and Pratt, 2016) which states that creativity is a result of task motivation, domain-relevant knowledge, and creativity-relevant skills. We build on this componential theory by identifying the most important individual traits and abilities that contribute to group product innovation.

Our results demonstrate how team creative abilities add incremental explanatory power above that which is explained by the team's personality and cognitive ability on the development of creative products. This identification of the most dominant personality traits and creative abilities provide researchers and managers greater insight into the identification and selection of participants needed to produce creative products and ideas.

1.1 Theoretical Background

Following prior research, we define creativity as the production of high quality, original and elegant solutions to problems (Besemer and O'Quin, 1999; Christaans, 2002; Mumford and Gustafson, 1988). Mumford and his colleagues (2011a; 2011b) argued that this definition implies that creative work is the outcome of creative problem solving. From this standpoint, creativity is the outcome and creative problem solving is the process.

We base our research on Amabile's (1996) componential theory of individual creativity which claims that individuals must be motivated to use their domain-relevant skills and creative-relevant cognitive processes to produce novel products. Implied in this theory is a multiplicative model where all three key elements (motivation, domain relevant skills, and creative-relevant processes) must be present to produce creative products. We evaluate each of these three dimensions to develop theoretical support for our research.

Motivation is both a state and relatively stable trait that is related to personality (Conti, Coon and Amabile, 1996; Ruscio, Whitney and Amabile, 1998). Taggar (2002) and other creativity researchers have relied heavily on the five factor model (Costa and McCrae, 1992) to evaluate the link between personality and creativity. However, there may be other distinct creative personality attributes that add further explanation to why individuals would be motivated to engage in creative problem solving and why they would be compelled to work harder to develop a creative product. Understanding this motivation may start from understanding the link between personality and creativity.

Amabile's second component, domain-relevant skills, can be viewed as the ability of the individual to learn tasks associated with their jobs or the knowledge that a person possesses in a specific domain (Amabile, 1996). For an individual to be creative in music, knowledge about music concepts is expected.

Creative-relevant cognitive processes, the combination of cognitive ability and learned creative processes, is the final component. Individuals develop on their own, or can be trained, to develop idea generating schemas. Previous experience in solving problems also generates learned processes that can be used in future creative problem solving. However, in much of the previous innovation literature, general cognitive ability has been used as a predictor of both domain relevant skills and creative processing skills (Ree and Carretta, 1998; Taggar, 2002). This approach may have caused researchers to look specifically at creativity relevant skill attributes that are closely tied to general cognitive ability, while ignoring other creative abilities.

1.1.1 Personality and Creativity

Research and practice has shown that the right people, in the right environment, using effective social and cognitive processes, can become highly innovative teams (Paulus, Dzindolet and Kohn, 2011). This statement demonstrates that people, process, and product are all important to team creativity. We look first at which people are the "right people"?

Creative personalities have been studied among common and highly creative participants (Hoff, Carlsson and Smith, 2011) to identify personality characteristics that are associated with individuals who have high creativity scores (Eysenck, 1995; Martindale, 1989). Some of these characteristics include self-confidence, enthusiasm, hard-working, tolerance for ambiguity, risk-taking, emotional, hostile and bitter (Feist, 1998; Martindale, 1989; Mumford et al.,

1993). This wide array of descriptive characteristics has also led to contradiction in the descriptions given of creative persons (Eysenck, 1995). To analyze these characteristics, and to make sense of these contradictions, we separate these characteristics into two groups: FFM personality (Costa and McCrae, 1992) and creative personality.

The prevailing measure of personality in management literature has been based on the five factor model which identifies conscientiousness, agreeableness, neuroticism, openness to experience, and extraversion as the most prevalent stable personality traits (Costa and McCrae, 1992). At the individual level, studies using the five factor model have consistently found that creativity is positively associated with openness to experience and negatively related to conscientiousness (Batey, Chamorro-Premuzic and Furnham, 2010; Feist, 1998). Explanations for these relationships include the belief that creative people use their openness to new ideas and experiences to find ways to solve problems, and therefore generate more creative ideas. Conversely, conscientious individuals often have highly restrictive rules that may impede the problem-solving process which may cause them to never consider novel solutions. The remaining three factors, of the five factor model, have shown weaker and more varied results. Research has shown that creative people low on agreeableness (Dudek et al., 1991; Eyseneck, 1995), low on extraversion (Kemp, 1981; Eysenck, 1995; Feist, 1998) and high on neuroticism (Bakker, 1991; Eysenck, 1995) are often less creative.

