THE EFFECTS OF LEADERSHIP AND GENDER ON DYAD CREATIVITY

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The present article considers how leader emergence and leadership style affect creativity in dyads of varying gender composition. While there is extensive research regarding dominative dynamics within group settings and their impact on creativity, less has focused on gender as an additional influencer to the creative process and its effect on dyad efficiency. To this end, leadership emergence and leadership style within dyads of varying gender composition was examined. Creativity was measured using five insight problems. One hundred and eight participants participated in this experiment and were assigned to either same gender or mixed gender dyads, resulting in an all-male, all-female, or mixed gender pairs. Dyads with emerged leaders solved more problems and solved them faster than dyads without leaders. Pairs with autocratic leadership solved problems faster, however they solved less problems correctly as compared to groups with the democratic leadership style. Leaders were more likely to emerge in an all-male dyad, compared to other conditions. And while all-male dyads solved problems faster, there was no difference in solution rates among different gender conditions. In all, examination of the creative problem-solving behaviors in dyads of the varying gender composition brought a new understanding of factors influencing creativity in small groups.

Keywords: *creativity, dyads, leadership, gender.*

Much work has been done in recent years looking at how certain leader qualities in the workplace affect individual employee creativity and creativity within large groups (e.g., Mumford, 2000; Oldham & Cummings, 1996; Rickards & Moger, 2000;). Studies show that the presence of a leader may foster creative performance, particularly, if a leader prompts others to think creatively (e.g., Basadur, 2004; Qu, Janssen, & Shi, 2015). Various findings also suggest that a supportive leadership style correlates with a higher employee creativity, while a controlling leadership style negatively affects employee creative performance (Deci, Connell, & Ryan, 1989; Deci & Ryan, 1987; Mumford, 2000). These studies predominantly ex-

amined large groups of individuals having the hierarchical organizational structure, in which a leader was typically assigned to a group. Yet, a considerable amount of creative work is accomplished by small groups of individuals, such as research teams at universities, product development teams, process actions teams, etc. In the case of academic research teams, these groups often consist of two or three primary investigators. Consequently, organizational leadership may not play a significant role, but what does matter is leadership emergence and behavioral styles within this small group. In such small groups, leadership may emerge in different ways, or may not emerge at all. Also, the role and emergence of a leader in a small group might be qualitatively different from a leader's role within the broader organization (Mehra, Marineau, Lopes, & Dass, 2009; Oliveira, Boz, Broadwell, & Sadler, 2014). Leadership within small groups might be more dynamic, and the emergence of a leader might be based on the factors that are more similar to the formation of friendship rather than the factors that generally determine leadership emergence within a large organization.

The phenomenon of leader emergence in groups with no assigned leader is well-documented (starting with Ansbacher, 1951; Cattell & Stice, 1954). After initial interaction among group members, while engaged in a task, a leader sooner or later emerges within the group. Different theories have explained this phenomenon in the literature, mostly using the trait approach to leadership (e.g., Cattell & Stice, 1954). A more recent theoretical explanation has been developed by Guastello (2007 a, 2007 b) – how and why a leader emerges – explains the phenomenon using the mathematical *Swallowtail catastrophe model.* Guastello's model proposes that leader emergence depends on complex and dynamic multidimensional interactions among variables such as personal attributes of group members, situation, and the type of task.

The model predicts that on creative problem solving tasks, leader emergence will be predicted by the participants' behaviors such as the clarification of the task and ideas of other members, gatekeeping, facilitating others' ideas, controlling the conversation, and the consideration of other members' interests. In short, these behaviors may be grouped under an umbrella of behaviors titled "controlling the conversation" (Guastello, 2007 a, p. 364) and "task control" (Guastello, 2007 b, p. 607). Another parameter that may be used to predict how a leader will emerge is composed of variables such as information sharing, production of creative ideas, competing with other group members, and a high concern for the outcome, these being collectively titled "creativity*"* (Guastello, 2007 a, p. 364).

Multiple taxonomies have been offered to classify differing leadership styles (e.g., Bass, 1981). For example, Kurt Lewin and colleagues (Lewin & Lippitt, 1938; Lewin, Lippitt, & White, 1939) offered operational definitions for three types of leadership style: autocratic, democratic, and laissez-fair. Laissez-fair groups in Lewin's studies clearly showed a decreased member satisfaction and a decreased productivity. Thus, later researchers concentrated on the former styles (autocratic and democratic) as more promising (for reviews, see: Anderson, 1959; Bass, 1981; Stogdill, 1974).

