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Culture and the Interaction of Student Ethnicity with Reward Structure in Group Learning

Eric A. Hurley
Pomona College

Brenda A. Allen
Brown University

A. Wade Boykin
Howard University

This study tests the hypothesis that cultural differences in group orientation predict an interaction between the student variable—ethnicity—and a learning context variable—reward structure—on math performance after group learning. One hundred and thirty-two African-American and European-American female and male fourth and fifth grade students studied math estimation in one of three group learning contexts. The learning contexts operationalized were: intergroup competitive, interpersonally competitive, and communal-no reward. ANCOVA confirmed a predicted interaction of ethnicity with learning context on post study session performance. Although there was no difference overall, African-American and European-American students performed best in the aggregate in different contexts. Independent ratings of students' group-positive behaviors mirrored the two-way interaction between learning context and ethnicity. The findings suggest that important student variables interact with the variable elements of group learning and should be studied in greater detail. They also support Boykin's (1994) contention that the cultural context of learning is a critical mediator of children's achievement.

For several decades scholars and educators have looked to group learning, largely under the banner of cooperative learning, for its potential to support students' academic achievement. Although there is impressive empirical data in the cooperative learning literature demonstrating that group learning can benefit students, classroom outcomes are as varied as the methods employed in the name of cooperative learning (Slavin, Hurley, & Chamberlain, 2002; Zahn, Kagan, & Widaman, 1986). In response to this inconsistency, researchers have directed considerable effort toward determining the importance and impact of variable components of group learning on student outcomes. Comparatively little attention has been paid to teacher, curriculum content, and, of

Correspondence should be addressed to Eric A. Hurley, Department of Psychology, Pomona College, 647 North College Way, Lincoln 2128, Claremont, CA 91711. E-mail: erichurley@pomona.edu

interest here, student variables with which those components must interact. The current study seeks to address a gap in the literature concerning the interaction between variables associated with the configuration of group learning contexts and variables associated with students themselves.

One component of group learning that makes a ready distinction among methods, and which is acknowledged in the literature to be important, is reward structure. In group learning, reward structure refers to the conditions under which students may receive performance incentives during or after a learning task. A variety of reward structures are possible in cooperative learning. In the abstract, cooperation with intergroup competitive rewards promises incentives if group members collectively perform better than other groups. Cooperation with interpersonally competitive rewards links incentives to individual student's outperforming others. Cooperation with group criterion rewards connects incentives to group members' average performance relative to some fixed goal, and cooperation with individual criterion rewards links incentives to a student's individual ability to reach a fixed criterion goal. *Pure cooperation* involves no external reward for performance. Forms of these five reward structures are represented experimentally and in classroom practice, often in mixed combinations.[1]

The variety of cooperative learning reward structures can be examined in relation to their assumptions about how cooperative learning benefits students. Most operate on the premise that group learning benefits students procedurally, that is by eliciting behaviors such as cognitive elaboration (Slavin, 1996), modeling (Ellis & Rogoff, 1982), participatory appropriation (Rogoff, 2003), and promotive interaction (Biehler & Snowman, 1997). Motivation is treated as a distinct concern that must be separately managed toward enhancing such procedural benefits. What is debated primarily is how best to motivate. Two types of motivation, to succeed or to exert effort and motivation to interact or help, are of interest.

To achieve the first, many cooperative learning strategies appeal to students' self-interest in the form of individual accountability, the promise of individual reward or both. To achieve the second, cooperative learning strategies attach group contingencies to the accountability or reward structures. Cooperative learning with interpersonal competition, for example, attends mainly to the first, using individual accountability and the promise of reward to motivate students to work hard in their groups. Group competition attends to the second, linking the promise of reward to the goal of outperforming other groups thereby making individual success contingent on the success of the group interaction (so that students will help others). Cooperative learning with individual criterion rewards maintains high accountability and the promise of rewards but omits competition presumably because of its potential negative effects (Deci, Koestner, & Ryan, 2001). Group criterion is similar but also omits individual accountability while maintaining the promise of reward and group goals.