Team personality studies have also analyzed group elements of the five factor model (Costa and McCrae, 1992), but only a limited number of studies are available (Reiter-Palmon, Wigert and De Vreede, 2011). One study revealed a negative link between team conscientiousness and group creativity (Robert and Cheung, 2010) while a second indicated that groups with some extraverted members outperformed groups with no extraverts (Barry and Stewart, 1997).

Based on the results of individual and group personality studies, we expect that team personality attributes will be related to team creative product development. One obvious complexity added to group analysis is the necessity to determine how to measure team attributes. We will follow the lead of other creative researchers and average each personality variable across team members (Stewart, 2006). Based on these comments we propose that:

H1a.: Groups with a higher average openness to experience will produce more creative products than groups with lower average openness to experience.

H1b.: Groups with lower average conscientiousness will produce more creative products than groups with higher average conscientiousness.

H1c.: Groups with lower average neuroticism will produce more creative products than groups with higher average neuroticism.

H1d.: Groups with higher average extraversion will produce more creative products than groups with lower average extraversion.

H1e.: Groups with higher average agreeableness will produce more creative products than groups with lower average agreeableness.

Our second group of personality characteristics includes those personality attributes not included in the five factor model. A meta-analysis of creativity and personality literature found that additional factors account for some degree of individual creative performance (Feist, 1998) and that team creativity is a complex phenomenon where other personality factors affect team creativity (Baer et al., 2008). These additional factors include tolerance for ambiguity, self-confidence, intuition, resistance to closure, less conventional, driven, ambitious, hostile, and impulsive. At question is whether any of these new traits affect the development of creative products. One means of measuring these attributes is to analyze the individual's creative personality (Gough, 1979). Creative personality has been tested empirically and employees that scored higher on creative personality produced more creative work (Oldham and Cummings, 1996). We anticipate that the same processes that are present at the individual level will be identified at the group level for creative product development:

H1f.: Groups with a higher average creative personality will produce more creative products than groups with lower average creative personality.

Since most previous research has not included a measure of creative personality it is anticipated that they may have overlooked a personality dimension that may be vital to evaluating group product creativity. We propose that:

H1g.: Increased average group creative personality positively affects group product creativity above what is explained by the five-factor model of personality.

1.1.2 Creative Process

Creative problem solving cognitive processes have received much more attention at the individual level than at the group level (Reiter-Palmon, Herman and Yammarino, 2008). This is evidenced by the lack of cognitive process inclusion in a team creativity meta-analysis (Hulsheger, Anderson and Salgado, 2009). Research has potentially omitted other variables because it does not consider the complex nature of creative thought.

The production of high quality, original and elegant solutions to problems requires individuals, and groups, to develop ideas and then select those ideas which are considered to be the most creative or best fit for the situation. The process of generating creative responses is a combination of divergent thinking (Guilford, 1950; 1967), which is often referred to as ideation, and the evaluation of those ideas through convergent thinking. Based on the desire to focus on idea generation, we will focus only on divergent thinking processes.

To many people, divergent thinking has been considered a theory of originality. This is a simplified misconception based on only one dimension of the construct. Divergent thinking describes the processes that individuals use to generate new

ideas (Acar and Runco, 2011) and is a combination of cognitive processes adopted by individuals to produce many and varied ideas. During divergent thinking, individuals use learned schemas to generate ideas. General cognitive ability certainly affects divergent thinking ability since an individual must learn creative processes. However, research has shown that divergent thinking abilities can be improved by training individuals to better use effective idea generating schemas. This means that a person's divergent thinking ability may be due to factors other than just general cognitive ability. Therefore, we hypothesize that:

H2.: Groups with a higher average divergent thinking ability will produce more creative products than groups with lower average divergent thinking ability.