A democratic leader has been defined in leadership research literature as "friendly, helpful, and encouraging participation", while an autocratic leader has been described as "directive, controlling, and discouraging or suppressing participation" (Luthar, 1996, p. 340).

Many other leadership style taxonomies have been developed, yet, arguably, the majority of these taxonomies may be simplified into two distinct categories: autocratic vs. democratic leadership style (Luthar, 1996). In turn, these can be related to controlling vs. supportive leadership styles; descriptors used in other literature (e.g., Deci et al., 1989). While some theorists propose that these two styles might simply just be two ends of the same continuum, research suggests that they are distinctly different and may be conceptualized as such (e.g., Eagly, Makhijani, & Klonsky, 1992).

Numerous studies (see meta-analytic review: Gastil, 1994) looked into the effectiveness of autocratic vs. democratic leadership styles in various domains, mainly examining group productivity and member satisfaction as outcome variables. Research findings are mixed, field studies revealed a moderate correlation between the democratic leadership style in productivity using the correlational design, but a negative correlation using the quasi-experimental design. Lab experiments, on the other hand, show no correlation. This suggests that democratic leadership is more effective when occurring naturally, and not as a result of experimental manipulation. Moreover, the further examination of experimental studies using task complexity as a moderator variable revealed a more complex relationship. In simple tasks there was a negative correlation between the democratic leadership and creativity, while for complex tasks, there was a positive correlation observed between democratic leadership style and productivity. Member satisfaction, on the other hand, was moderately correlated with the democratic leadership, but was also moderated by task complexity. In simple tasks, a correlation between democratic leadership style and satisfaction was detected, however, in highly complex tasks the correlation was near zero.

Group gender composition may alternatively affect group dynamics, leader emergence, and consequently, group creativity. Notably, gender has been shown to affect preference for becoming a leader, men having a higher motivation to emerge as a leader than women (e.g., Schuh et al., 2014). At the same time, perceptions of leadership effectiveness seem to relate, at least in part, to the gender of a leader. Luthar (1996) has found that females evaluate female leaders more positively than they evaluate male leaders. Similarly, men exhibit a preference towards having their own gender in leadership positions. Both genders perceive female autocratic leaders as more effective than male autocratic leaders. Also, studies demonstrate that male presence within a group may cause women to experience performance deficit. At the same time, men tend to share more ideas in the presence of women as compared to offerings made within all-male groups (Myaskovsky, Unikel, & Dew, 2005). Women's performance on tasks that are perceived as masculine in nature, such as mathematical skills, declines as the number of men in a group increases (Inzlicht & Ben-Zeev, 2000). Women's subjec-

tive feelings of comfort also seem to decline in the presence of men within a group (Hawkins & Power, 1999).

While the aptitude for creativity seems to be the same for both genders, historically in Western culture there are more eminent men creators than women creators (Kaufman & Sternberg, 2010). This is most likely due to cultural and societal influences that have historically limited women's access to creative fields where they might likely have been widely recognized and left a noticeable impact. Such fields as architecture, science, literature, and visual arts have been traditionally dominated by men, while women channeled their creative activity to more perishable fields, such as textile, embroidery, and clothes making (Ludwig, 1992). While somewhat different in character, these cultural influences may still exist today, implicitly making women less likely to engage and succeed in those tasks perceived as masculine in nature.

Multiple studies demonstrate the existence of an attitude within North American culture that views leadership as stereotypically masculine (see meta-analysis by Koenig, Eagly, Mitchell, & Ristikari, 2011). There have been different approaches devised to study and explain this stereotype. For example, Schein (1973) proposed the *think manager–think male* paradigm which correlates female and male stereotypes to a typical leader stereotype. A large number of studies have found that the correlation between a stereotypical male and a stereotypical leader are stronger than between a stereotypical woman and a stereotypical leader (Koenig et al., 2011). Another method, called the *agency-communion* paradigm, examines the overlap of a good leader stereotype and separately the feminine and masculine stereotype overlap (Powell & Butterfield, 1979). Similarly to the previous approach, studies using this paradigm find that good leader stereotype includes more highly masculine features (Koenig et al., 2011). The third approach, the *masculinity-femininity* paradigm (Shinar, 1975), investigates different leadership categories and their correlations to masculinity-femininity scales. The results are similar to those of the previous approaches, reporting stronger correlations between highly masculine features and leadership (Koenig et al., 2011).

