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ETHNIC COMPOSITION AND ITS DIFFERENTIAL IMPACT ON GROUP PROCESSES IN DIVERSE TEAMS

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This study contrasts the effects of two types of ethnically heterogeneous groups on their enjoyment of and performance on an interactive creative task. The majority of each group was composed of either ethnic minorities or Caucasians. Analyses were conducted using hierarchical linear modeling where appropriate. Teams composed mostly of ethnic minorities rated working with the group to be more enjoyable and reported experiencing more positive and fewer negative emotions. Ethnic composition was not predictive of task creativity. Both individual ethnicity and the interaction between individual ethnicity and ethnic composition had an effect on negative emotions; these effects were independent of the group-level effect. Issues concerning ethnic diversity, group dynamics, and context effects are discussed.

Keywords: ethnic composition; small group dynamics; group enjoyment

There was a time in the United States when work teams could be assumed to be composed almost entirely of Caucasians. Not only are work groups becoming more diverse, but the United States is facing a demographic revolution such that even the traditional definition of ethnic majorities and minorities will soon become outdated. Over the next 25 years, minority groups are expected to account for more than 50% of the population in Hawaii, California, New Mexico, and Texas and close to 50% in other heavily popu-

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lated states such as New York, Maryland, and New Jersey (Population Reference Bureau, 2002). This same trend is also reflected in organizations and universities. For example, since 1988, people describing themselves as Caucasian have made up less than 50% of students at the University of California, Berkeley (Ralston, 2001). In fact, as of 2000, self-reported Caucasians made up less than 31% of the total student population (Ralston, 2001). In addition, expanding multinational companies will increasingly involve work teams made up of people from diverse cultures. As this demographic revolution continues, the important questions become,

How much will the change in demography affect our workforce? How will different levels of heterogeneity affect individual members of diverse working teams? How will people in the current majority position (Caucasians) respond to the changing dynamics of ethnic composition?

Previous studies on ethnic composition primarily compared homogenous versus heterogeneous teams (e.g., McLeod, Lobel, & Cox, 1996; O'Reilly, Williams, & Barsade, 1998; Williams & O'Reilly, 1998). Some reviewers of the literature suggested that teams homogeneous with regard to ethnicity may be more cohesive than heterogeneous teams (Barsade & Gibson, 1998; Williams & O'Reilly, 1998). On the other hand, ethnic diversity may, in fact, improve the quality of creative brainstorming (e.g., McLeod et al., 1996; O'Reilly et al., 1998; Williams & O'Reilly, 1998) and may increase group outcome efficacy (Sargent & Sue-Chan, 2001).

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This kind of homogeneous versus heterogeneous team comparison, as well as simple cross-national comparisons, is being challenged: Researchers are now being asked to examine situations where people from different cultures interact (Smith, 2001). As the demographic revolution within the United States continues, work teams will become increasingly heterogeneous such that the important issues will revolve around the type or degree of heterogeneity and how it affects people from different ethnic groups. For example, a recent study by Earley and Mosakowski (2000) looked at different levels of heterogeneity and found that low and extremely heterogeneous groups outperformed moderately heterogeneous groups. These moderately heterogeneous groups were composed of roughly half of one group and half of another.

We propose a typological framework to organize previous research on ethnic composition as well as to guide our own research (see Figure 1). The first set of rows in Figure 1 illustrates the simple homogeneous versus heterogeneous dichotomy typically used in the literature. The second shows how Earley and Mosakowski (2000) conceptualized heterogeneity along a three-type continuum. The third example is a more complex continuum of heterogeneity: In addition to having more categories, some of the categories involve a majority of one group over another. For example, the homogeneous, low heterogeneous, and somewhat low heterogeneous groups involve one ethnicity dominating the team. The moderate category, on the other hand, has equal numbers of both groups. Both the somewhat high and high heterogeneous groups have a great deal of heterogeneity. In the highest heterogeneous groups, no one group has a numerical advantage or disadvantage.

However, these three typologies described so far ignore the issue of the social context: Which ethnic or racial group actually dominates numerically, and is that ethnic group a numerical majority in the population at large? This is going to be an increasingly important distinction: Working groups within the United States will not simply be homogeneous or heterogeneous but dominated by Caucasians or by a mix of ethnic minorities. Also, a homogeneous group composed mainly of Asian Americans has different implications for group culture than a homogeneous group composed

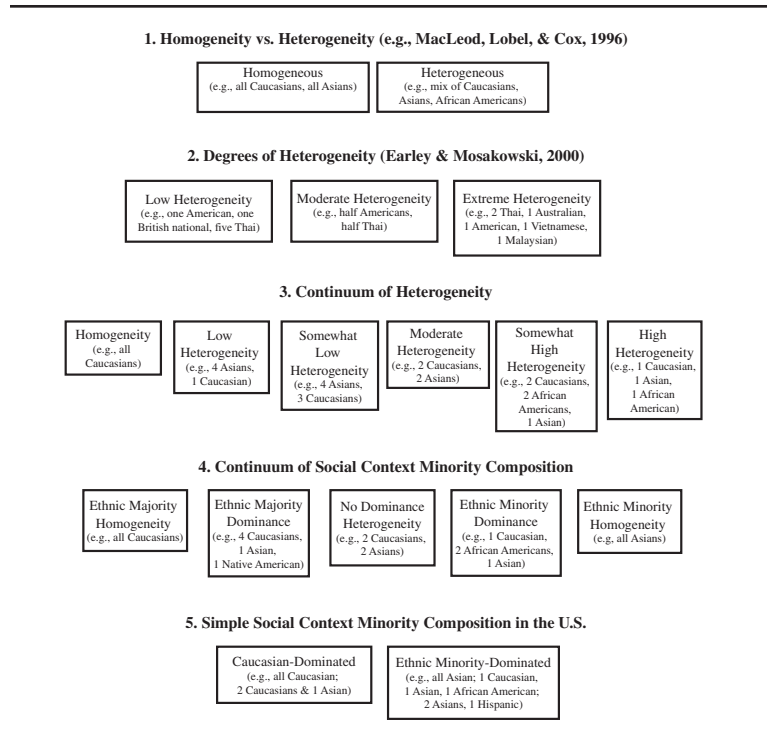


Figure 1: Typology of Ethnic Composition

mainly of Caucasian Americans. A recent report by O'Reilly, Williams, and Barsade (1999) provides evidence that the ethnicity in the minority may make a difference for group functioning: Whites reported more teamwork in groups dominated by ethnic minorities, particularly Asians.