The Torrance Test of Creative Thinking (TTCT) is likely to be the most popular of all divergent thinking tests (Hunsaker and Callahan, 1995). The TTCT evaluates an individual's divergent thinking abilities by looking at fluency, flexibility, originality, elaboration, verbal criterion-referenced indicators, and figural criterion-referenced creativity indicators of developed products. Fluency is an evaluation of the number of non-redundant ideas, insights, problem solutions, or products generated during the creative process (Guilford, 1967; Torrance, 1966). Individuals that can produce more ideas will have a larger set of ideas to choose from when they engage in the convergent thinking process of selecting their best idea. Producing more ideas often results in producing more creative ideas. It is anticipated that an individual's ability to produce more ideas will increase their ability to produce creative products. It is also anticipated that these same processes will be present at the group level.

H2a.: Groups with higher average fluency ability will generate more creative products than groups with lower average fluency ability.

A second divergent thinking ability is flexibility which is demonstrated when different perspectives are used to develop creative ideas (Amabile, 1996). Flexibility is measured by evaluating the number of different approaches that individuals take to solve the problem (Torrance, 1995). Increased flexibility enables people to look at a problem from various angles, which can increase product creativity. Individuals that have developed the ability to look at problems from various viewpoints increase their degree of flexibility in creative problem solving and are expected to generate more creative products. Similarly, teams that have members with higher levels of flexible thinking will generate more creative group products.

H2b.: Groups with higher average flexibility in solving problems will generate more creative products than groups with lower average flexibility in solving problems.

Originality is the single dimension of divergent thinking that is often most related to the construct itself. However, originality only measures the degree to which an idea is uniquely different from ideas that would have been generated by others

(Guilford, 1967). Originality can be obtained by generating the idea or through elaboration on a previously generated idea or using flexible thinking to alter a previously generated idea. Individuals that are better at producing original ideas will generate more creative products. It is expected that the same process is true at the group level.

H2c.: Groups with higher average originality abilities will generate more creative products than groups with lower average originality abilities.

Another divergent thinking ability is elaboration which identifies an individual's ability to add details to products, ideas, or creative solutions (Torrance, 1995). Elaboration occurs after one idea has already been generated and embellishments are added to the original idea. In this manner the individual begins with the idea and then modifies it by attaching a complimentary element. The ability to elaborate allows individuals to develop more creative products. Groups are expected to use a similar process.

H2d.: Groups with higher average elaboration ability will generate more creative products than groups with lower average elaboration ability.

The TTCT also considers verbal criterion-referenced creativity indicators as contributors to divergent thinking. Responses are evaluated for richness and colourfulness of imagery, emotions/feelings, future orientation, humour, and provocative questions. Individual verbal response ability is seen as a complement to divergent thinking since the individual is relaying their idea through their verbal response. Individuals who have developed the unique ability to add layers of richness and colourfulness, or emotions, humour or future orientation will have a greater chance of having their idea evaluated as being creative. It is anticipated that these abilities apply to the group level as well.

H2e.: Groups with higher average verbal criterion-referenced creative ability will generate more creative products than groups with lower average verbal criterion-referenced creative ability.

A similar situation is expected with figural criterion-referenced creativity where responses measure the individual's resistance to premature closure, unusual visualization, movement and/or sound, richness, abstractness, storytelling, internal visual perspective, and fantasy. The elements contained in the figural responses can also contribute to other divergent thinking elements, but is predicted to add to the level of creative productivity at both the individual and group level.

H2f.: Groups with higher average figural criterion-referenced creative ability will generate more creative products than groups with lower average verbal figural-referenced creative ability.