These findings all suggest that whether a female or male leader emerges within a dyad, he or she will tend to exhibit more masculine traits, such as assertiveness and independence in decision making, which may undermine group discussion and thus dyad creativity. On the other hand, dyad gender composition may affect group dynamics, who emerges as a leader, and what leadership style is utilized, all which consequently affect group creativity.

Of particular interest to this study was the question of how leadership emergence and leadership style affect creative insight problem-solving within dyads with a varying gender composition. Insight studies have been widely used in examining the creative process (e.g., Ash, Cushen, &Wiley, 2009; Duncker, 1945; Gilhooly, Ball, & Macchi, 2015; Tidikis & Ash, 2013). Many researchers hold the study of insight central to the study of creativity (e.g., Duggan, 2015; Duncker, 1945; Weisberg, 2006). Insight problems are designed to mimic creative processes in the real world and are defined as unfamiliar problems that require the solver to change the problem's representation in order to solve

it (Ash & Wiley, 2006). The process benefiting insight problem solutions is often viewed as two-staged (Knoblich, Ohlsson, Haider, & Rhenius, 1999). First, the solver explores the most obvious solution(s) coming to mind based on previous experience. However, correct solutions are not generally obtainable using familiar solutions. At this point, the solver reaches impasse, a state where no further progress towards a solution can be made. Next, in order to achieve a solution, the solver must change the manner in which he/she views the problem, or restructure the problem's representation (Davidson, 1986; Duncker, 1945; Kaplan & Simon, 1990; Lv, 2015; Ohlsson, 1992; Wertheimer, 1945/1959). Multiple iterations of these two stages might be necessary before a solution is reached.

Despite the voluminous amount of literature on how different leadership styles and leader qualities affect performance, particularly in larger teams, less studies have looked at how the mere presence of a leader in small groups influences its performance. Based on the literature examining leadership emergence, it does appear that leadership emergence is inevitable and occurs naturally over time. Humans seem to have a need for a leader, particularly when working on a common task. Thus, the leader's existence appears to have an evolutionary function. The exact nature of this function is debated in the literature. For example, the *evolutionary theory* proposes that a leader is necessary for coordination among group members when carrying out a common task (Van Vugt, Hogan, & Kaiser, 2008). Other researchers (e.g., Guastello, 2009) dispute this position by explaining the inevitability of leadership emergence in terms of a need for communication. In this view, leaders exhibit behaviors that are useful to the group and help group members communicate freely. In any case, whether serving as a coordinator or communication facilitator, a leader seems to serve a valuable function, helping the group to accomplish the task. Thus, *Hypothesis 1* predicts that the presence of a dyad leader will foster a creative problem solving performance.

Research literature shows that men have a higher motivation to become a leader than women (e.g., Schuh et al., 2014). Thus, *Hypothesis 2* predicts that the dyad gender composition will affect leadership emergence, in particular, all-male dyads will more likely have a leader emerged compared to all-female dyads.

A meta-analytic review of previous research (Gastil, 1994) showed that on difficult tasks the democratic leadership style fosters group performance. Previous studies, using a set of the insight problems used in the current study, reported solution rates below 50% (e.g., Ash & Wiley, 2006); thus, it was feasible to classify these problems as "difficult". *Hypothesis 3* predicts that in dyads where a leader emerges, the autocratic leadership will impede creativity, while the democratic leadership will foster creativity.

An exploratory *Research Question 1* was also developed in this study. Previous literature showed that there might be a gender difference in problem solving performance and eminent creativity, with men exhibiting a more eminent creativity and better solution rates on problems that are perceived as stereotypically masculine. Since it was not clear if the insight problems would be viewed as stereotypically

masculine or not, this research did not predict the direction of the relationship. Thus, this research question aims to examine whether dyad gender composition will influence the insight problem solving performance.

