Group Diversity and Creativity: Does Anonymity Matter?

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GROUP DIVERSITY AND CREATIVITY: DOES ANONYMITY MATTER?

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Abstract

This study expands on the current body of research examining technology-supported groups, individual creativity, and group diversity. By incorporating each of these elements into the experimental design, our objective was to determine how technology can best be leveraged to promote group creativity. We argue that diverse groups who are visually anonymous – i.e., they make use of the anonymity feature of collaborative technology and have not seen each other – will produce more creative results than homogeneous groups or groups who are diverse but not visually anonymous. A lab experiment was conducted using 80 student groups for whom anonymity was manipulated and diversity characteristics were captured. Conducting analysis for surface- and deep-level diversity differences uncovered interesting patterns. First, our analysis of surface-level differences revealed our all-male groups produced more creativity ideas than mixed gender groups. Second, groups who demonstrated deep-level diversity were higher performing when visually anonymous. Taken together these findings suggest visual anonymity can potentially be beneficial to both homogeneous and diverse groups.

Keywords: creativity, diversity, collaborative technologies, anonymity
GROUP CREATIVITY, GROUP AFFECT AND COLLABORATIVE TECHNOLOGIES: UNDERSTANDING THE ROLE OF ANONYMITY

Introduction

This study seeks to add to the study of creativity by integrating two areas of study: 1) the relationship between diverse group composition and creativity (McLeod, Lobel, and Cox, 1996), and 2) the use of information technology (IT) to facilitate creativity (Dewett, 2003; Dennis, et al., 1997). A prominent theme in workforce diversity research is that companies need to manage diversity not only because of demographic trends but also because of diversity’s potential as a source of competitive advantage (Cox and Blake, 1991). This “value-in-diversity” theme rests on the hypothesis that diversity, when properly managed, produces tangible positive effects on organizational outcomes. One such positive effect is greater creativity. Diversity within a group refers to its composition in terms of the distribution of demographic traits and cognitive differences manifested as surface-level or deep-level attributes. While much of the belief in the “value-in-diversity” hypothesis rests on anecdotal evidence, empirical evidence is emerging to substantiate this claim in general, and as it relates to creativity in particular. For example, McLeod, et al, (1996) found ethnically diverse groups outperformed homogeneous teams by generating more creative ideas. Further, Miura and Hida (2004) found groups exhibiting deeper-levels of diversity (in terms of variety of perspectives) produced more creative ideas than groups that were similar in thinking.

Research on IT and creativity has focused on the productivity of electronic brainstorming (EBS) suggesting that technology provides a productivity boost to groups engaged in idea generation (Dennis, et. al, 1997). Typically, productivity of EBS has been operationalized as the number of unique ideas generated and/or idea quality – both of which are elements of creativity. While not directly considering EBS, some previous work (Carte and Chidambaram, 2004) describes how technology can help leverage the positive aspects of diversity while limiting its negative aspects. Essentially arguing that technology can reduce the immediate salience of surface-level diversity, the key source of process losses in diverse groups (Watson, et al., 1993), this theory of accelerated technology deployment may provide additional insight into the use of technology to facilitate group creativity.

A factor that is likely to improve interaction processes and minimize process losses is the visual anonymity offered by many collaborative technologies (CTs). Visual anonymity prevents group members from seeing physical cues that identify other group members (Walther, et. al, 2001) – in a technology-supported group context this means not putting a face with a (user)name. This capability may impede group members’ perceptions of diversity within the group thereby limiting any process losses that otherwise might have occurred due to group diversity. In addition to visual anonymity, many CTs also provide a level playing field to all participants, and the combination of these capabilities has been shown to lower evaluation apprehension and increase participation (Dennis, et al., 1988) potentially leading to greater satisfaction.

In this study we investigate the following research question: Does anonymity facilitate creativity and promote positive attitudes towards task processes in a diverse group context? Better insight into this question provides us with a perspective on how we can leverage the diversity of opinions and experience brought by members of heterogeneous groups. Given the increasing use of diverse teams in organizations and the rising globalization of corporations (Jehn et al., 1999; Kirkman et al., 2004), it seems imperative to examine such issues. In order to examine this question we draw on and integrate the literature in the areas of creativity, diversity, and electronic brainstorming systems (EBS).
THEORETICAL BACKGROUND AND HYPOTHESES

Creativity

Creativity has been defined as a useful and novel product (Garfield et al., 2001; Tierney & Farmer, 2002). Drazin, et al (1999) describe it as a process “consisting of the ebb and flow of creative engagement among different occupational subcultures…” (Drazin et al., 1999; p. 301), focusing primarily on sensemaking and interpretive perspectives. The conceptual framework that underlies the foundation of many creativity studies (Bostrom & Nagasundaram, 1998) is the theoretical model of the 4-Ps proposed by Fellers and Bostrom (1993) (Figure 1). In this framework, creativity is a dynamic and interactive phenomenon in which four elements interact. These four elements are press, product, process, and person.

Figure 1: Four P's of Creativity (Fellers and Bostrom, 1992)

The creative press or environment is the context in which creative products are created and explored. The creative product is the “thing” or object that draws praise or appreciation. It could be an idea, a new design, a strategy or a plan. Creative processes are procedures or methods used by individuals and groups to bring creative ideas to life. Persons are responsible for bringing the creative product into being, whether directly (e.g., by formulating the problem at hand) or indirectly (e.g., by generating ideas for a design). Each of the four P’s influences one another (Rhodes, 1961; Fellers and Bostrom, 1993). Creativity, thus, varies as a function and interaction of these four dimensions (Conti et al., 1996; Fellers and Bostrom, 1993). However, little research has systematically explored the relationship among three or four elements. In fact, as asserted by Bostrom & Nagasundaram (1998), most investigations focus primarily on one or two elements at one time. The empirical study presented here attempts to fill this void through an investigation of the interdependence among three components: product, press, and person.

Creative products are the outcome of the creative process and can be categorized in a variety of manners. In the past the creativity of an idea has been measured by its quality, novelty, originality, appropriateness, or usefulness (Mullen, Johnson & Sala, 1991; Barron, 1968). The way in which one chooses to measure the creative level or type of the creative product is oftentimes governed by the goal of the creative process. In some cases, the goal is to create a large quantity of ideas, while in other cases the goal is to create a few high quality ideas (de Bono, 1970; Gallupe, et al., 1992). In this paper, the creative product is defined in terms of uniqueness, originality and meaningfulness.