Therefore, two additional typologies have been included (see Figure 1). These presume that Caucasians are the predominant ethnic group of the overall population but could easily be revised to assume that another ethnic group predominates. In one, the complex heterogeneity continuum has been revised to range from Caucasian dominated to ethnic-minority dominated. In the final typology, the teams are assumed to be composed of an odd number of individuals, and the continuum is simplified into two categories: Caucasian dominated and ethnic-minority dominated. To date,

research examining groups like those in the last two typologies has been extremely rare (e.g., Davis, Cheng, & Strube, 1996).

The current study examines the two types of work teams in the final typology. As such, some minority-dominated teams may, in fact, be homogenous as may be some of the Caucasian-dominated teams. The variable of interest is not homogeneity or heterogeneity per se but the proportion of the team that is made up of America's dominant racial/ethnic group. We believe it is important for diversity research to go beyond a simple head count of how many individuals are from different ethnic groups to bring the social/cultural contexts (e.g., the ethnic dominance in the greater society) into the study of small group processes. This study addresses the psychological consequences of the different types of ethnic dominance in a small group setting.

We also distinguish further the effects of ethnic composition as both group-level and cross-level effects. Ethnic composition is a group-level variable; it can only be measured at the level of the team. As a group-level effect, ethnic composition can influence group-level outcomes such as team productivity or climate. As a cross-level effect, ethnic composition might influence individual-level outcomes such as individual productivity or satisfaction. Both of these types of effects are considered context effects because the independent variable is at the group level.

However, these context effects may be contingent on variables at the individual level. In other words, there may be significant interaction effects between individual ethnicity and the experience of team ethnic composition. Some researchers have referred to this sort of effect as a *frog pond effect* (Klein, Dansereau, & Hall, 1994); that is, a large frog has a different experience in a small versus a large pond. Frog pond effects are essentially the interaction between a contextual (group-level) effect and an individual-level variable (Burststein, 1980). In the case of our study, teams composed primarily of ethnic minorities may have certain effects on group dynamics—but only for specific ethnic minorities. Asian students might have a very different experience in teams composed mainly of ethnic minorities in comparison to Caucasian students. This particular frog pond effect (for individual-level ethnicity and group-

level ethnic composition) has been found before. Lee, Loeb, and Lubeck (1998) found that inequalities in learning between African American and European American children were smaller in classrooms with higher concentrations of African American students. In other words, not only does the context have an effect, but the interaction between the context and the individual has its own effect. Frog pond effects related to ethnicity may be prevalent in diverse, small groups. Therefore, ethnicity may have an effect at the individual level (e.g., Asian American ethnicity), at the group level (teams composed primarily of Caucasians), and in the interaction between the two (Asians have a different experience in teams composed primarily of Caucasians than do Caucasians themselves). It is possible for these effects to occur independently and/or covary.

The purpose of this study is to examine the effects of ethnic composition on group dynamics. Numerous variables can measure different aspects of group dynamics. Taking the traditional distinction between socioemotional and task dynamics within groups (McGrath, 1984), we are interested in group enjoyment and creative performance. Just as creative performance is a measure of team task success, so is group enjoyment a measure of team social success. These variables may be affected differently by team composition. In this study, *group enjoyment* refers to how the individual members of a team rate their interest and pleasure in working with their team. High group enjoyment will also result in more positive emotional experiences and fewer negative emotional experiences. Group enjoyment is different from and more specific than group cohesion. Group cohesion is a more general and complex construct that has been described as *solidarity* or *morale* (Levine & Moreland, 1998). Because ethnic composition has not been studied in this manner before, literature on this topic is very limited.

To predict the effects of ethnic composition on group enjoyment, it is constructive to use the theoretical dimensions of individualism and collectivism. Psychological research has often suggested that ethnic differences in the United States follow the prescribed differences by the general framework of individualism-collectivism (Phinney, 1996; Thomas, 1999; Triandis, 1989). Members of collectivist cultures are thought to conform to group norms and have a

greater interdependence with others, specifically in-group members. They are often contrasted with members of individualistic cultures who focus more on their independence and individual achievement (Triandis, 1989).¹ Individualism and collectivism have been variously described as opposite ends of a continuum (e.g., Hofstede, 1983) or as two somewhat orthogonal dimensions (e.g., Coon & Kemmelmeier, 2001). On the country level, many countries have been assessed via their individualism and collectivism: America and the United Kingdom are considered highly individualistic, China is considered extremely collectivistic, and Israel is considered moderately collectivistic (Hofstede, 1983).

Previous studies have also found differences between different American ethnic groups on individualism and collectivism. In a recent meta-analysis that conceptualized individualism and collectivism as two different dimensions, African Americans and Asian Americans scored significantly higher than European Americans on collectivism (Coon & Kemmelmeier, 2001). However, African Americans scored higher than both European Americans and Asian Americans on individualism (Coon & Kemmelmeier, 2001). Because individualism and collectivism are group-level constructs, teams composed primarily of Caucasian Americans are assumed to be higher on individualism and lower on collectivism than groups composed primarily of Asian Americans, African Americans, and Hispanics (Triandis, 1989).

It is important to acknowledge that the typical categories of Caucasian, Asian, Hispanic, and so on are flawed—particularly as proxies for culture (Betancourt & Lopez, 1993). Ethnicity should not be defined solely by race, nationality, or geographic location but by psychologically meaningful cultural variables such as values, attitudes, identities, and social experiences. Although we are interested in studying the interaction between different kinds of individual ethnicity and team ethnic composition, we understand that these interactions take place in a wider context that is predominantly Caucasian.² What is more important to our research, therefore, is that members of different ethnic minority groups in the United States may share some common experiences (particularly when interacting with Caucasians; e.g., Phinney, 1996). What is

more, we are interested primarily in effects at the level of the team rather than at the level of the individual. Therefore, we consider it appropriate to examine the experience of individuals within teams that are predominantly either Caucasians or a combination of other ethnic groups.