Method

Participants and Design

A total of 108 people, 54 women and 54 men, participated in this study. Participants' age ranged within 18–42 years. Participants were recruited from a pool of undergraduate students in attendance at a large Southeastern university in the United States and received a course participation credit in exchange for their participation. In the United States, introductory Psychology courses typically require student participation in research studies conducted within the Psychology Department; conversely, higher-level courses often offer research participation as an extra-credit opportunity. Students with mandated research requirements, i.e. those enrolled in lower-level courses, could otherwise satisfy their research participation requirement by submitting an article critique in lieu of research participant activities.

Participants scheduled their preferred participation time slots from a list of available times by signing up for a one-hour session using the university's computerized research system (SONA). To ensure randomly created dyads of various gender composition, two parallel studies were created in SONA: one allowing only females to sign up, and the other allowing only males to sign up. Some time slots allowed two persons of the same gender to sign up, creating either all-male or all-female dyads. Other time slots linked with the corresponding slots from the parallel study and signed participants into mixed-gender dyads. The time slot order corresponding to different conditions was randomized using a random number generator. Thus, male and female participants were randomly assigned to either a same gender or a mixed gender dyad resulting in three conditions (all-male, all-female, and mixed gender pairs). The data were collected from the total of 54 dyads, one dyad per experimental session (for each condition's *n* see Table 2). Ethical guidelines as set forth by the American Psychological Association were followed; informed consent was required of all participants, and their participation was video-recorded for the later analysis.

Materials

Problems. The five problems used in the experiment were cognitive insight problems that had been previously used in earlier studies to simulate creative problem solving (see Ash & Wiley, 2006; Tidikis & Ash, 2013). These problems required participants to manipulate objects: matchsticks, hexagons, and glasses (adapted from Ash & Wiley, 2006; Ashcraft, 1994; Katona, 1940). In search of a solution, participants manipulated actual physical objects placed on a table at which they were seated. Two problem types were used: Few Moves Available (FMA) and Many Moves Available (MMA) (see Figure 1). The difference between these problem types is the availability of the initial search space prior to arriving at impasse, or until the problem's representation is changed. In FMA problems, the solver arrives at impasse right at the beginning of problem presentation. In MMA problems, the solver has op-

tions available to work towards a solution before arriving at impasse. The two sets of problems, FMA and MMA, have similar solution rates (Ash & Wiley, 2006), and each problem in a FMA-MMA pairing is identical in terms of manipulation or nature of restructuring required to arrive at an insight. For example, the number of available moves in the hexagon problem (Problem 1, Figure 1) is determined by the start positioning of hexagons. The FMA version has fewer moves available before the solver arrives at impasse as compared to the MMA version. However, both problems require the solver to move from a two-dimensional to a three-dimensional representation of the problem by placing hexagons on top of one another in order to successfully solve. As no difference was found in solution rates across conditions between FMA and MMA problems, the two types of problems were combined for further analyses.

Apparatus. The participants' performance was recorded using a MiniDV video camera; its video feed was routed directly into a Macintosh computer workstation, thereby allowing each participant's behavioral characteristics to be later analyzed.

Procedure

Upon their laboratory arrival, participants provided their informed consent to partici-