The creative press or environment is the context in which creative ideas are produced and explored. The press includes environmental and cultural factors (Amabile, Goldfarb, and Brackfield, 1990). In any given organization there can be a variety of cultures and subcultures that may be homogenous in some aspects but can vary drastically in other aspects. These cultures can have differing impacts on the creative process. When a technology is introduced to the creative process it brings with it its own internal environment. This work uses an electronic brainstorming system as the press in which the idea generation takes place.

While the creative product is the outcome of the creative process and the creative press (the environment) in which the creative products are produced, it is the human mind that is the seed to the products produced in the creative process. The cognitive process of creativity starts in the mind of individuals to formulate the problem and produce ideas. ACT* theory (Anderson 1983, 1987) argues that cognitive behavior is controlled by production rules—rules specifying the steps of cognition—that produce ideas when activated. Production rules are activated automatically by stimuli, without conscious control (Anderson, 1992). A stimulus will activate a rule, or set of rules, each of which has its own weight (i.e., likelihood of being activated), based on past experiences and inherent tendencies. Individuals tend to recall and cluster or bundle information together (frames) that they have encoded in similar ways (Meyer, 1970; Santanen, Briggs and DeVreede, 2004). As activation spreads through memory, rules related to the
stimuli and to each other have the greatest strength and thus are most likely to be activated (Dennis, Valacich, Connolly, and Wynne, 1996).

While the creative process can start within the mind of an individual, in most cases people do not work in isolation; they often work with others, as part of formal or informal groups (Drazin, Glynn, Kazanjian, 1999; MacCrimmon and Wagner, 1994). Not all ideas that are produced in a participant’s mind are actually contributed; the individual must choose to contribute a particular idea. As members work together they establish structures or traditions that constrain how they act by defining “normal” and “unacceptable” behavior (Gersick and Hackman, 1990) and thus impact the likelihood that an individual will share an idea with their group.

Various aspects of the group can have a significant impact on what is considered acceptable behavior and what ideas an individual is willing to share with the group. For instance, group diversity has been shown to impact group interactions and group creativity. Group diversity can increase creativity by giving the group a range of perspectives (Amabile, 1988) but it may also decrease creativity in the beginning of a group’s life, due to the group members’ limited shared experiences and the difficulty of dealing with diverse perspectives (which tends to decrease over time).

**Effects of Diversity**

Diverse groups can potentially offer key abilities and produce highly innovative ideas. However, empirical studies have revealed dysfunctional effects of diversity (Mohammed & Angell, 2004) such as dissatisfaction with the group, distrust and in-group bias. Arguing from a social categorization stance (Turner, 1987), Pelled (1992) proposed that increased perceptual salience and visibility of demographic variables are more accessible than other characteristics and thus, more apt to result in the occurrence of relationship conflict (relationship conflict is associated with conflict in interpersonal relationships often characterized by hostility or emotional reactions) as well as stereotyping within a group. This, in turn, damages cohesion, diminishing and eliminating any potential creative benefits that could be accrued from the use of diverse groups (Pelled, 1996; Jehn et al. 1999).

Demographic diversity variables can be categorized into two dimensions: surface-level and deep-level. Surface-level diversity refers to differences among group members on the basis of physical and overt features including gender, race and age (Pelled, 1996; Jehn et al., 1999). In contrast, deep-level diversity (or diversity of perspectives) refers to more covert or invisible traits that relate to perspectives, attitudes and beliefs that are often influenced by differences in organizational tenure, education and functional background (Harrison et al., 2002, Moody et al, 2003). Social identity theory (Tajfel, 1978) and the similarity-attraction paradigm (Bryne, 1971) provide some theoretical basis for explaining the impacts of diversity on group effectiveness and behavior. Social identity theory suggests that individuals are more likely to affiliate with other group members with the same surface-level demographic characteristics and compete with others who are less like themselves (Tajfel, 1978). The desire to identify with members of the same social category leads to favoritism towards the in-group and discrimination against the out-group (opposing group), which in turn disrupts group interaction, fuels tensions and provokes relational conflict (Weirsema & Bantel, 1992; Jehn et al., 1999), and eventually leads to process losses (Weirsema & Bantel, 1992). The similarity-attraction paradigm suggests that individuals are more inclined to be attracted to similar others as they perceive their own values, worldviews and beliefs to be reinforced by these similar others.

While surface-level diversity generally produces negative group outcomes, deep-level differences can have positive impacts. Deep-level diversity stems from differences in viewpoints, beliefs and knowledge that members bring to the group and can lead to a higher degree of task conflict. Task conflict (conflict involving disagreements about task-related issues) can enhance group and creativity performance by bringing out varying perspectives on the same issue (Pelled, 1996; Jehn et al., 1999; Nijstad et al., 2002). Varied knowledge bases and expertise in groups can lead to the exploration of more categories of ideas which stimulates the likelihood of creative thinking (Pelled, 1996; Woodman et al., 1993). In fact, several studies have revealed that members, when exposed to the viewpoints of dissimilar members, consider a wider range of perspectives and identify more unique approaches to the problems at hand (Latimer, 1998; Nijstad et al., 2002).

However, while surface-level diversity does not predict one’s attitudes and beliefs, these visible demographic traits can contribute to cognitive diversity and underlying psychological differences such as work experiences, values, and norms among individuals (Jackson et al., 2003; Townsend & Scott, 2001). Recent work suggests that aspects of underlying diversity including beliefs, value, knowledge and behavior are represented by elements of readily detectable diversity (Jackson et al., 2003; Townsend & Scott, 2001). In a manner consistent with these claims, the
results of an empirical study indicated that African-American and whites hold different attitudes toward their teams and about their team’s performance. This subsequently leads to differences in terms of team performance (Townsend & Scott, 2001).

As asserted by Milliken & Martins (1996), “diversity appears to be a double-edged sword, increasing the opportunity for creativity as well as the likelihood that group members will be dissatisfied and fail to identify with the group” (p. 403). This suggests that diverse groups, if effectively managed, can result in increased creativity due to the divergent patterns of thinking and multiplicity of perspectives contributed by members of such groups (Latimer, 1998; Jehn et al., 1999; Jones, 2005; McLeod, et al, 1996).

**Effects of gender and the importance of proportion representation**

An often studied element of surface-level diversity is gender. Sociological-based models, including social role and status expectation theories, offer important insights concerning differences in gender behaviors. Social role theory asserts that individuals adopt stereotypical gender roles or have preexisting beliefs imposed by society. As a consequence, men are required to identify with characteristics associated with masculinity and instrumental orientation (Bem, 1974) while women are expected to display femininity characteristics that emphasize “expressive orientation, an affective concern for the welfare of others” (p. 156). Investigation into group behaviors have reflected that, in general, males tend to engage in more task-oriented behaviors while females tend to play roles that are more communal and reactive. Task-oriented behaviors include verbal and nonverbal actions such as evaluating opinions of others, evaluating task outcomes, initiating task suggestions and opinions, dominating group discussions and other associated behaviors that aid in the resolution of task as well as establishment of status hierarchies (Eagly, 1987; Eagly & Karau, 1991). Communal behaviors, in contrast, include behaviors associated with agreeing with others, responding to others, and other positive socio-emotional actions.