The literature on ethnic composition and the socioemotional side of group dynamics is extremely limited. Three studies help shed light on possible connections between ethnicity, individualism/collectivism, and the enjoyment of group work. In one study, collectivists were found to value the relationship maintenance aspects of a work relationship more than individualists (Gomez, Kirkman, & Shapiro, 2000). Another study suggests that Mexican Americans assume that work group success is facilitated by socioemotional factors to a greater degree than do Anglo Americans (Sanchez-Burks, Nisbett, & Ybarra, 2000). It is not that Mexican Americans deny the importance of task-related factors, but "for Anglo-Americans, task success seems dependent on minimizing socioemotional concerns, whereas for Latinos, emphasis on socioemotional aspects is compatible with efficiency and success" (Sanchez-Burks et al., 2000, p. 187). Sanchez-Burks and his colleagues attributed these differences to differences in relational schemas regarding work groups. In other words, attending to relationships is probably part of appropriate working behavior for Latinos but is considered separate or extraneous for the Anglo Americans. Finally, O'Reilly et al. (1999) demonstrated that Caucasians report more teamwork when in groups dominated by non-Caucasians than in groups dominated by Caucasians. This finding was primarily driven by the experience of Caucasians in groups with proportionally more Asians than non-Asian minority groups.

Taking these disparate studies together, it seems likely that teams composed primarily of ethnic minorities (which may be higher on collectivism) will have greater group enjoyment. Whether because of relational schemas or collectivist values, it seems likely that members of ethnic minority groups such as Asians and Latinos will be more likely to pay attention to the maintenance or socioemotional aspects of group work. Given that the socioemotional aspects of teamwork are inherently tied to how well

a group will get along socially, we predict that individuals in teams dominated by ethnic minorities will enjoy working with their group more. This enjoyment will also correspond with more positive emotions experienced and fewer negative emotions.

Hypothesis 1: Individuals in teams composed of members mostly from ethnic minority groups will enjoy themselves more than teams composed mostly of Caucasians as measured by both direct and indirect measures of group enjoyment. This is a cross-level effect of group-level ethnic composition on individual enjoyment and emotions.

Much of the past literature focuses on composition differences in performance, particularly team creativity (e.g., McLeod et al., 1996), so we find it important to test this aspect. We chose an interactive, creative task as the focus of our study. Literature on the effects of ethnic composition in terms of Caucasian dominance versus minority dominance is nonexistent.

What literature there is on ethnic composition shows that heterogeneous teams outperform homogeneous teams on creative tasks (McLeod et al., 1996; O'Reilly et al., 1998), although moderately heterogeneous teams have been outperformed by somewhat and extremely heterogeneous teams (Earley & Mosakowski, 2000). The main reason suggested by researchers for these findings is that ethnic diversity is assumed to be correlated with diversity in terms of attitudes, skills, knowledge, and other factors (Thomas, Ravlin, & Wallace, 1996). These different perspectives are theorized to lead to a greater diversity of original ideas. Although the research on heterogeneity versus homogeneity does not directly speak to our types of groups, the theory behind it can still guide our predictions. Diversity in knowledge and skills is likely to foster innovation but probably only when tempered by sufficient group dynamics to allow the team to take advantage of the diversity (West, 2002). Both minority-dominated and Caucasian-dominated teams can be heterogeneous and diverse; however, we predict that minority-dominated teams will have the necessary focus on group processes to allow creativity to develop.

Hypothesis 2: Teams composed mostly of ethnic minorities will outperform those composed mostly of Caucasians on an interactive creative task. Their outputs will be more creative. This is a group effect of ethnic composition on group creativity.

We will also differentiate ethnic composition effects from individual-level ethnicity effects. For example, if Caucasians tended to rate their experiences more positively, then analyses involving ethnic composition would show that teams composed primarily of Caucasians have higher enjoyment. We do not expect individual-level ethnic differences on the dependent variables of interest; effects due to ethnic composition are not simply due to an aggregation of individual-level ethnicity effects but are true group-level effects. Therefore, we will test these effects with individual race/ethnicity as an independent variable. We predict that there will be no mean differences between individuals of different ethnicity on the dependent variables of interest.

Hypothesis 3: There will be no mean differences between participants of different racial/ethnic backgrounds *on the individual level* for group enjoyment or creative performance. This hypothesis does not contradict those above that predict differences based on overall ethnic composition (group level).

As mentioned before, we are also interested in frog pond effects for individual ethnicity. In addition to there being an effect for context (group ethnic composition), there could be an effect for the interaction between the individual and the context. This means that the experience of an Asian American in a minority-dominated team could be different from a Caucasian in a minority-dominated team. Given the finding that disparities in test scores are smaller in classes where African American children are in greater numbers (Lee et al., 1998), it is likely that ethnic minority individuals will enjoy being in teams dominated by ethnic minorities above and beyond that explained by the team effect. However, significant frog pond effects are often difficult to discover when the interaction covaries with the main effects (Burststein, 1980).

Hypothesis 4: We expect to find evidence for frog pond effects such that the findings due to team ethnic composition will be especially pronounced for members of some ethnic groups compared to others. In other words, we predict an interaction between individual race/ethnicity and ethnic composition for the different group-process variables.

METHOD

PARTICIPANTS

The participants were 108 undergraduates at the University of California (UC), Berkeley, who took part in the study to fulfill a partial course requirement. They worked together in teams of 3 per session to give a total of 36 teams. These teams were small, but the creative task they performed required interdependence and mutual awareness—two qualities necessary for a group (McGrath, 1984). The participants signed up to be in the study with no knowledge of its purpose. Ethnic composition of teams occurred naturally.

Seventy-five percent of the participants were female, and 25% were male.³ In terms of ethnic composition, 70% of the teams had two or three ethnic minorities (minority dominated), and 25% had two or three Caucasians (Caucasian dominated). One team in each category was homogeneous and the rest were heterogeneous. Overall, only two (less than 6%) of the teams were homogeneous in terms of ethnicity, so analyses comparing heterogeneous and homogeneous teams were not possible. The analyses comparing group ethnic composition, therefore, examine differences primarily between different types of heterogeneous teams (although all teams were included in all analyses). Individually, the participants were 43% Asian or Asian American, 34% Caucasian, 5.6% African American, 5.6% Hispanic, and 10% a combination of two or more ethnic identities. Two percent did not report their ethnicity. Five percent of the teams were not classified in terms of ethnic composition because of the 2% of participants who did not report their race/ethnicity and were dropped from the analyses. The overall gender

and ethnic proportions were typical of the UC Berkeley participant pool.