2 METHODOLOGY

This study was conducted at a large southeastern US public university. Students were recruited from several undergraduate classes and students were informed that the study involved the evaluation of personal creativity attributes and group creative processes. In total 349 undergraduate students participated where respondents were 54% male with an average age of 22. Data collection was conducted in two phases. First, demographic data, personality assessments and divergent thinking assessments were conducted using self-report instruments. The purpose of these assessments was to determine individual characteristics that each student brought to their team. After the individual assessments were complete, the respondents were randomly assigned to groups of 3 or 4 students, which comprised 105 groups. The decision to use groups of this size is consistent with other literature which suggests that groups that are too large allow for social loafing while smaller groups do not perform as well (Mumford et al., 1993). Each group was given the task of developing a novel product in fifteen minutes and instructions were read out loud to ensure students understood the task. Groups worked together in separate areas of the classroom discussing options. After thirteen minutes, groups were told they had two minutes to finalize their discussions and choose their best answer. At the conclusion of the fifteen minutes, one person from each group recorded the group's best answer on a paper which was collected by the researchers. The purpose of the team assignment was to determine how each team used the individual attributes of each team member to develop a group idea.

2.1 Measures

Group level creativity – The dependent variable in this study is the level of product creativity. Each group was given fifteen minutes to solve a novel task (Mumford, Hester and Robledo, 2011a), to "develop a new use for aluminium foil". Products were evaluated for novelty, resolution, and style using the Creative Product Analysis Matrix (Besemer and Treffinger, 1981). Each product was scored independently by two expert raters with extensive experience in testing and scoring performance measures for "gifted and talented" students in the State of Virginia educational system. Interrater reliability was 0.98, indicating strong agreement between raters.

Creative Personality – Gough's (1979) creative personality scale (CPS) was used to evaluate individual creative personality. The CPS is an adjective checklist comprised of 30 items (18 are associated with creative people; 12 are associated with less creative people). Scoring of the scale consists of assigning a +1 for each creative adjective checked by the respondent and a -1 for each uncreative adjective checked. Oldham and Cummings (1996) report an alpha reliability of 0.70 for this measure. The CPS is a personality checklist completed by each individual and it is not reasonable to expect there to be any substantive agreement between group members. We follow the recommendations by Chan

(1998) on aggregation using the additive model and average individual CPS scores for the group level of analysis.

Divergent thinking ability – We used the Abbreviated Torrance Test for Adults (ATTA) to evaluate divergent thinking ability. The ATTA is a shortened version of the original Torrance Test of Creative Thinking (TTCT) (Torrance, 1966) which has been widely used in creative research for over 40 years (Cramond et al., 2005). Respondents complete three activities. In task one the individual lists problems associated with a novel concept. The second and third tasks ask respondents to complete the drawing of somewhat abstract figures and title their drawings. The same raters used to evaluate the creative product were also used to rate the ATTA and interrater reliabilities for the six dimensions of the ATTA, fluency, originality, elaboration, flexibility, verbal, and figural were 0.99, 0.97, 0.97, 0.99, 0.95, and 0.97 respectively. These reliabilities are all within the normal range .95 to .99 reported in the ATTA manual (Goff and Torrance, 2002). As with the CPS, ATTA scores were averaged at the group level (Chan, 1998).

Personality – The five factor model of personality (Goldberg, 1990) was used in this study. The Mini International Personality Item Pool (Mini-IPIP) (Donnellan et al., 2006), which is a shortened version of the 50 item IPIP developed by Goldberg (1990), was used to measure the five personality factors. The alpha reliabilities for openness, conscientiousness, extraversion, agreeableness, and neuroticism in this study were 0.75, 0.67, 0.82, 0.86, and 0.70 respectively.

Cognitive ability – Cognitive ability was proxied with standardized test score averages for all participants.

2.2 Analytical Approach

Hierarchical regression analysis and correlations were used to test hypotheses. Three models were used to control for the influence of variables on creative performance. Model 1 consists of the primary controls in the study, the big five personality traits and cognitive ability. CPS was added in Model 2 and ATTA components were added in Model 3. Analyses were performed at the group level.

3 RESULTS

Tab. 1 summarizes the means, standard deviations and correlations among all variables included in this study. *Hypotheses 1a* through *1e* predicted that the average individual personality traits would be related to team creative performance. The correlations presented in Tab. 1 show that extraversion (*H1d*) is the only group personality trait that is significantly related ($r=0.217$, $p<0.05$) to total product creativity. The regression results in Tab. 2, Model 1 show that the inclusion of all five personality traits and cognitive ability have a significant R^2 of 0.18 ($p<0.01$). However, the regression coefficients for all five personality traits are not significant. Based on these results, our study shows limited support for *Hypothesis 1d* where average team extraversion is significantly related to

team creative performance.Openness to experience (*H1a*), conscientiousness (*H1b*), neuroticism (*H1c*), and agreeableness (*H1e*) are not significantly related to team creative performance.