Status expectation theory, on the other hand, purports that other things being equal the salience of gender is akin to a status characteristics in which males are deemed to possess a higher status than females (Eagly, 1987; Eagly & Karau, 1991; Shelly & Munroe, 1999). The existence of status characteristic in a work group triggers behaviors that characterize the establishment of status hierarchies (Ridgeway, 1988); males are granted more speaking time, are perceived as more influential, and their suggestions are given more attention. Moreover, males are viewed as more competent with higher performance expectations than females (Shelly & Munroe, 1999; Ridgeway, 1988). Such underlying performance beliefs have self-fulfilling effects on individual behaviors resulting in inequalities in participation, influence, and attention thus reinforcing the status hierarchy and task-related behavioral differences between females and males (Shelly & Munroe, 1999).

While theories of status expectation and social role provide vital explanation for gender differences in behaviors, Kanter’s (1977) proportional representation model offers another complementary lens. This structural perspective suggests that the proportion or numerical representation of females and males in a group shapes patterns of interactions and behaviors. Accordingly, any numerical underrepresented group will experience three consequences-visibility, polarization and assimilation. First, those in the numeric minority gain disproportionate attention and higher visibility against the majority. Second, stark contrasts between minority and majority members lead to feelings of alienation and isolation for minority members. As a result, the contributions offered by minority members are less valued (Karakowsky et al., 2004). Finally, role entrapment occurs such that males in the minority “are pushed” to greater task and instrumental activities while females in the minority “are pushed” to greater socioemotional and communal activities (Johnson & Schulman, 1989; Karakowsky et al., 2004). Johnson and Schulamn (1989), for instance, found that females displayed lower levels of task activity when their proportions decrease. Moreover, lone females in male-dominated groups displayed task-related behaviors that were far below group averages. Lone males, on the other hand, exhibited task-associated behaviors that were above group averages. In short, proportional representation may amplify gender differences.

**Electronic brainstorming and creativity**

An electronic brainstorming system (EBS) can be used in a variety of ways to improve the group process and outcomes such as creativity. For example, structural features such as anonymity can significantly influence how information is discussed, and thereby impact members’ interaction. The anonymity feature of an EBS, allows participants to interact and exchange messages via identified (non-anonymous) or anonymous means (Valacich et al., 1992). Valacich et al. (1992) provides a finer distinction concerning the type of anonymity. In particular,
Diversity in IS Research and Practice

anonymity may be categorized as either content (source) or process (participant). Process anonymity refers to the “extent to which group members can determine who is participating by directly observing who is making a contribution” (p. 225) whereas content anonymity is when members are unable to identify the specific sources of messages (Valacich et al., 1992; Sosik et al., 1998). In the current paper, we adopt the term visual anonymity. Visual anonymity is realized when both content and process anonymity are present: i.e., group members cannot determine who is participating through observation and specific sources of messages are hidden. We chose the term “visual anonymity” because it conveys the lack of visual stimulus. Group members have no picture in their heads of what other group members look like; as such, the social-categorization impacts of surface-level diversity should be minimized.

The anonymous communication mode provides a platform for group interaction such that individuals are more willing and comfortable to bring forward their ideas and opinions; thus increased participation should result (Sosik et al., 1998; Pissarra & Jesuino, 2005). While increased participation does not necessarily spur the creation of new and novel ideas, it is via enhanced participation that broader information sharing emerges, and drives greater expression of opinions and remarks (McLeod, 1997; Sosik et al., 1998). Exposure to more external stimulus is likely to trigger thoughts that are novel and divergent in nature, thus increasing creative performance (Nijstad et al., 2002).

Notwithstanding the strong theoretical arguments concerning the advantages of anonymous input on creativity, research studies which examined the influence of anonymity on idea generation productivity and group processes as well as other outcomes have been somewhat ambiguous (Pinsonneault et al., 1999). Anonymity has helped groups to improve participation (Jessup et al., 1990), equalize participation (Chidambaram & Bostrom, 1993; Valacich et al., 1994; McLeod, 1997), increase quality of ideas (Pissarra & Jesuino, 2005) and improve satisfaction (Pissarra & Jesuino, 2005). Other studies have shown that anonymity decreases solution satisfaction or had no effects of anonymity on idea generation and solution quality (for a review, see Kahai et al., 1998 and Pinsonneault et al., 1999). Kahai et al. (1998) conducted an analysis of the electronic brainstorming research and suggested that the effects may be moderated by such factors as evaluative tone, members’ proximity, issue sensitivity, group composition and the manner in which anonymity was operationalized in various studies implying that generalizing the results across different studies may be limited (McLeod, 1997).

Electronic brainstorming and diversity

Communication theorists argue that the absence of socio-emotional cues (e.g. body language cues) is particularly salient in technology aided communication environments, especially in electronic brainstorming (EBS). As a consequence, the receivers of the message may become more task-oriented and may not pay as much attention to the sender as to the message itself (Sproull & Kiesler, 1986; Bhappu et al., 1997; Yoo & Alavi, 2004). With the absence of identifying information during brainstorming sessions, the salience of differences that pertain to demographic traits among group members is further reduced (Kahai et al., 1998; Kayworth & Leidner, 2002; Yoo & Alavi, 2004). For instance, Bhappu et al. (1997) found that individuals in traditional settings paid more attention to in-group/out-group differences in terms of gender as compared to groups communicating in a technology-mediated environment.

The elimination of these demographic markers through anonymous interaction further prevents group members from evaluating ideas on the basis of status characteristics or other forms of readily detectable diversity. Employing the case of gender as an instance, males are frequently perceived as more competent or higher status than women due to societal and gender stereotypical expectations (Watson & Hoffman, 2004). Consequently, opinions of males are considered more influential than females even when females demonstrate equivalent capabilities in terms of the task performed (Watson & Hoffman, 2004). The use of anonymity during such discussions can shift evaluation from the status of the sender to the merit of the message.

In addition, members of minority groups may be reluctant to participate and express ideas for fear of evaluation in an identified communication setting (Kahai et al., 1998). By reducing social barriers, the use of anonymity provides a more egalitarian context such that minority members may be more comfortable with the expression of opinions and critical remarks. Anonymity, therefore, facilitates the development of a more egalitarian environment in which

1 Impacts of social categorization cannot be eliminated because participants can assume the team shares the surface-level diversity characteristics of the population from which they were drawn.
there is greater equality of influence and less domination (Jessup et al., 1990; McLeod, 1997; Pissarra & Jesuino, 2005) as compared to identified or face-to-face interactions.