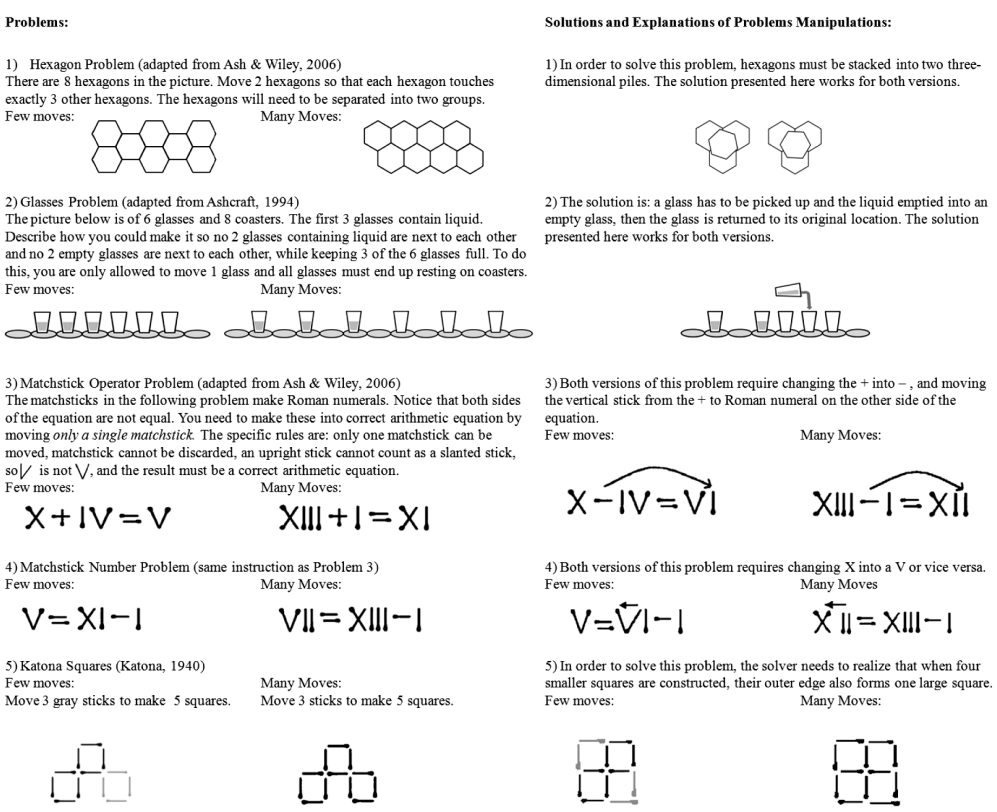

Figure 1. ***Examples of insight problems***

pate and be videotaped. Both dyad members were then asked to approach a table where a researcher presented them with a series of problems. They were given five minutes to complete each problem. Participants were encouraged to verbalize their thinking process related to problem solving by using the Think Aloud Protocol. The Think Aloud Protocol has been successfully used in other studies investigating the thinking process of participants working on different tasks (e.g., Ericsson & Simon, 1980, 1993; Khandwalla, 1993). The problem presentation order was randomized across the participants. The participants were debriefed at the end of each session.

At the end of each trial, participants were asked if they had a previous experience with any of the problems presented during their session. In the case of a positive response, data pertaining to a previously seen problem were discarded and treated as missing values in the analyses.

Data coding. After viewing video recording of each trial, two independent coders coded the participants' behavior for the number of correctly solved problems, solving time, leadership emergence, and leadership style. To establish inter-rater reliability for the two coders, the following coefficients were calculated. The interclass correlation coefficient for solving time was $ICC = 0.92$; the number of problems solved, $ICC = 0.86$; leadership emergence, $KR20 = 0.71$; and leadership style, $KR20 = 0.73$, all of which are indicative of good to acceptable rater agreement. For the number of problems solved and solving time, the mean of the two coders' responses was used for analysis.

As only a limited number of studies have been done examining leadership emergence and style within dyads, the current study conceptualized leadership emergence and style based on studies examining larger groups. Coders were extensively trained to identify leadership emergence and leadership style. Leadership emergence was defined based on previous meta-analytic studies by Eagly & Karau (1991) and Guastello (2007 a) as a group of behaviors collectively described as one group member controlling the conversation. This included such behaviors as initiating and guiding the discussion, clarifying responses given by other members, clarifying the ideas offered, being concerned with the quality of the final answer, and either having the last word or initiating discussions regarding the making of final decisions as to what solution to present and when to declare an answer final. If at least one of these behaviors were demonstrated by either one or both dyad members while working towards a problem solution, a dyad was coded as having an emerged leader. In the absence of any of these behaviors, a dyad was coded as not having an emerged leader.

An autocratic and democratic leadership coding rubric was developed based on the previous research and theoretical work (Gastil, 1994; Lewin & Lippitt, 1938; Luthar, 1996). Autocratic leadership was defined as one dyad member dominating the group's discussion and determining the final decision as to what answer to present and when to do so, regardless of the other member's opinion. Autocratic leadership was also defined as suppressing another member's participation, being directive, controlling, non-friendly, and discouraging the other member's effort. If an emerged leader displayed one or more of these behaviors, the dyad was coded as having an autocratic leader. The democra-

tic leadership style was defined if a leader emerged, while allowing other member to express ideas, being helpful in answering questions, and offering friendly encouragement to participate in making decisions as to what answer to present and when to do it. If an emerged leader exhibited one or more of these behaviors, the dyad was coded as having a democratic leader. Two coders coded video material for the leadership emergence and leadership style using a dichotomous coding system (yes/no for the leadership emergence, and democratic/autocratic for the leadership style). Their responses were verified by the third coder, and in the case of disagreement (e.g., one coder coding leader emergence and the other coding the absence of a leader), the third coder made a determination as to what response to select.