The evident tension between individual accountability and group goals leads some models to layer the two by making the group goal a visible composite of individual performances. This is intended to maintain individual accountability and to ensure that strong students will work to support, rather than simply overcompensate for, the performances of their less able peers. By definition, none of the reward-based models consider that social responsibility might

[1] A distinction is sometimes made between tangible or material rewards (prizes, privileges) and intangible rewards (recognition, feedback); and within the category intangible, between rewards that are administered in a controlling manner or as information regarding competence (Deci, Keostner, & Ryan, 2001). While we acknowledge the significance of this distinction for some purposes, in this work we refer to all except the last of these as external reward.

be a significant part of how children understand "group" and so might itself be motivating. Pure cooperation, by contrast, omits secondary manipulation of student motivation, presumably because the process of working cooperatively may itself be motivating, either or both because it evokes social responsibility or that it allows students' intrinsic motivation to be expressed.

Several scholars have conducted reviews and meta-analyses aimed at establishing which reward structures are the most effective for cooperative learning implementation and have reached conflicting conclusions. These reviews have reported variously that students' performance and preference is optimal in cooperative groups with group competitive (Chapman, 2001; Slavin, 1983), individual criterion (Johnson, Maruyama, Johnson, Nelson, & Skon, 1981), or group criterion reward structures (Qin, Johnson, & Johnson, 1995).[2]

While the debate remains unresolved, supporters of each perspective have moved forward into assessing elements of a learning context that influence students' success within a given reward structure. *Constructive competition*, for example, stresses the importance of fair rules, reasonable likelihood of winning, and strong positive relationship among competitors (Tjosvold, Johnson, Johnson, & Sun, 2003). Other work details elements that build cohesion, said to be essential for noncompetitive cooperative groups. These elements include training for positive interpersonal interactions and processing of the group's activity (Johnson & Johnson, 1985; 1999). Still others focus on types of collaborative behavior and discourse that foster productive group work (Cohen, Lotan, Scarloss, & Arellano, 1999; Webb & Mastergeorge, 2003). Missing from these analyses, however, is a theory-driven consideration of *student* variables that must interact with the structure of group learning.

One important student variable that begs consideration is their ethnocultural background. From the beginning of the cooperative learning movement in education, scholars have observed that African-American students often gain more from the implementation of cooperative learning techniques than do White and other students (Lucker, Rosenfeld, Sikes, & Aronson, 1976; Slavin, 1983). Garibaldi (1979) found that not only did the average achievement of Black students improve more than that of other students in the study, they were also more likely than non-Black students to report satisfaction with the group interaction, enjoyment of the task, and liking of their group members. In a study designed specifically to determine whether Black and White students respond differently to cooperation and competition, Johnson and Johnson (1985) found that, on average, African-American students participated more willingly in cooperative learning contexts and reported higher levels of satisfaction than did European-American students.

Given the ubiquitous gap in academic performance across racial groups on a range of measures, the idea that cooperative learning could be especially well suited for significant numbers of African-American students seems compelling. However the benefits of cooperative learning seem to vary across forms for them as well. Among the few studies that have compared cooperative

[2]Overlapping the debate concerning reward structure is the controversy over the potentially negative effects of extrinsic rewards on intrinsic task motivation. As with reward structure, there is mixed support for both perspectives (Cameron & Pierce, 1994; Ryan & Deci, 1996; Deci, Koestner, & Ryan, 2001). The debates overlap in that many cooperative learning structures involve the use of extrinsic rewards of various types to motivate students; and those that do not, often cite protecting students' intrinsic motivation to learn as part of the rationale for that choice. By the same token, the points of overlap involve what we have termed motivation to succeed/exert effort but seem apart from motivation to cooperate/help, which may have its own relationship with intrinsic (task) motivation.

learning reward structures and which specifically considered African-American students, the results are mixed (Dill & Boykin, 2000; Garibaldi, 1979; Widaman & Kagan, 1987). Garibaldi, for example, found no difference in math performance among African-American students in group criterion and intergroup competitive contexts, but that both outperformed students who worked alone under individual criterion or interpersonally competitive reward structures. Widaman and Kagan, comparing two modes of group competition, concluded that the learning climate was biased against the cooperative orientations of African-American students when individual students represented their teams in interpersonally competitive tournaments, compared to when students' scores were combined to determine their team's performance.