Furthermore, rather than spending time on social interaction and resolving personal conflicts, groups with electronic, anonymous support turn more of their attention towards task-related issues; this leads to increased efficiency, enhanced positive attitudes and greater satisfaction towards both the process and task (Jessup et al., 1990; Vitharana & Ramamurthy, 2003; Pissarra & Jesuino, 2005). In a related vein, the “bundle of capabilities” offered by collaborative technologies has been shown to facilitate more effective group processes as well as reduce the deleterious effects of surface-level diversity (Chidambaram and Carte, 2005; Carte and Chidambaram, 2003).

Taken together, the above discussion suggests that any negative effects that occur as a result of diversity differences among group members are likely to be mitigated to a greater extent in anonymous groups as compared to identified groups. This is largely due to the fact that anonymous expression reduces social barriers. The anonymity technological feature may represent one method which enables groups with diverse membership to leverage their multiple and divergent perspectives and yet, attenuate undesirable effects and in-group bias arising from diversity. Moreover, anonymity eradicates conditions that inhibit idea generation to a greater extent than the identified communication mode; this should, in turn, encourage members to consider a wider range of solutions and creative ideas, thus leading to enhanced idea generation. The above discussion leads us to our overall research framework (Figure 2) and the following hypotheses:

**H1**: Groups that are diverse at a surface level and perform the brainstorming task in a visually anonymous condition will generate a greater number of ideas that are (a) unique; (b) meaningful; and (c) original; than homogeneous/surface-level diverse groups that perform the brainstorming task in an anonymous/identified condition.

**H2**: Groups that are diverse at a deep level and perform the brainstorming task in a visually anonymous condition will generate a greater number of ideas that are (a) unique; (b) meaningful; and (c) original; than homogeneous/deep-level diverse groups that perform the brainstorming task in an anonymous/identified condition.

As discussed earlier, anonymity provides a setting that reduces barriers to participation as compared to identified groups and further facilitates the expression of ideas. Subsequently, certain process losses such as relationship conflict and negative emotional arousal may be minimized, resulting in greater sense of satisfaction towards the task process among group members.

Increased creative performance coupled with heightened levels of involvement among group members further elicit a collaborative atmosphere for task activities, leading to more satisfaction and positive attitudes among individuals (Vitharana and Ramamurthy, 2003; Ocker, 2005). Premised on the assumption that diverse groups collaborating in an electronic environment supported with anonymity are likely to outperform other combinations of groups with respect to creativity, we further argue that members of diverse groups will likely gain greater satisfaction and present more favorable attitudes during brainstorming sessions than will members of homogeneous groups.

**H3**: Groups that are diverse at a surface level and perform the brainstorming task in a visually anonymous condition will be more satisfied with the process than homogeneous/surface-level groups that perform the brainstorming task in an anonymous/identified condition.

**H4**: Groups that are diverse at a deep level and perform the brainstorming task in a visually anonymous condition will be more satisfied with the process than homogeneous/deep-level diverse groups that perform the brainstorming task in an anonymous/identified condition.
METHODS

Research Design

Our study employed a 2x2 repeated measures design. Participants were identified in one of two treatments. In the condition where anonymity happened first, the groups experienced visual anonymity because they did not know which people in the room were members of their group versus other groups. When anonymity happened second, the participants knew who was in their group but not who said what; hence the treatment simulated anonymity but not visual anonymity. As such, our repeated measures design created an opportunity to compare visual anonymity versus anonymity versus identified EBS.

Subjects

Voluntary subjects were drawn from an introductory class at a large Midwestern University. The 385 subjects in this study were randomly assigned to 80 groups ranging in size from three to five students. Sample demographics are provided in Table 1. All participants were given bonus points for participation and, to further motivate them, it was announced in each session that a $200 cash prize would be given to the group that did the best job on the two tasks.

Table 1: Sample demographics

<table>
<thead>
<tr>
<th>Gender</th>
<th>male=217</th>
<th>female=168</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>mean=20.4</td>
<td></td>
</tr>
<tr>
<td>Ethnicity</td>
<td>Caucasian =300</td>
<td>Asian = 25</td>
</tr>
<tr>
<td></td>
<td>African American = 17</td>
<td>Native American = 17</td>
</tr>
<tr>
<td></td>
<td>Other = 26</td>
<td></td>
</tr>
</tbody>
</table>

Not all students who signed up to participate actually showed up resulting in some sessions producing more groups than other sessions. As such, our experiment design was not balanced. The number of groups in each cell is reported in Table 2.

Table 2: Number of groups by treatment

<table>
<thead>
<tr>
<th></th>
<th>Risky task first</th>
<th>Diversity task first</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anonymous first</td>
<td>20</td>
<td>18</td>
</tr>
<tr>
<td>Identified first</td>
<td>23</td>
<td>19</td>
</tr>
</tbody>
</table>
Task

The groups generated ideas for two tasks (using GroupSystems, a commercially available EBS environment). The tasks were:

- Diversity task: How can the university improve recruitment of diverse students (diversity was defined in terms of gender and ethnicity)?
- Risky task: How can the university reduce risky student behavior (e.g., excessive drinking, drug use, sexual encounters)?

These tasks were created for two reasons: 1) to make salient surface and/or deep level differences in the groups and 2) to tap into the groups’ inherent expertise. The recruitment task, due to its focus on recruiting ethnic minorities and women, was expected to make salient perceived differences in gender and ethnicity within the groups (i.e., surface-level diversity), while the risky behavior task (focusing on reducing drinking, drug use, and sexual behavior) was expected to make salient differences in morals/values (a component of deep diversity). Furthermore, these students having recently been the targets of the policies involved in these tasks may be seen as having reasonable expertise (see appendix one for full task description).

Procedures

The experimental procedures are detailed in Table 3.