Results

Descriptive statistics for the study variables were as follows. A leader emerged in 61% of the dyads. For the leadership style, 70% of the groups where a leader emerged exhibited a democratic and 30% an autocratic leadership style. Data of the number of problems solved were normally distributed (skewness = –0.28, kurtosis = –0.33), with M = 3.5, SD = 1.22. Data of the solving time were also examined for normality and found to be within acceptable parameters (skewness = 0.18, kurtosis = –1.1), with M = 2.01, SD = 0.99.

To test the hypothesis whether the presence of a leader would foster a better problem solving performance (*Hypothesis 1)*, this research looked at how the emergence of a leader within a dyad affects solution rate and solving time. Independent samples of t-tests were used to test the hypothesis. Assumptions of the independent t-test such as the homogeneity of variance and the normality of the distribution of differences among the groups' scores were examined, and no violations of the assumptions were found. For solution rates, the groups in which the leader emerged solved more problems than did groups with no leader (Table 1). Groups having

Table 1. ***Independent samples t-tests for solving time and number of problems solved***

Independent variable	**Dependent variable**	***n***	***M***	***SE****	***t***	***df***	***p***	**95% CI***	**Cohen's *d***
Leader emerged	Solving time				2.78	52	0.021	0.09, 1.14	0.66
yes		33	1.75	0.17					
no		21	2.37	0.19					
Leadership style	Solving time				4.10	31	< 0.001	0.50, 1.50	0.70
democratic		23	1.97	0.20					
autocratic		10	0.97	0.14					
Leader emerged	Number solved				–2.40	52	0.02	–1.48, –0.13	0.62
yes		33	3.66	0.16					
no		21	2.85	0.33					
Leadership style	Number solved				1.84	31	0.08	0.09, 1.45	0.68
democratic		23	3.48	0.23					
autocratic		10	2.80	0.29					

* SEs and 95% CIs are for the difference of group means.

an emerged leader solved problems faster than did groups with no leader (Table 1).

Hypothesis 2 predicted that the dyad gender composition would affect leadership emergence, i.e. all-male dyads would most likely have a leader emerged, followed by mixed gender, followed by all-female dyads. A Chi-square test for independence showed that a leader was more likely to emerge in all-male dyads (49%) than in mixed-gender dyads (30%) or in all-female (21%) dyads, χ^2 (1, N = 54) = 8.91, p = 0.012, φ = 0.41). An exploratory analysis of the relationship between a dyad's gender composition and the leadership style found no significant relationship between the variables, χ^2 (1, N = 54) = 1.29, p = 53, φ = 0.15.

Hypothesis 3 predicted that autocratic leadership would impede while democratic leadership would foster creativity in dyads. To test this, the current study looked at the leadership style, solution rates, and solving time for groups where a leader emerged. Independent samples t-tests were used to test the hypothesis. Assumptions of the independent t-test, such as the homogeneity of variance and the normality of the distribution of differences between the groups' scores were examined, and no violations of the assumptions were found. Independent samples of t-tests revealed that autocratic leadership groups solved problems faster than did groups with a democratic leader (Table 1). However, solution rates in groups with democratic leadership were higher than in groups with an autocratic leader. While the *t*-test result did not reach the conventional Alpha 0.05 level, the effect size was substantial (Table 1).

This study's exploratory *Research Question 1* aimed to examine whether the dyad gender composition would influence problem solving performance. One-way between-subject ANOVA was performed on solving time and solution rates. ANOVA assumptions of the homogeneity of variance and normality of scores on the dependent variable distribution within groups were examined, and no violation of the assumptions was found. ANOVA showed a significant difference among dyads of various gender composition for solving time, F (2, 51) = 4.66, p = 0.01, partial η^2 = 0.154. A follow-up Bonferroni comparison showed that all-male dyads solved problems significantly faster than did all-female dyads, p = 0.002, 95% CI [–1.67, –0.41], and mixed gender dyads, p = 0.015, 95% CI [0.16, 1.39] (for descriptive statistics, see Table 2). The one-way between-subject ANOVA detected no significant relationship between gender group composition with regard to solution rate, F (2, 51) = 0.46, p = 0.633, partial η^2 = 0.018 (for descriptive statistics, see Table 2).