PROCEDURE

We chose an interactive creativity task to provide an appropriate setting with both task (creativity) and socioemotional outcomes. The participants worked together to write a creative ending to a short story, "The Boy Who Sang for Death," by Jane Yolen (1989). The story as published has two endings and, therefore, has a natural stopping point where it needs to be resolved. We instructed the participants to make their ending as creative as possible but warned that it had to flow logically from the story. This task can be generalized to the common practice for television and movie scriptwriters to work on story elements in small teams (e.g., Pritzker & Runco, 1997). After writing down their story ending, the participants then individually filled out a questionnaire that asked them to rate their enjoyment of the task and working with the team. The survey also asked the respondents to indicate which of several emotions they felt during the session. Participants were asked for their racial/ethnic identity in an open-ended question, and these data were coded according to U.S. Census (1995) categories. The questionnaire data were treated as individual-level variables, as each participant filled out the questionnaire without input from the others.

MEASURES

Creativity. Each team came up with one story ending, which was evaluated for its creativity. The story endings were rated for creativity by six English literature graduate students who were familiar with assessing writing and were themselves diverse in terms of both gender and ethnicity (half male, half female; three Caucasians, two Asian Americans, and one Hispanic). The coders used the Amabile consensual assessment technique to make their judgments on a scale of 1 to 5 (Amabile, 1996). With this technique, coders work independently to rate the story endings relative to

each other for creativity. Interrater reliability was satisfactory: Cronbach's alpha, which is what Amabile (1996) generally used, was .79 (standardized and unstandardized), and the intraclass correlation using the means of the raters' assessments was .76 (lower bound .69, upper bound .82).

Group enjoyment. How well the participants enjoyed working with their team overall was operationalized as three specific variables: group enjoyment, more positive emotions experienced, and fewer negative emotions experienced. Here, group enjoyment was formed from a composite of three specific questionnaire items: enjoyment of working with the group, how interesting it was to work with the group, and willingness to work with the same group again on a similar task in the future ($\alpha = .91$). The emotion data, which were initially binary (whether the emotion was selected or not), were grouped into two composites: all the positive emotions ($\alpha = .72$) and all the negative emotions ($\alpha = .59$). The emotion checklist was based on a list used in previous emotions research for participants to assess a dyadic interaction (Gonzaga, Keltner, Londahl, & Smith, 2001) but modified for breadth and applicability to a creative team project. The positive emotion composite included feeling amused, engaged, attractive, excited, happy, joyful, playful, effective, interested, hopeful, loving, proud, and sympathetic. The negative emotion composite included feeling afraid, angry, annoyed, anxious, bored, contemptuous, cynical, distracted, disgusted, embarrassed, envious, exhausted, frustrated, guilty, lonely, painful, sad, and tired. The alpha of the negative emotion composite is low because the responses for negative emotions were idiosyncratic with many of the emotions listed (such as anger) chosen by fewer than 6 respondents. The negative emotion composite was significantly negatively correlated with the positive emotion composite ($r = -.31, p = .001, N = 108$), although negative and positive emotions may be weakly positively correlated in interdependent (collectivist) cultures (Bagozzi, Wong, & Yi, 1999). The group enjoyment composite was positively correlated with the composite of positive emotions and negatively correlated with the

composite of negative emotions ($r = .61, p < .001, N = 108$, and $r = -.53, p < .001, N = 108$, respectively).

It was also necessary to create dummy variables for individual-level race/ethnicity and for ethnic composition. Groups composed mainly of ethnic minorities were coded as 1, and groups composed mainly of Caucasian students were coded as 0. There were two dummy variables for individual race/ethnicity. For the first race/ethnicity dummy variable (*Race1*), Caucasian participants were coded as 1 and all other students were coded as 0. For the second race/ethnicity dummy variable (*Race2*), Hispanic, African American, and all other non-Asian ethnic minorities were coded as 1 and Asian American and Caucasian students were coded as 0. The coding of the race/ethnicity variables allowed the intercept (β_0) to be the mean of Asian and Asian American participants when both race/ethnicity variables were entered into the equation (see below).

ANALYSES

Researchers realize that analyzing multilevel data using normal regression methods can be fraught with problems. For example, the individual-level data are interdependent (Bonito, 2002; Kenny, Kashy, & Bolger, 1998), and analyzing the data at the individual and/or group level alone is both mathematically and conceptually inaccurate (Hopkins, 1982). Unless otherwise mentioned, the data were analyzed using hierarchical linear modeling (HLM) (Bryk & Raudenbush, 1992) via the hierarchical linear and nonlinear modeling program, HLM5 (Raudenbush, Bryk, & Congdon, 2000). This is considered the best method for analyzing multilevel and cross-level data as well as data with unbalanced groups (Bryk & Raudenbush, 1992). In our case, our data are both unbalanced (70% vs. 25% ethnic composition teams) and have dependencies within the different groups. Given that HLM uses maximum likelihood estimation methods, it is quite robust in analyzing unbalanced data (Bryk & Raudenbush, 1992). Unless otherwise noted, the information explaining the HLM analyses below is described in Bryk & Raudenbush (1992). Frog pond effects here are analyzed as group-

TABLE 1: Unstandardized Means, Standard Deviations, and Frequencies

<i>Variable</i>	<i>N</i>	<i>M</i>	<i>SD</i>
Group enjoyment (1 to 7 scale)	108	4.99	1.29
All positive emotions composite	108	3.03	2.39
All negative emotions composite	108	1.34	1.59
Creativity of story ending	36	2.55	0.69
Age (years)	108	19.9	3.37
Gender (%) (total)			
Female	81	75	
Male	27	25	
Individual race/ethnicity (%)	108		
Asians/Asian Americans	46	42.6	
Caucasians	37	34.3	
African Americans	6	5.6	
Hispanics	6	5.6	
People of mixed ethnicity/race	11	10.2	
Did not report	2	1.9	
Combination of African Americans, Hispanics, and people of mixed ethnicity/race	23	21.4	
Group ethnic composition (%)	36		
Groups composed mainly of ethnic minorities	25	69.5	
Groups composed mainly of Caucasians	9	25	
Groups deleted from ethnic composition analyses because of incomplete data	2	5.5	

level effects that influence individual-level effects (which is theoretically similar to how they would be tested in regression as interaction vectors between group- and individual-level effects). All nondummy variables were standardized for the HLM analyses.