**Table 3: Experimental Procedures**

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Participation of 15-30 students per session was solicited</td>
</tr>
<tr>
<td>2.</td>
<td>As participants arrived for their session, they were randomly assigned to one of the 3-5 groups formed for each session (assigned seating was distributed throughout the lab so that group members were never seated next to each other);</td>
</tr>
<tr>
<td>3.</td>
<td>A warm-up task was completed to train the students in using the technology.</td>
</tr>
</tbody>
</table>
| 4.   | The first task was completed. The process depended on treatment ordering:  
  o If the first treatment was anonymous, the participants completed the first task (having no knowledge of who in the room was in their group)  
  o If the first treatment was identified, the participants met their group’s members then completed the first task (with their names attached to each idea posted) |
| 5.   | Survey 1 was completed (this included demographic and perceived diversity questions). |
| 6.   | The second task was completed. This process also depended on treatment ordering:  
  o If the first task was anonymous, the participants met their group’s members before completing the second task – which would be identified (i.e., names attached to ideas).  
  o If the first task was identified, then this one was anonymous. Participants would have met their group’s members before the first task, so had knowledge of who was in their group, but the messages for this task would not include identifying information. |
| 7.   | Survey 2 was completed (this included satisfaction with the team outcome). |

Independent and Dependent Variables

Our independent variables of interest were diversity and anonymity. The actual surface-level diversity inherent in our groups was captured using self-reports of gender and ethnicity. Deep-level diversity is believed to be related to education and corporate tenure (Moody, et al. 2003) and was thus operationalized using self reports of GPA (a proxy for education) and credit hours (a proxy for organizational tenure). The individual-level values for gender were aggregated to reflect the proportion of women on a team (i.e., by counting the number of women and dividing by number of team members). Ethnicity was categorized based on the proportion of members of each ethnicity. If only 1 member has a different ethnicity relative to the rest of the team members, the group is labeled as “mixed”. However, if 2 members have different ethnicity relative to the rest of the team members, the group is labeled as “very mixed”. Homogeneous groups consist of members of the same ethnicity (in our sample, it happens to be all
Caucasian), GPA and credit hours were calculated using the coefficient of variation, a technique that is commonly employed in prior studies (e.g. Allison, 1978; Jehn & Bezrukova, 2004). The coefficient of variation is calculated by dividing the standard deviation of the selected attribute with its mean. For instance, to calculate GPA diversity of a group, the group’s standard deviation of GPA is divided by the group’s mean GPA.

Our dependent variables were group affect (satisfaction with the task) and creative performance (uniqueness, meaningfulness, and originality of ideas). In an attempt to control for differences in team size, we divided all creativity measures by the number of team members.

**Group affect - Satisfaction with task**

This was measured using a four item scale previously validated (Chidambaram, 1996). Reliability was acceptable at .857.

**Creative performance - Identification of unique ideas**

In order to identify unique ideas all non-ideas were removed and all log entries that contained more than one idea were broken down so that each entry contained a single idea. Non-ideas are statements of general agreement, non-task oriented statements, statements that cannot be viewed as a solution to the task or are re-statements of the problem. Ideas that merely repeat someone else’s idea in the group also were removed. An idea was defined as a unique idea when it added a new piece of information that pertains to the task domain beyond what the participant had previously typed (Gallupe, et al., 1992).

**Creative performance - Originality**

The study of creativity has emphasized the generation of original ideas that are different from what has come before (Amabile, et al., 1996; Oldham & Cummings, 1996; Woodman, et al., 1993, Rickards and Moger, 2006). In this sense, idea originality represents the rareness or uniqueness of an idea; more obvious (i.e., less original) ideas will be generated more often, and more original ideas will occur less often. There are two ways to measure originality. One way is to calculate the frequency with which an idea is expressed within a given set of data. Another way is for a rater to rate each idea on how original they perceive it to be using their own preconceived notion of the solution set for the problem at hand. We chose to use the later. The definition of originality provided to our coders was this: An idea is most original if no one has expressed it before. Originality is judged from your perspective - that is according to the ideas you expect to see (it is not according to the actual ideas generated).

**Creative performance – Meaningfulness**

Meaningfulness comprises both the appropriateness of an idea and the feasibility of an idea. Appropriateness is assessed by its fit with the organizational goals. Usefulness is assessed by its relevance to helping solve the problem at hand and the possibility that the idea can be implemented. The definition of meaningfulness provided to our coders was: does it help find a solution to the problem in a useful and appropriate way?

**Coding the ideas**

Two raters were recruited to code the ideas generated by the subjects in this experiment. The ideas were identified as unique ideas and then coded based on originality and meaningfulness. Our raters were first trained using data from the warm-up exercise. After they coded each warm-up session any disagreements in coding were discussed and the meaning of the constructs and coding scales were clarified. We determined training was complete when the Cronbach’s alpha used in assessing the inter-rater reliability measures were .65 and over. Once training was completed, each coder was assigned to code all of one task and a third of the other task to enable us to calculate inter-rater reliability. Overall IRR for the coding was above .80.
Data analysis / Results

The data were first evaluated to verify that our manipulation worked. After completing the first task, participants were asked: How different are the members of your group in their ethnic background? (1= not at all...4= neutral...7=very different). ANOVA results were significant (F7, 67=8.03; p=.000), and in the direction anticipated. Participants in the unidentified treatments were largely neutral in their assessment of the ethnic similarity of their group, while participants in the identified treatments varied in their perception depending on the ethnic make-up of their teams. Further analysis revealed a significant treatment effect for number of ideas (F3, 62 =7.735, p=.000) as show in Figure 3, but no significant differences in number of ideas generated by diverse versus homogeneous teams. Our teams generated more ideas per person about increasing diversity than about reducing risky behavior regardless of treatment order. However, the identified risky task seemed to produce the most pronounced gap between the number of ideas produced in each task.

Figure 3: Task effects

These findings suggest that there were significant task and task order effects that may impact our hypothesis testing. As such, further analysis may be more informative if data are analyzed separately for each of the treatments described along the X-axis of Figure 3.

To examine surface-level effects (gender and ethnicity), a MANOVA was first conducted. Univariate tests were then performed in order to identity the source of effects. To explore deep-level diversity effects, different sets of regression analyses for our data corresponding to the X-axis in Figure 3 were conducted.

Surface-level Effects

In order to test hypothesis one (i.e., the effects of surface-level diversity on creativity and satisfaction) we ran MANOVA. Our operationalization of surface-level differences included gender and ethnicity. Using Roy’s Root, the findings indicated that interaction effects of ethnicity and treatment (F=2.62, p<0.05), and gender and treatment (F=4.80; p<0.05) existed.

Ethnicity Effects

As mentioned in the earlier paragraph, ethnicity was categorized based on the proportion of members of each ethnicity. A group is labeled as “mixed” if there is only 1 group member with a different ethnicity relative to other members while the group is labeled as “very mixed” if 2 members have different ethnicity relative to the rest of the team members. Groups which consist of members of the same ethnicity were labeled as homogeneous (in our sample, these happen to be all Caucasian). 29.1%, 53.2% and 17.7% of the groups in our sample were homogeneous...
groups, mixed groups and very mixed groups respectively. The majority of our subjects were Caucasian; included in minority categorizations were Asians, Hispanic, African American, Italian, and Spanish. We next conducted separate univariate analyses based on task order to determine the interaction and main effects of ethnicity and anonymity on the three aspects of creativity. Results indicated that there were no interaction effects of ethnicity and anonymity on number of ideas, meaningful ideas or originality of ideas. Neither were there any significant interaction effects of ethnicity and anonymity on satisfaction.