Table 1 – Group Means, Standard Deviations, and Correlations

	Mean	Std. Dev.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Conscientiousness	4.77	0.85														
2. Agreeableness	5.37	0.56	0.32**													
3. Neuroticism	4.56	0.71	0.22*	0.23**												
4. Openness	5.32	0.63	-0.22*	-0.04	0.01											
5. Extraversion	4.76	0.95	-0.26**	-0.15	-0.14	0.13										
6. Grade	0.12	0.54	0.14	0.02	0.17	0.00	-0.16									
7. CPS	5.26	3.24	-0.18	0.01	0.18	0.30**	0.25**	0.08								
8. Fluency	15.86	1.43	-0.27**	0.00	0.03	0.04	-0.08	0.04	0.25**							
9. Originality	16.87	1.52	0.08	-0.02	0.23**	0.04	0.07	0.23*	0.42**	0.35**						
10. Elaboration	15.78	1.51	-0.24*	-0.14	-0.22*	0.33**	0.24**	0.09	-0.05	0.33**	-0.18					
11. Flexibility	15.33	1.44	0.06	0.19*	0.02	-0.11	-0.12	0.00	-0.07	0.47**	-0.01	0.19				
12. Verbal	3.53	1.25	-0.05	-0.07	0.12	0.19*	0.28**	0.03	0.46**	0.34*	0.49**	0.09	-0.14			
13. Figural	6.95	1.80	-0.19*	-0.06	-0.14	0.29**	0.19*	-0.04	0.19	0.26**	0.15	0.53**	-0.10	0.19*		
14. Divergent Total	74.31	5.15	-0.19	-0.03	0.00	0.23*	0.17	0.10	0.34**	0.78**	0.50**	0.59**	0.39**	0.53**	0.64**	
15. Total Creative Product	14.29	5.33	0.00	0.08	0.07	0.06	0.22*	0.13	0.30**	0.15	0.29**	0.22*	-0.06	0.39**	0.26**	0.36**

Notes: *p<0.05, **p<0.01

Tab. 2 presents the results of hierarchical regression for all three models with total group creative performance as the dependent variable.

Hypothesis 1f suggested that groups with higher average creative personalities would produce more creative products than groups with lower average creative personalities. Tab.1 correlations support this claim since average team creative personality was positively and significantly related to total creative product (r=0.30, p<0.01). Tab. 2, Model 2 also supports *H1f* by having a positive and significant unstandardized regression coefficient (β=1.19, p<0.01) for CPS.

Hypothesis 1g stated that increased creative personality would affect group creativity above what was explained by personality. Tab. 2, Model 2 results support *H1g* by showing that adding CPS increases the explanatory power of the model (R^2 change =0.36, p<0.01).

Table 2 – Group Level Results for Total Creative Performance

Variable	Model 1 Control Variables	Model 2 Control and CPS	Model 3 Control, CPS, and ATTA
Conscientiousness	-0.70	-0.31	0.18
Agreeableness	1.22	1.13	0.96
Neuroticism	0.33	-0.82	-0.70
Openness	0 .68	-0.90	-0.91
Extraversion	0.32	-0.60	-0.24
Cognitive Ability	3.94**	3.35**	3.16**
CPS		1.19**	0.94**
Fluency			1.20**
Originality			0.36
Elaboration			-0.18
Flexibility			-0.72*
Verbal			-0.02
Figural			0.31
Model df	6	7	13
Model R^2	0.18	0.54	0.65
R^2 *Change*	0.18**	0.36**	0.11**