RESULTS

Descriptive information on all variables of interest is presented in Table 1. In addition to individual race/ethnicity, ethnic composition, gender, and age, this table presents unstandardized means for creativity, group enjoyment, and positive and negative emotions. Overall, participants rated group enjoyment higher than the midpoint and listed slightly more positive emotions than negative ones. Using HLM where appropriate, the hypotheses were tested in turn.

Hypothesis 1: Ethnic Composition Effects on Enjoyment of Group Work

We predicted that groups composed mainly of ethnic minorities would enjoy themselves more than teams composed mainly of Caucasians. For this hypothesis, there were three different outcome measures: group enjoyment, positive emotions, and negative emotions. Each of these outcome variables was analyzed in the same way. Group enjoyment was included as an example of the different equations below.

First, a base HLM analysis was conducted. This means that no predictor variables are entered and allows us to determine some basic information about the outcome variable. As with all the HLM analyses performed in this article, data were analyzed at both the individual and the group level simultaneously. HLM requires the outcome (dependent) variable to be at the lower level of analysis. In the base analysis, the outcome variable (in this case, the standardized group enjoyment composite) is predicted by β_0 (the mean intercept) and a random coefficient (r). On the second (group) level of analysis, β_0 is further defined by a fixed effect (γ_{00}) and a random effect (μ_0). The random effect on the individual level is normally distributed from 0 to sigma squared (σ^2), whereas the random effect on the group level is normally distributed from 0 to tau (τ_{00}). It is important to note that the numbers derived from these equations are estimations of true and error values, respectively. The Level-One (L-1) and Level-Two (L-2) equations are (see Equations 1a and 1b):

$$\text{Base Model: L-1: } Z\text{Groupfun} = \beta_0 + r \quad r \sim N(0, \sigma^2) \quad (1a)$$

$$\text{L-2: } \beta_0 = \gamma_{00} + \mu_0 \quad \mu_0 \sim N(0, \tau_{00}) \quad (1b)$$

From this base analysis, we obtained some important information. First of all, the reliability of the mean of group enjoyment (standardized *ZGroupfun*) was .67. This means that, as an outcome variable, group enjoyment was moderately reliable, so we trust the results of the analysis to some degree. Second, we obtained information on the estimated tau and sigma squared. Using Equation 2,

TABLE 2: Ethnic Composition Effects on Outcome Variables: Fixed Effects (Separate Analyses)

<i>Outcome Variable</i>	<i>γ Coefficient</i>	<i>SE</i>	<i>t</i>	<i>df</i>	<i>p</i>
Group enjoyment	.59	0.29	2.03*	32	.05
Positive emotions	.71	0.22	3.26**	32	.003
Negative emotions	-.60	0.20	-3.03**	32	.005

* $p < .05$. ** $p < .01$.

this information allows us to estimate the intraclass correlation (*ICC*) of group enjoyment. In other words, we can discover what proportion of the variance is due to group-level effects.

$$ICC = \tau_{00}/(\tau_{00} + \sigma^2) \quad (2)$$

For our base model, tau is .405 and sigma squared is .603. Using this equation, the *ICC* is 40%. Therefore, 40% of the variance in group enjoyment as reported by our individual participants is due to group-level predictors.

Next, we inserted a predictor variable into the model. For Hypothesis 1, we were interested in the effects of ethnic composition (an L-2 predictor) on group enjoyment. We used the set of equations (Equations 3a and 3b) as follows:

$$\text{L-1: } Z_{\text{Groupfun}} = \beta_0 + r \quad r \sim N(0, \sigma^2) \quad (3a)$$

$$\text{L-2: } \beta_0 = \gamma_{00} + \gamma_{01}(\text{ethnic composition}) + \mu_0 \quad \mu_0 \sim N(0, \tau_{00}) \quad (3b)$$

From this model, we discovered that the variance coefficient for γ_{01} is .59 such that $t(1, 32) = 2.03$ and $p = .05$ (standard error = 0.29; also see Table 2). In other words, ethnic composition had a borderline significant effect on the composite of reported enjoyment of working within the team. We know from the sign of the variance coefficient that teams composed primarily of ethnic minorities therefore had a positive effect on group enjoyment.

We also determined what proportion of the variance was explained by ethnic composition using Equation 4:

$$\text{Proportional variance} = \frac{\text{base model } \tau_{00} - \text{current model } \tau_{00}}{\text{base model } \tau_{00}} \quad (4)$$

For the ethnic composition model, τ_{00} is .353. Thus, almost 13% of the variance attributed to the group level was explained using that model.

When we repeated these models and analyses for the standardized composites of emotions, we found that, although the reliabilities of the outcome variables were modest for positive emotions and poor for negative ones (.52 and .34, respectively), both were significantly predicted by ethnic composition (see Table 2). Teams composed primarily of ethnic minorities resulted in more positive emotions and fewer negative ones. The base ICCs for positive and negative emotions were 27% and 15%, respectively, indicating that the majority of the variance in those variables was caused by individual-level rather than group-level factors (base $\tau_{00} = .27$ and .14, and base $\sigma^2 = .75$ and .81, respectively). However, of that, ethnic composition explained 32% of the group-level variance of positive emotions and 45% of the group-level variance in negative emotions (new $\tau_{00} = .19$ and .08, respectively).