Table 2. ***Means and standard deviations for number of problems solved and solving time***

Dyad gender composition	**Number solved**		**Solving time**		
	M	***SD***	***M***	***SD***	***n***
All-male	3.28	1.07	1.59	0.95	18
All-female	3.38	1.26	2.55	0.95	16
Mixed gender	3.00	1.34	2.00	0.90	20
Total	3.35	1.22	2.01	0.99	54

Discussion

One methodological challenge faced by this research was whether dyads could effectively represent the processes occurring within larger groups. In the literature, a debate exists as to whether dyads operate via the same mechanisms as do larger groups. While some researchers hold an opinion that a dyad is technically not a group, thus, it should not be used to study group processes (e.g., Moreland, 2010), others argue that one needs to look at the type of processes a researcher aims to study, and then to decide whether to use dyads as representatives of larger groups (Williams, 2010). Of course, one cannot study processes such as fissions development or coalition formation using dyads. However, more basic underlying cognitive processes are similar in both dyads and larger groups. The basic processes underlying creativity are thought to operate via the same mechanisms in groups of two, three, or more people. Thus, this research made no distinction between dyads and groups.

The first hypotheses predicted that a leader presence would foster the problem solving performance. Indeed, leadership emergence was related to a higher solution success and less time spent solving problems. A leader within a dyad might have enhanced the focus necessary to help move its members through the problem-solving process. Thus, overall, the presence of a leader led to faster problem solving. On the other hand, differing leadership styles (*Hypothesis 3*) showed a varying relationship with the problem-solving time and solution success. Interestingly enough, autocratic leadership was related to a faster solution time, but groups with an autocratic leader solved fewer problems successfully than did groups with a democratic leadership. Thus, it appears that the autocratic leader may have pressured the dyad into coming up with a quick answer; however, when solving creative problems, the early answer is not necessarily the correct answer, as problems are structured in such a way that the solver has to exhaust the obvious solutions first, before realizing the need to restructure the problem's representation in order to come up with a more creative solution (Ash & Wiley, 2006). Creative thinking requires time (Jung et al., 2010), thus, being under pressure to provide an answer may not be the best means of fostering creativity. A more democratic leadership style supports the sharing of ideas and allows for a more inclusive, thus equitable, decision-making process. In such groups, a final decision about what solution to choose and when to declare it as such stems from the majority, if not all, group members and not just from the view of its leader.

Hypothesis 2 predicted that a leader would most likely emerge in all-male dyads as compared to mixed-gender and all-female pairs. In support of this hypothesis, a leader was indeed more likely to emerge within all-male dyads as compared to mixed-gender or all-female dyads, which was consistent with the previous research (e.g., Schuh et al., 2014). The higher likelihood of a male emerging as a leader might be explained in terms of male motivation in becoming a leader. It might also be explained in terms of implicit expectations regarding gender and leadership that still prevail in the North American culture (Hoyt & Burnette, 2013). In turn, the gender dyad composition was related to the time spent solving a problem (*Research*

Question 1). All-male and mixed-gender dyads solved problems faster than did all-female dyads; however, gender was not related to the number of problems solved. The faster solving time for all-male dyads might be related to the greater likelihood of leadership emergence in such dyads. Leaders may have forced dyads to come up with a solution faster. Gender was also unrelated to leadership style, thus there was no relationship between being male or female and the type of the leadership style exercised (autocratic vs. democratic). These findings in parallel are reported from organizational studies that likewise did not find differences in the leadership style between genders (e.g., meta-analysis by Eagly & Johnson, 1990).

This study has added to the existing literature on leader and leadership style influence on group creativity by investigating how dyads solve insight problems. Small groups, such as research teams, often composed of a principal investigator and a co-investigator, are regularly engaged in creative activities requiring the insights that this study aimed to simulate. Understanding the factors that influence the insight problem solving in such small groups is important, as these factors may have different influence in small versus large groups. The strength of this study, as compared to the previous research on the topic, is that more stringent control of extraneous variables is offered by the nature of its experimental design. The next step would be to look at specific differences among the processes influencing creative problem solving in small versus larger groups. Another interesting question worthy of further consideration might be the examination of different types of creative tasks targeting the different cognitive processes of individual group members and how different leadership styles might influence performance on these tasks.