**Gender Effects**

To examine the effects of gender, we first calculated the proportion of females/males in each group. Groups that consisted of all males were assigned to category 1, groups that consisted of 0.25-0.40 proportion of females were assigned to category 2, groups that consisted of 0.50-0.60 proportion of females were assigned to category 3, groups that consisted of 0.67-0.80 proportion of females were assigned to category 4 and finally, groups that consist of all females were assigned to category 5. The distribution of gender was as follows: 22.8%, 30.4%, 17.7%, 25.3% and 3.8% in each category respectively. However, given the small sample size of the all female groups (3.8%; n=3), all female groups were excluded from the analysis.

For the diversity task, there were significant main effects of gender composition on number of ideas (F 4,63=2.651, p=.041) and originality (F 4,63=3.532, p=.012). Interestingly, groups with all males generated more ideas and more original ideas than groups with some proportion of women. Lacking a comparable sample of all women we cannot determine if the findings suggest that groups of all men were higher performing versus homogeneous groups of a non-specific gender. For both task types, there were no significant effects between all male groups and groups with a large proportion of females (i.e. above 0.67) with respect to the number of original ideas and total number of ideas produced suggesting our findings more likely reflect a gender composition effect rather than an effect of gender per se.

For the risky task, the trend seems to be somewhat reversed. There were significant differences for number of ideas (F 2,62=2.591, p=.045), meaningfulness (F 4,62=4.044, p=.006), and originality (F 4,62=3.389, p=.014). In particular, groups with a larger proportion of males (i.e. teams with 0.25-0.40 proportion of females) produced fewer original ideas than groups with more females (i.e. more than 0.67). These results are also reflected in the number of meaningful and total number of ideas generated. Specifically, groups with a 0.25-0.60 proportion of females produced fewer meaningful ideas and total number of ideas than groups with a large proportion of females (i.e. above 0.67).

**Interaction effects for anonymity and gender**

For the diversity task, there were significant interaction effects between gender and anonymity on total number of ideas and meaningful ideas (p<0.05). Univariate analyses were conducted to examine the source of the effects. Results reflected that male-only groups produced more meaningful ideas and total number of ideas when they were visually anonymous brainstorming for the diversity recruiting task than male-only groups in any other treatment condition. Further, for all groups who discussed the diversity task under visually anonymous conditions, male-only groups produced significantly more original ideas (p<0.05), total number of ideas (p<0.05) and meaningful ideas (p<0.05) than mixed-gender groups. This performance result seemed to also spill over onto the risky task performance. Male-only groups who discussed the diversity task under visually anonymous conditions would, by design, discuss the risky task in an identified setting subsequently. Here, they tended to outperform mixed gender groups performing the risky task in other anonymity conditions. Interestingly, even when male-only groups performed the risky task under identified conditions first, they produce more original and meaningful ideas than groups with a 0.25-0.60 proportion of females. Conversely, for the risky task in an anonymous setting, male-only groups generated significantly fewer original ideas than groups which consist of mostly females (0.67-0.80 proportion of females) and groups with the largest proportion of females produced more meaningful ideas than groups of any other composition.

In sum, these findings provide no support for H1a-c. When surface-level diversity is assessed using ethnicity there are no significant differences found; however, we did find significant differences based on gender composition but contrary to our hypotheses. Further, no significant effects were found for satisfaction, thus H3 is not supported. The findings indicate that anonymity and task type influenced the number of original ideas, total number of ideas and meaningful ideas produced by the groups. Male-only groups realized significant performance improvements when
they discussed the diversity task in the visually anonymous condition and the risky task in the identified condition while mixed-gender groups (specifically groups with a large proportion of females) realized performance advantages when anonymously discussing the risky task.

**Effects of deep-level diversity**

We ran regression analyses to explore the effects of deep-level diversity (credit hours and GPA) and anonymity on creativity and satisfaction. The mean and standard deviation of credit hours are 1.94 and 1.32 respectively while the mean and standard deviation of GPA are 9.63 and 5.95. We conducted different sets of regression analyses for our data corresponding to the X-axis in Figure 3. Separate analyses were run due to the task-order effects reported earlier and demonstrated in Figure 3. Table 4 displays the significant regression results for creativity (number of ideas, originality and meaningfulness) and satisfaction. Regardless of whether teams were addressing their first assigned task (labeled session 1 in Table 4) or their second (labeled session 2 in Table 4), the only significant findings were for the visually anonymous, diversity task during the first session and the identified, risky task in the second.

Analysis reported in Table 4 shows Hypotheses 2a-c were only partially supported for session 1. For this session, deep-level diverse groups performing the diversity task in a visually anonymous condition produced more ideas ($F_{2,14}=4.23, p=.037$) and ideas that were more original ($F_{2,14}=8.18, p=.004$) and meaningful ($F_{2,14}=5.66, p=.016$) than deep-level diverse groups who performed either the risky/diverse task in a visually anonymous or identified condition. In short, deep-level attributes --credit hours and GPA -- were found to significantly influence all three aspects of creativity when brainstorming was conducted using a visually anonymous technological tool discussion on a diversity task. Taken together, the results indicated that not only do technological features play an important role in enabling groups of deep-level diversity to take advantage of others’ perspectives, the task type matters too. Conversely, deep-level diverse groups performing the risky task in a visually anonymous condition were still not able to generate similar levels of creativity as deep-level diverse groups who performed the diversity task using the visually anonymous communication mode.

*Table 4: Standardized beta coefficients from the regression models with treatment as moderator*

<table>
<thead>
<tr>
<th></th>
<th>Trt=visual anonymity diversity task (session 1)</th>
<th>Trt=identified risky task (session 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>β</td>
<td>t</td>
</tr>
<tr>
<td><strong>Model : number of ideas</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Credit Hours</td>
<td>0.51</td>
<td>2.58*</td>
</tr>
<tr>
<td>GPA</td>
<td>0.48</td>
<td>2.31*</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>0.38</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>4.23*</td>
<td></td>
</tr>
<tr>
<td><strong>Model : originality of ideas</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Credit Hours</td>
<td>0.44</td>
<td>2.43*</td>
</tr>
<tr>
<td>GPA</td>
<td>0.57</td>
<td>3.16**</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>0.47</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>8.18**</td>
<td></td>
</tr>
<tr>
<td><strong>Model : meaningfulness of ideas</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Credit Hours</td>
<td>0.52</td>
<td>2.62*</td>
</tr>
<tr>
<td>GPA</td>
<td>0.41</td>
<td>2.04*</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>0.37</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>5.66**</td>
<td></td>
</tr>
</tbody>
</table>

+p<0.10; * p<0.05; ** p<0.01; trt=treatment

Interestingly, there were no significant differences in terms of satisfaction level between deep-level diverse groups. This seems to imply that satisfaction with the task is not necessarily tied to creativity, at least in the preliminary
stage when newly formed groups worked together on a task for a short duration of time. Perhaps, the de-individuation phase that resulted from the use of technological media led members to focus more on the task and pay less attention to relational aspects.