Hypothesis 2: **Ethnic Composition Effects on Creativity**

The second hypothesis was that teams composed mainly of ethnic minorities would have more creative story endings. Each team came up with one story ending, not three, and each story ending was coded for creativity separately. However, because HLM does not allow for predictors at the group level (Moritz & Watson, 1998), this variable had to be tested using a normal regression analysis on the group level. There was no significant difference in creativity between the groups composed mainly of ethnic minorities and those composed mostly of Caucasians in terms of the creativity of their story endings (unstandardized $M = 2.61$, $SD = 0.70$ and $M = 2.57$, $SD = 0.64$ for minority-dominated groups and Caucasian-dominated groups, respectively; using standardized creativity, $R^2 = .001$, $F[1, 32] = 0.03$, $p = .87$).⁴

Hypothesis 3: Individual-Level Race/Ethnicity Effects

It is important to demonstrate that any ethnic composition effects were not simply due to aggregates of individual-level race/ethnicity effects. If teams composed mainly of ethnic minorities enjoyed themselves more, it needed to be established that this effect was not simply because of higher rates of enjoyment by, for example, the Asian and Asian American participants. To determine the truth, the four outcome variables (group enjoyment, positive and negative emotions, and creativity) were all tested for race/ethnicity effects. There were three different groups that had enough participants for meaningful ethnicity contrasts: Caucasians, Asian and Asian Americans, and all other students. The dummy variables (*Race1* and *Race2*, as described above) were created so that when both race/ethnicity variables were entered, the intercept would be the mean of the Asian American participants for the outcome variable. However, given the limitations of the data (small number of participants per team), each dummy variable was entered separately into the model. The race effect was also allowed to be random so that the model looked like this:

$$\text{L-1: } Z\text{Groupfun} = \beta_0 + \beta_1(\text{Race1}) + r \quad r \sim N(0, \sigma^2) \quad (5a)$$

$$\text{L-2: } \beta_0 = \gamma_{00} + \mu_0 \quad \mu_0 \sim N(0, \tau_{00}) \quad (5b)$$

$$\beta_1 = \gamma_{10} + \mu_1 \quad \mu_1 \sim N(0, \tau_{11}) \quad (5c)$$

The analyses were repeated such that *ZGroupfun* was replaced by the other two significant outcome variables, and half of the analyses had the second race vector instead of the first. The race effect was allowed to be random because race might not have a constant effect. This is the crux of Hypothesis 4—the existence of frog pond effects involving an interaction between race and team ethnic composition. If the effect was fixed, then no other variable could influence it.

For the majority of the analyses, race/ethnicity did not have a significant effect on the outcome variable (Table 3). There were no sig-

TABLE 3: Hypothesis 3: Fixed and Random Effects of Individual Race/Ethnicity Effects

Independent Variable	Fixed:			df	p
	γ Coefficient	Fixed: SE	Fixed: t		
	Random: μ_1 Slope	Random: SD	Random: Chi-Square		
Outcome: Group enjoyment					
Race contrast 1: Fixed γ_{10}	.13	.18	0.73	33	.47
Race contrast 1: Random μ_1	.02	.15	21.50	23	> .50
Race contrast 2: Fixed γ_{10}	.30	.19	1.57	33	.13
Race contrast 2: Random μ_1	.00	.06	15.72	16	> .50
Outcome: Positive emotions					
Race contrast 1: Fixed γ_{10}	.13	.22	0.60	33	.55
Race contrast 1: Random μ_1	.43	.65	30.30	23	.14
Race contrast 2: Fixed γ_{10}	.30	.20	1.54	33	.13
Race contrast 2: Random μ_1	.03	.19	16.71	16	.41
Outcome: Negative emotions					
Race contrast 1: Fixed γ_{10}	.00	.21	0.01	33	.99
Race contrast 1: Random μ_1	.36	.60	29.48	23	.17
Race contrast 2: Fixed γ_{10}	-.29	.14	-2.02*	33	.05
Race contrast 2: Random μ_1	.00	.05	6.54	16	> .50

* $p < .05$.

nificant differences between Caucasian participants, Asian/Asian American participants, and participants of other races/ ethnicities (including people of mixed heritage) for group enjoyment or positive emotions. There was only one significant effect: The fixed effect for listed negative emotions for the difference between the "other race/ethnicity" category and the combination of Asians and Caucasians was significant. This means that Asian and Caucasian participants were *more* likely to check off negative emotions in general than the combination of Hispanic participants, African American participants, and participants who listed mixed ethnicities ("other" $M = -.297$; Caucasians/Asians $M = .034$). This accounted for only 4% of the group-level variance (base model $\tau_{00} = .141$, Race2 model $\tau_{00} = .135$).

As before, because creativity was measured at the group level, analyses with creativity as an outcome had to be conducted via linear regression. Because individual race does not exist at the group level, the analyses were done on the individual level. Even though

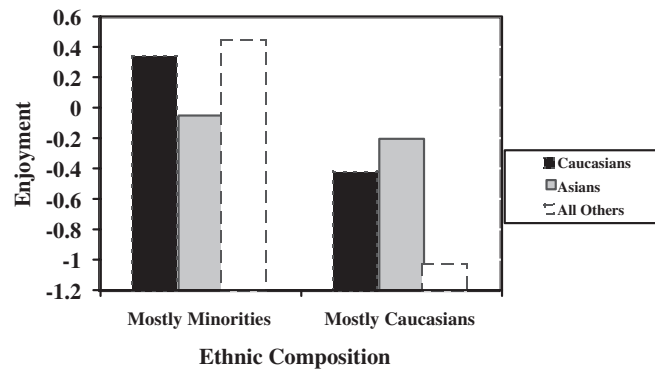


Figure 2: Group Enjoyment (z Scored) by Individual Ethnicity (Caucasians, Asians, & All Others) by Team Ethnic Composition

conducting this analysis artificially inflated the chance that a significant difference would be found, there were no differences due to individual participant ethnicity on creativity ($R^2 = .01$, $F[2, 103] = 0.51$, $p = .60$; standardized betas for *Race1* and *Race2* = .05 and .12 at $p = .71$ and .34, respectively).