While studies have widely used insight problems as a measure of creativity (e.g., Ash et al., 2009; Duncker, 1945; Gilhooly et al., 2015; Tidikis & Ash, 2013), insight problems may represent only one aspect of the creative process. Starting with Guilford and colleagues (1951), the idea that creativity requires both divergent thinking (producing possible associations) and convergent thinking (narrowing down useful ideas) has been widely accepted by creativity researchers (Kaufman, & Sternberg, 2010). Finke, Ward, and Smith (1992) have proposed that solving insight problems involves both generative (divergent thinking) and solution stages (convergent thinking). However, measures of the solution rate and the solving time in insight problems might be more representative of the solution, or the convergent thinking stage of the creative process. In the future, researchers may gain benefit by including divergent thinking measures to investigate dyad creativity.

On the other hand, working in dyads while solving insight problems, as orchestrated by this study, may have provided participants a limited opportunity to exhibit the entire range of behaviors associated with leadership emergence. Looking to the future, it might be beneficial to incorporate the tasks that encourage participants to engage in behaviors conducive to promoting leadership emergence (i.e. allowing time for dyad members to get acquainted) prior to creative problem solving activities.

The main implication of this research is that the creative problem solving is af-

fected by dyad dynamics, such as the presence of a leader, leadership style, and gender composition of the group. While these factors have been investigated in larger groups, such as workplace teams, the present study is unique in that it has looked how the group dynamics affects the creative insight problem solving in dyads. Since a lot of creative work is done in smaller groups, these findings yield important information for many areas of human endeavor. Differing suggestions emerge from this research depending on whether the emphasis is placed on increasing creativity or group productivity. While organizational research has traditionally been mostly concerned with productivity, more recent technological and market developments suggest a shift towards the need to focus more on workplace innovation and creativity. Likewise, this research may provide educators who are greatly concerned with effective learning processes an insight into the factors that may lead to an increased creativity in small groups.

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LYDERIAVIMO IR LYTIES ĮTAKA DIADŲ KŪRYBIŠKUMUI

Viktoria Tidikis

S a n t r a u k a

Šiame straipsnyje yra nagrinėjama, kokią įtaką kūrybiškumui turi lyderio atsiradimas ir lyderio vadovavimo stilius abiejų lyčių dviejų žmonių grupėse. Yra daug tyrimų, nagrinėjančių, kaip vadovavimo dinamika veikia didesnių grupių kūrybiškumą, o klausimui, kokią įtaką mažos grupės narių lytis daro kūrybiniams procesams, skiriama mažiau dėmesio. Siekiant atsakyti į šį klausimą, mūsų tyrimas nagrinėja, kaip lyderio atsiradimas ir vadovavimo stilius veikia kūrybinių užduočių atlikimą abiejų lyčių porose. Kūrybiškumas buvo matuojamas naudojant penkias insaito užduotis. Šiame eksperimente dalyvavo šimtas aštuoni dalyviai, jie buvo suskirstyti arba tos pačios lyties, arba abiejų lyčių poromis. Taip paskirsčius susidarė vien moterų, vien vyrų ir abiejų lyčių poros. Rezultatai parodė, kad poros, kuriose vyravo lyderis, išsprendė daugiau užduočių ir tai padarė greičiau nei poros, neturinčios lyderio. Poros, turinčios autokratinį lyderį, baigė užduotis greičiau, deja, mažiau jų išsprendė teisingai, nei poros, turinčios demokratišką lyderį. Vyrų porose iškilo daugiau lyderių, nei kitose grupėse. Ir nors vien vyrų grupės baigė užduotis greičiau, šios grupės neišsprendė daugiau užduočių teisingai nei vien moterų ar abiejų lyčių grupės. Apskritai šis tyrimas atskleidė naują supratimą apie veiksnius, darančius įtaką mažų grupių kūrybiškumui.

Pagrindiniai žodžiai: kūrybiškumas, diados, lyderiavimas, lytis.

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