Notes: Value in cells are unstandardized coefficients *p<0.05, **p<0.01

Hypothesis 2 claimed that groups with higher divergent thinking abilities would produce more creative products and *Hypotheses 2a* through *2f* further defined which of the six divergent thinking abilities would affect creative product development. Tab. 1 correlations show that the team's total divergent thinking ability (*H2*) is positively and significantly related to the total creative product (r=0.36, p<0.01). Fluency (*H2a*) was not significantly related to the total creative product (r=0.15, p>0.05). Team flexibility (*H2b*) was not related to overall team creative (r=-0.06, p>0.05). Team average originality (*H2c*) is positively and significantly related to total creative product (r=0.29, p<0.01). Elaboration (*H2d*) is positively and significantly related to total creative product (r=0.22, p<0.05). Verbal criterion-referenced divergent thinking (*H2e*) was also positively and significantly related to total creative product (r=0.39, p<0.01). Figural criterion-referenced divergent thinking (*H2f*) was positively and significantly related to total creative product (r=0.26, p<0.01).

Tab. 2, Model 3 adds further support for *H2* by having a significant unstandardized regression coefficient for at least one of the divergent thinking dimensions, and by also having a significant change in R^2 of 0.11. The only significant divergent thinking trait was flexibility which is in the opposite

direction than expected (β=-0.72, $p<0.05$). There is significant support for the claim that team's divergent thinking abilities are positively related to team creative performance. At the dimension level, there is partial support for fluency, originality, elaboration, verbal-criterion referenced, and figural-criterion referenced as predictors of team creative product development.

The results from this study show how important creative personality and creative processes are in development of creative products by a team. The results of this investigation advance team creativity research in three areas. The first contribution comes from the identification of an important personality attribute for predicting team creativity. The results of this study show that creative personality adds approximately 36 percent more explanatory power than just cognitive ability and the FFM in predicting team creativity. Most previous research has focused on using the five factor model to depict the personality attributes that are significant in team creativity. Our research supports the claim that these five dimensions are important. However, the more important personality element is creative personality. This may be related to Amabile's (1996) motivation component for creative performance. Individual's that score higher on creative personality may be more confident in their abilities to be creative and therefore less reluctant to contribute as creative team members.

A second major contribution of this research is the dissection of creative ability into creative ability components. By using a proven means of assessing individual divergent thinking ability, we were able to show that divergent thinking ability further increased the R^2 of our model from 0.54 to 0.65. The results for the six divergent thinking dimensions (fluency, originality, elaboration, flexibility, verbal and figural criterion-referenced creativity) showed that every dimension had an effect on at least one aspect of team product evaluation. This is an important outcome since most previous research only considered fluency to be a significant predictor of product creativity.

The final implication of this research comes from the design of our study. Our research design measured the team product, individual performance, and individual behaviours. We combined these measures with three separate methods of evaluation; survey studies, psychometric studies, and qualitative studies. The evaluation of creative processes and products involves the development of complex research design techniques. We believe that this study contributes to previous research by including three methods and three measures in one study.

This study has significant implications for managers. Our identification of creative personality as a key indicator of team creative performance allows human resource managers a means of identifying and hiring for the potential to perform creative work. In addition, creative personality allows managers a means of identifying which members may perform well on creative problem solving teams. Another contribution is the identification of divergent thinking skills, primarily fluency and originality, as key individual creative abilities that contribute significantly to the creative product. Finally, we have demonstrated that various creative personality and creative processes are in play when groups

are asked to develop creative products. Once defined, the manager is more capable of determining which members to include on creativity teams.

4 CONCLUSION

Based on the findings of this study, we argue that the study of a team's creative problem solving ability goes much deeper than personality, cognitive ability, and the number of ideas a team can generate. Our evaluation of divergent thinking abilities suggests that creative ability is not just a function of cognitive ability. Individuals develop creative abilities and teams use these abilities to develop ideas that can be evaluated by the group. Added to this is the idea that there are creative personality attributes that may cause some individuals to either be more creative, or at least feel like they are more creative. This may increase the individual's motivation to participate and share their ideas with the team. However, we realize that this study has limitations based on the sample and the simplicity of the creative task assigned. Future studies should try to evaluate the creative process in actual business environments. We believe this study helps identify the individual attributes that should be evaluated for these studies. It is almost a certainty that organizations will continue to use groups to solve their most important problems in the future and this research begins to uncover the attributes that leaders should consider when they choose the individuals that will perform on these teams.

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