Hypothesis 4: Frog Pond Effects Between Ethnic Composition and Individual Race/Ethnicity

Finally, we hypothesized frog pond effects, such as the effects for ethnic composition, would depend on the individual race/ethnicity of the participant. In other words, there would be an interaction effect between individual-level ethnicity and group-level ethnic composition. This hypothesis makes sense when you graphically present the data (see Figure 2 for an example of group enjoyment). Frog pond effects were tested for the three different outcomes where ethnic composition was found to have an effect (group enjoyment, positive emotions, and negative emotions). The frog pond effects were fixed. The full model was as follows:

$$L-1: ZGroupfun = \beta_0 + \beta_1(Race1) + \beta_2(Race2) + r \quad r \sim N(0, \sigma^2) \quad (6a)$$

$$L-2: \beta_0 = \gamma_{00} + \gamma_{01}(\text{ethnic composition}) + \mu_0 \quad \mu_0 \sim N(0, \tau_{00}) \quad (6b)$$

TABLE 4: Hypothesis 4: Fixed Frog Pond Effects for Ethnic Composition and Individual Ethnicity/Race on Group Enjoyment, Positive Emotions, and Negative Emotions

<i>Independent Variable</i>	<i>γ Coefficient</i>	<i>SE</i>	<i>t</i>	<i>df</i>	<i>p</i>
Outcome: Group enjoyment					
γ_{11} : <i>Race1</i> & ethnic composition	.48	0.48	1.01	96	.31
γ_{21} : <i>Race2</i> & ethnic composition	.23	1.04	0.22	96	.83
Outcome: Positive emotions					
γ_{11} : <i>Race1</i> & ethnic composition	.45	0.49	0.93	96	.35
γ_{21} : <i>Race2</i> & ethnic composition	.71	0.42	1.69	96	.09
Outcome: Negative emotions					
γ_{11} : <i>Race1</i> & ethnic composition	.13	0.36	0.36	96	.72
γ_{21} : <i>Race2</i> & ethnic composition	.97	0.46	2.13*	96	.03

* $p < .05$.

$$\beta_1 = \gamma_{10} + \gamma_{11}(\text{ethnic composition}) \quad (6c)$$

$$\beta_2 = \gamma_{20} + \gamma_{21}(\text{ethnic composition}) \quad (6d)$$

To test for frog pond effects, γ_{11} and γ_{21} were examined as fixed effects. If a significant effect was found for γ_{11} , for example, that would mean that ethnic composition influenced the difference in reported group enjoyment between the Caucasian and Asian/Asian American participants. The reason why the difference would be between the Caucasian and Asian participants is because the second race/ethnicity vector controls for the difference between Asians and other minorities (unlike with the individual race analyses, which only included single race/ethnicity vectors).

Only one significant frog pond effect was found (Table 4). What is more, this frog pond effect was found even when controlling for what ended up being significant main effects for both ethnic composition and race (Table 5). This significant finding was for the effect of ethnic composition on the difference between Asian/Asian American participants and other minority participants on negative emotion. When non-Asian ethnic minority participants were in groups composed mainly of Caucasian participants, their tendency to list more negative emotions was increased above and beyond the Asian/Asian American participants' tendency to do so.

TABLE 5: Full Model of Race/Ethnicity, Ethnic Composition, and Frog Pond Effects for Negative Emotions

<i>(a) Fixed Effects</i>					
<i>Independent Variable</i>	<i>γ Coefficient</i>	<i>SE</i>	<i>t</i>	<i>df</i>	<i>p</i>
For the intercept, β_0					
γ_{00} : Intercept	0.81	0.20	4.12**	32	.00
γ_{01} : Ethnic composition effect	-0.89	0.26	-3.46**	32	.002
For <i>Race 1</i> slope, β_1					
γ_{10} : <i>Race 1</i> effect (Asians vs. Caucasians)	-0.47	0.26	-1.79 [†]	96	.07
γ_{11} : <i>Race 1</i> & ethnic composition frog pond effect	0.13	0.36	0.36	96	.72
For <i>Race 2</i> slope, β_2					
γ_{10} : <i>Race 2</i> effect (Asians vs. other minorities)	-1.18	0.44	-2.72**	96	.007
γ_{11} : <i>Race 2</i> & ethnic composition frog pond effect	0.97	0.46	2.13*	96	.03
<i>(b) Random Effects</i>					
<i>Independent Variable</i>	<i>Variance Component</i>	<i>SD</i>	<i>Chi-Square</i>	<i>df</i>	<i>p</i>
<i>Intercept 1</i> , U_0 , τ_{00}	.12	0.34	45.70 [†]	32	.055
<i>R</i> , σ^2	.78	0.88			

[†]*p* is marginally significant (between .05 and .09). **p* < .05. ***p* < .01.

In other words, as a group, African Americans, Hispanics, and participants of mixed race/ethnicity were more swayed by the difference in ethnic composition than Asians or Asian Americans. Their experiences in minority-dominated teams were relatively *more* positive than that of the Asian/Asian American participants. However, we should continue to take into account the low reliability (.34, as determined when we tested Hypothesis 1) of the outcome variable.

DISCUSSION

These findings describe a complex picture of how ethnic composition relates to group enjoyment and creative performance.

Although there were no significant differences in creative performance, teams composed mainly of ethnic minorities were more likely to enjoy working together, reported more positive emotions, and reported fewer negative emotions. We also found only one individual-level race/ethnicity effect: People who self-identified as being of mixed race/ethnicity, African Americans, and Hispanics were less likely to report negative emotions overall than Caucasians and Asians. Critics might suggest that the effect of ethnic team composition on negative emotions was then because of individual ethnicity such that the preponderance of non-Asian minorities in the teams composed mainly of ethnic minorities lowered the overall level of reported negative emotions. However, the frog pond analysis revealed that the race/ethnicity effect was in addition to and independent of both the ethnic composition effect and a frog pond effect. The individual-level race/ethnicity effect on negative emotions was moderated by ethnic composition. Not only were non-Asian ethnic minorities less likely to check negative emotions on average, they were *more* influenced by ethnic composition effects than the Asian/Asian American participants.

For two of our indicators of group enjoyment, teams composed mainly of ethnic minorities reported having a better time than teams composed mainly of Caucasians without any effects for individual ethnicity or interactions between individual ethnicity and group composition. For the third outcome variable, the group effect occurred above and beyond the individual-level and interaction effects. These group effects for ethnic composition were *not* because of an aggregate of individual ethnicity effects; they were true context effects. The one individual ethnicity effect combined with the group-level effect to produce a frog pond effect. There was an interaction effect between individual-level and group-level ethnicity for negative emotions that was above and beyond what could be explained by each alone.

This study did not reveal advantages in creativity due to ethnic composition classified by Caucasian or minority dominance. It is entirely possible that our heterogeneous teams outperformed our homogeneous teams (such as with McLeod et al., 1996), but given that more than 93% of our teams were heterogeneous, this was

impossible to test. To our knowledge, this is the first study testing the effects of ethnic composition in this manner on creativity. A null result can have many meanings. Perhaps once a level of heterogeneity is achieved in a small group, the specific ethnicity of the members is less important for creativity. Perhaps the socioemotional advantages wrought by a minority-dominated group do not necessarily translate into better creativity (as was suggested by West, 2002). However, although there were no advantages in creativity, there were no disadvantages either. This suggests that greater group enjoyment was not achieved at the cost of performance on the task.