For session 2, hypotheses 2a-2c and hypothesis 4 were not supported. Specifically, deep-level diverse groups which performed a risky task in an identified condition produced more ideas ($F_{2,14}=6.03$, $p=.013$) and ideas that were more original ($F_{2,14}=3.34$, $p=.065$) and meaningful ($F_{2,14}=4.42$, $p=.033$) than deep-level diverse groups which perform either the risky/diverse task in a visually anonymous/identified condition. Surprisingly, the highest performing groups in session 1 seemed to continue to outperform other groups in session 2 despite performing a risky task in the identified condition. Moreover, this time round only credit hours was significant in each model (i.e., GPA was less useful in explaining variance in session 2 than session 1). We will further discuss these findings in the subsequent section.

**Discussion and Implications**

Results of our hypothesis testing are summarized in Table 5. Our hypotheses testing about diversity and creativity produced significant results counter to our hypothesizing for surface-level diversity and consistent with our hypothesizing about deep-level diversity. Furthermore, our hypotheses testing about satisfaction produced non-significant results. Taken together we believe these findings are good news. First, the visual anonymity feature can potentially be beneficial to both homogeneous and diverse groups, and second manipulations of anonymity seem to have little impact on satisfaction (i.e., while it does not help, it does not seem to hurt either).

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Findings</th>
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<tbody>
<tr>
<td><strong>H1</strong>: Groups that are diverse at a surface level and perform the brainstorming task in a visually anonymous condition will generate a greater number of ideas that are (a) unique; (b) meaningful; and (c) original; than homogeneous/surface-level diverse groups that perform the brainstorming task in an anonymous/identified condition.</td>
<td>Not supported. No ethnicity effects. Gender effects were significant but contrary to hypothesized direction.</td>
</tr>
<tr>
<td><strong>H2</strong>: Groups that are diverse at a deep level and perform the brainstorming task in a visually anonymous condition will generate a greater number of ideas that are (a) unique; (b) meaningful; and (c) original; than homogeneous/deep-level diverse groups that perform the brainstorming task in an anonymous/identified condition.</td>
<td>Partially supported Visually anonymous, diverse (based on GPA and credit hours) groups outperformed homogeneous and/or identified groups but only on the diversity task.</td>
</tr>
<tr>
<td><strong>H3</strong>: Groups that are diverse at a surface level and perform the brainstorming task in a visually anonymous condition will be more satisfied with the process than homogeneous/surface-level groups that perform the brainstorming task in an anonymous/identified condition.</td>
<td>Partially supported All male groups who performed the anonymous, diversity task first and identified, risky task second were more satisfied with the outcome of the risky task than male-only groups that discussed the risky task in an anonymous condition first.</td>
</tr>
<tr>
<td><strong>H4</strong>: Groups that are diverse at a deep level and perform the brainstorming task in a visually anonymous condition will be more satisfied with the process than homogeneous/deep-level diverse groups that perform the brainstorming task in an anonymous/identified condition.</td>
<td>Not supported One significant model – identified, diversity task first; GPA produced a significant and positive beta, however diversity in credit hours produced a significant negative beta.</td>
</tr>
</tbody>
</table>
Our surface-level diversity results have implications for gender composition in groups. It seems that the proportion of females in our groups played a significant role in influencing the number of ideas generated and original ideas produced. This is consistent with models of proportion representation (Karakowsky & Siegel, 1999) which purport that the numerical proportion of each gender plays a critical role in regulating the behavior of members in a mixed-gender work group. In our study, groups with either the largest proportion of females or no females outperformed other mixed-gender groups made of smaller proportions of females. Females in the majority may feel more at ease and comfortable with their group members while those who are in the minority may experience feelings of isolation; this, in turn, may affect their creative performance. This is consistent with prior empirical studies examined within the face-to-face context. For instance, Johnson and Schulman (1989) indicated females engage in less task behavior as the proportion of females in the group decreases. However, males seem to be less affected by the proportion of males in the group unless one is a lone man in the group.

These findings suggest that the use of the visual anonymity capability of collaborative technology seemed to act as a brake for dysfunctional processes, rather than as an accelerator of inherent value. By way of illustration, male-only groups that first performed the diversity task in an anonymous setting consistently outperformed groups of other types performing their tasks under similar anonymity conditions. Previous gender empirical studies have demonstrated that males tend to be more task-oriented as compared to females (Shelly and Munroe, 1999). It seems that by allowing our male-only groups to perform their first task in an anonymous setting, they were able to leverage their task-oriented nature instead of focusing on differences (or similarities) in physical characteristics.

Our findings also highlight the importance of visual anonymity and task type in enabling members of deep-level diverse groups to capitalize on the varied perspectives inherent in these groups. Specifically, our findings demonstrated that members who differ with respect to GPA and credit hours, and who conduct their discussion in a visually anonymous context were found to display higher levels of creativity as compared to groups with similar degrees of deep-level diversity and who carried out their discussion in an anonymous or identified context. These findings are somewhat in line with prior studies which demonstrated that the anonymous communication mode offers an important platform for members to bring forward their perspectives more openly, reducing any possible evaluation apprehension that could have happened in the absence of such a communication tool (Sosik et al., 1998; Pissarra & Jesuino, 2005). This may mean that hiring individuals with diverse GPAs and/or years in college can lead to more creative teams and that finding the right people for a job goes far beyond finding the person with the best academic performance.

Interestingly, our findings indicated that it is visual anonymity which matters more in terms of facilitating the contribution of opinions compared to the more generic anonymity capability of collaborative technologies. Visual anonymity is when group members do not have cues as to who is in their group and furthermore cannot identify what contributions come from the various group members. This environment is one that is often experienced when teams are formed from geographically dispersed individuals (i.e. often times a trait of virtual team). In an environment in which visual anonymity is offered, members are even less compelled and therefore, less inclined to conform to opinions of other group members (Kahai et al., 1998; Sosik et al., 1998; Valacich et al., 1992). This promotes greater and/or more varied contributions from members of such groups, triggering ideation and creativity. This is of importance in deep-level diverse groups as it has been argued that deep-level diversity is an important resource for cognitive diversity and yet, such groups have been found to demonstrate process losses (Weber & Donahue, 2001).