These findings are important both theoretically and practically. They provide evidence for the overall effects of ethnic composition regardless of individual race/ethnicity. Ethnic composition can truly be more than a sum of its individual members. Asians, non-Asian ethnic minorities, and Caucasians all enjoyed working in minority-dominated teams more. We suggest that this is because of the effects of group-level collectivism. Even Caucasians within teams of mostly Caucasians had less fun. All other things (like performance) being equal, it seems that groups dominated by minorities are more enjoyable for everyone. What is more, we discovered that non-Asian ethnic minorities were more influenced by ethnic context than anyone else. This implies that, when possible, making interactive teams composed mainly of ethnic minorities can have social benefits without decreasing task effectiveness.

This study is not without its weaknesses. First of all, we did not measure team levels of collectivism or individualism. Future studies need to clearly operationalize culture and determine that it is the mediating factor (although we are not alone in not specifically measuring culture ourselves, e.g., Erez & Earley, 1987). It is possible that ethnic composition had an effect for reasons other than group culture. However, the argument that members of minority groups were pleased to work in teams where they dominate does not account for the clear finding that Caucasians also enjoyed working in minority-dominated teams more than in Caucasian-dominated teams.

Second, these findings may not generalize to other settings. The university and city where this study took place are ethnically

diverse. These participants may be more accustomed to working with members of different ethnic groups than students at other colleges (as with Sargent & Sue-Chan, 2001) and may have developed skills to do so. Ethnic identity and multiculturalism are known to be explicitly valued in these settings. The flip side of this criticism is that our findings could generalize to other multicultural areas of the United States where diversity is celebrated.

Third, the teams were all ad hoc and small. There may be different results for teams that exist for longer than the course of a research session (McGrath, 1984) or for teams that are composed of more than three individuals. On the other hand, the fact that the statistical majority in such a small group can make a difference is very striking. Also, the finding is basically in line with that of O'Reilly et al. (1999), and their sample had teams ranging from 3 to 14 members, were long-standing, and were in the workplace.

Fourth, our data have limits and are not entirely conclusive. We found only one significant frog pond effect between individual race/ethnicity and ethnic composition, whereas more would have been expected given a glance at the data (e.g., Figure 2). This was most likely because of intercorrelations between the race/ethnicity variables and the ethnic composition variable as well as the small sample size. Also, to further understand race/ethnicity composition effects, it would have been useful to have a greater number of Hispanics and African Americans. Given sufficient resources, it would be useful to examine ethnic composition effects for different ethnicities. For example, does a group of majority African Americans have the same socioemotional benefits as a group of majority Asian Americans? In addition, our study sample was composed mainly of females: O'Reilly et al. (1999) found that White females were particularly likely to react positively to being surrounded by Asians. We found no effects for either individual gender or gender composition on any of our dependent variables, suggesting that O'Reilly et al.'s finding may not speak to our sample. Nevertheless, if gender has a possible effect, future studies should examine it.

Finally, because most of our groups were heterogeneous according to previous literature's heterogeneous/homogeneous typology, we were unable to separate out effects due to heterogeneity from

effects due to minority/Caucasian dominance. Although logistically difficult, a future study could manipulate ethnic composition as well as homogeneity/ heterogeneity to better understand the different implications from both.

This study provides a new and potentially more useful way to examine ethnic composition. Instead of contrasting heterogeneity versus homogeneity, we *assumed* diversity by focusing on the contrast between different types of heterogeneous teams. Ethnicity was conceptualized as both a group- and an individual-level variable and was more powerful at the group level. Simply the fact that everyone in minority-dominated teams (including Caucasians) enjoyed themselves more with no reduction in performance should be of note to managers and other leaders seeking to construct work groups. The next question to address should be why and under what circumstances do these teams have such a beneficial socioemotional effect, and does it always occur with no drop in productivity. In addition, we used HLM to distinguish individual, context, and interaction effects. It is our hope that future small group studies will utilize this appropriate method of analysis. Further research needs to be conducted to determine the exact group-process variables involved that tie together the complex relationship between ethnic composition, group enjoyment, and creative performance. The United States will only grow more diverse: It behooves us to discover ways to capitalize on the benefits of heterogeneity.

NOTES

1. Individualism and collectivism can also be individual-level variables. Also, we admit that there is a great deal of within-group variability on these values. However, our primary interest is in team-level effects.

2. Although *European American* is often used instead of *Caucasian* (e.g., Coon & Kemmelmeier, 2001), *Caucasian* is the term used by the U.S. Census in its analyses. *Caucasian* is used to include not only European Americans but also people of Middle Eastern and North African descent (U.S. Census, 1995). Although people of Middle Eastern and North African descent do not have the same privileged status as European Americans in U.S. culture, we would like to explicitly include them in our study. We also understand that *Asian American* can include a variety of groups such as Koreans, Chinese, Pacific Islanders, and so forth. Our primary interest is in overall ethnic composition, not in individual ethnicity. In

addition, if Caucasians make up less than 40% of a population, it seems inaccurate to refer to all other ethnic groups as minorities. However, in the United States overall, the general perception is that the majority ethnicity is Caucasian (and almost 70% of Americans, as reported in the 2000 Census, are non-Hispanic Whites; U.S. Census, 2001). Therefore, even though ethnic diversity is on the rise, the United States is still perceived as predominantly Caucasian.

3. Gender composition (majority female vs. majority male) was skewed. There were no all male groups, for example, and 18% had 2 males and 82% had 2 or 3 females. There were no significant differences in gender composition between the two different ethnic composition groups. Gender composition was not related to group enjoyment, positive or negative emotions, or creativity. In addition, gender at the individual level had no effect on group enjoyment, positive or negative emotions, or creativity.

4. This analysis was also conducted using hierarchical linear modeling with creativity as an individual-level outcome variable (even given the problems in doing so), and it was also not significant (γ coefficient = .14, $SE = 0.32$, $t = 0.45$, $df = 30$, $p = .66$).

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