Interestingly, our findings suggest it is particularly important to take the task into account. When our risky task was used, fewer ideas were generated regardless of anonymity condition. Group members may have felt uncomfortable discussing the sensitive issues associated with this task and thus, were unwilling to voice their opinions despite being visually anonymous. However, when our diversity task was used, members were more comfortable with the task and they were therefore able to leverage the diverse opinions within their groups and make use of the purported benefits of visual anonymity.

Further, our findings reflected that high performing groups (anonymous, diversity task) in the first session seem to continue to outperform other groups in session 2 in terms of all three dimensions of creativity although they were discussing a sensitive task (i.e. risky task) using the identified communication mode. Moreover, they were also marginally more satisfied with the task as compared with groups that discussed either the risky or diverse task using the identified or anonymous communication mode. Comparing our results with the findings of prior studies which examined the impact of anonymity on group processes and outcomes (Sosik et al., 1998; Valacich et al., 1992), our findings seem inconsistent. However, upon closer examination, our study considered different phases of a group’s
life. Given the nature of our experimental design, groups who received what appears to be the ideal treatment (anonymous, diversity task first) continued into session 2 perhaps having established critically important positive first impressions. This points to the necessity of introducing new groups to tasks and work environments that are as ideal as possible to enable quick positive feedback to occur within the group and thus stimulate the group to continue to perform at a high level on future tasks.

The formation and criticality of initial impressions have been highlighted and demonstrated in human resource management (HRM) research. Interviewers reached final decisions concerning applicants within the first few minutes of the interview, highlighting the importance of first impressions (Tullar, 1989; Judge et al., 2000). In a similar line of thought, Carte and Chidambaram (2004) argued that the reductive aspects of communication technologies are especially useful in the early phase of the life of a diverse team. By reducing the apparent salience of surface-level diversity, members of such groups are better able to focus on their task at hand and the likelihood of the formation of in-group and out-groups is then reduced. Processes losses are in turn reduced and teams are higher performing and have stronger relational bonds as they move into later stages of development (Carte and Chidambaram, 2004).

6. Limitations

There are several limitations to this paper. First the fact that we only used a positivist approach to our data analyses may have led to findings that do not fully express the contents of the data. Trauth and Jessup looked at anonymity and gender in an earlier EBS study (Trauth and Jessup 2000) and found that by analyzing the data using a positivist and interpretivist approach the data revealed very different results. We employed only a positivist approach to our data and feel that we may gain more insights into the findings if we reanalyze the data using an interpretivist approach. As in the Trauth and Jessup paper, it is possible that once the team members knew who in the room was on their team they were able to identify the author of each idea without the name being attached. Therefore, it is possible that the anonymous treatment was less effective than we anticipated. Furthermore, should we code the data based on affective and behavioral information we may be able to gain additional insight into the impact of diversity and anonymity on creative output and group satisfaction.

A second limitation is the use of only one time period. In other contexts where groups meet for longer periods of time (both in terms of session time and the longer life span of a group) these finding may not hold true. In virtual teams that work together on more complex problems over a longer period of time other factors such as trust (Jarvenpaa et al, 2004), relationship building, cohesion, and other factors may play a significant role in the way diversity impacts the creative output and satisfaction of teams (see Powell, et al, 2004 for a review of virtual team literature).

7. Conclusions

In this paper we have attempted to investigate whether visual anonymity enables groups of different diversity levels to leverage their varied perspectives and experiences. In contrast with the anonymity and identified features of technology, visual anonymity specifically focuses on manipulating initial group impressions in order to mitigate potential negative consequences of first impressions based on appearances. Our results suggest that visual anonymity may deliver on this promise.

Past work in the area of virtual teams has shown that teams are more productive if they establish trust and familiarity through face to face meetings (for example see Maznevski and Chudoba, 2000). Our findings suggest – at least for zero history, brainstorming groups – the opposite may be true. Both our homogeneous (male-only) and diverse (GPA and credit hours) groups benefited from the visual anonymity treatment. The mechanisms driving these results are likely different and certainly warrant further study. Our surface-level diverse groups were not higher performing as a result of visual anonymity. This reinforces the notion that surface-level diversity is not necessarily a good proxy for the existence of varied perspectives. Such findings are in line with some studies that have been carried out in a face-to-face setting which found that groups that differ with respect to only surface-level diversity do not necessarily gain any performance benefits from that diversity (Jackson et al., 2003). Our findings instead suggest that the value technological manipulations may deliver is that visual anonymity may improve homogeneous team performance by dampening the adoption of existing genres among homogeneous teams. The teams are in essence forced instead to negotiate a shared understanding that requires engagement in the task.
Conversely, our deep-level diverse groups demonstrated the value-in-diversity perspective. The visually anonymous treatment resulted in significant improvements in creativity. Our study employs a cross-sectional design; however, as suggested by Harrison et al. (2002), deep-level diversity becomes more influential over time. Future research employing a longitudinal study may be useful in further examining how technology can best support deep-level diverse groups. While this study answered some questions it also created new ones. More work in this area has great potential to drive theory and inform practice.

REFERENCES


Diversity in IS Research and Practice


Appendix 1

**Task 1: Improving diversity in the student population**

A public university has been told by their legislature that they need to have an equally balanced student profile with respect to minority, female and international students.

In fall 2004, there were 32,612 undergraduate students: 6,522 (20%) were minorities and 1,696 (5.2%) were international students, while the rest were white (24,394 or 74.8%). This figure shows a 5% decline in minority students from the previous year and a 9% decline in international students from the previous year.

The gender ratio during the same time also changed (with 58% of the undergraduates being male and 42% being female).

Given the decline in enrollment by minority, international and female students, your task is to generate ideas to increase the diversity of the university’s student body.

Keep in mind your time limit of 12 minutes.

**Task 2: Reducing high-risk behavior in the student population**

A recent survey of university students enrolled in a large public state university has shown that students are engaging in more risky behaviors now than they did 10 years ago. The survey found that 80% of the students drink alcohol and 15% use other forms of drugs. College students also report that they have more unprotected sex with multiple partners than they did in the past. These trends have been on the increase in the last several years and college officials are concerned about these behaviors.

Given the increase in high risk behaviors, your task is to generate ideas to reduce these behaviors among the university’s student body.

Keep in mind your time limit of 12 minutes.