It is difficult to identify a clear pattern in the body of cooperative learning findings apart from the general themes that group learning methods have a broad potential for classroom application and that African-American students can be particularly responsive to group learning. In explaining the second trend, some authors have suggested that it may be due to cultural differences in the way that Black and White Americans generally relate to groups (Kagan, Zahn, Widaman, Schwarzwald, & Tyrrell, 1985; Slavin, 1983).

Boykin (1986; 1994), viewing this trend from the perspective of cultural psychology, has argued that compared with conventional instructional methods that are based in individualism and/or interpersonal competition, cooperative learning tends to be more congruent with communal tendencies among African-American children.

Communalism is a term for the form of group orientation that is found in African-American culture. It is characterized by a marked awareness of the fundamental interdependence among people that makes social bonds and interconnectedness with others a central priority and which leads to a primacy of the views, needs, and goals of the group. Communalism is thought to have origin in the West African cultures from which many African Americans' ancestors were enslaved and to have been preserved by the voluntary and involuntary forces that insulate ethnic and cultural groups in the United States (Akbar, 1985; Boykin, 1994; Boykin & Allen, 2003).

In cultural psychology, "to understand individual thinking, one needs to understand the social, cultural and historical context" in which it is developed (Rogoff & Chavajay, 1995, p. 866). Psychology's emerging understanding of the link between culture and cognitive development adds an important dimension to the study of schooling for it permits analysis of the interactions among differing cultural groups brought into close proximity by public schooling. Such analyses have been advanced by a number of scholars (see, for example, Boykin, 1986; Ladson-Billings, 2002; Malloy & Jones, 1998). Among them, Boykin (1986) asserts that the psychological orientations and behavioral inclinations of African Americans are informed by systems of meaning that are often distinct from those that inform U.S. mainstream culture and that communalism is one of the dimensions on which such a distinction has been observed.[3]

Several theorists have suggested that communalism leads many Black students to a preference for group over individual or competitive interactions and a facility with the modes of cognition needed there (Boykin, 1994; Gay, 1978; Shade, 1987). As such, findings like those discussed earlier may be attributable to cooperative learning methods allowing the Black students' existing abilities and orientations to support their acquisition of academic skills.

[3]Among the other themes identified in African-American culture are verve, rhythmic movement orientation, and spirituality (see Boykin & Allen, 2003 for a discussion).

The presence of communalism in African-American culture is substantially documented across a range of regional and socioeconomic sample groups.[4] Boykin, Jagers, Ellison, and Albury (1997), for example, reported positive endorsement of *communalism scale* items in three samples of African-American college students. They also reported that these ratings were correlated positively with cooperative attitudes and negatively with individualistic attitudes. Other survey research has reported that communalism among African-American participants is related to volunteerism (Mattis, Jagers, & Hatcher, 2000), religiosity (Mattis, Hearn, & Jagers, 2002), moral reasoning (Woods & Jagers, 2003), and other constructs that are commonly associated with group orientation (Triandis, 2001). Several comparative studies have reported that African-American students were more inclined toward communal than individualistic (Coleman, 1996; Dill & Boykin, 2000; Hurley, Allen, & Boykin, 2005) or competitive (Marryshow, Hurley, Allen, Tyler, & Boykin, 2005; Sankofa, Hurley, Allen, & Boykin, 2005) interactions.

Acknowledging that the orientations of individual Black children are determined by the particular circumstances in which they are socialized,[5] Boykin and Allen (2000) describe how, for many children, themes such as communalism are appropriated early in development through their participation in the culturally structured contexts that are typical in the home and community lives of many African Americans. Such themes take on developmental salience for children who are so socialized because they become linked to positive affect and significant others. Further, because these themes permeate the conditions for the development and practice of emerging skills, they come to guide the children's perceptions and perspectives, and therefore significantly shape their behavioral and cognitive repertoires.

An important implication of this assertion is that such cultural themes could be significant resources to academic learning because their inclusion would provide opportunities for such children to exercise existing competencies in the service of attaining new ones. Moreover, learning contexts that include salient cultural themes would be more likely to sustain and enhance students' motivation to engage in required tasks than contexts characterized by less familiar themes. The empirical work generated by Boykin's model has demonstrated that incorporating African-American cultural themes into learning contexts can lead to improved academic performance for Black school children. See Boykin and Allen (2003) for a review of the research.

In their efforts to observe communalism-related behaviors among African-American children, Boykin and his associates have employed methodologies similar to those used in cooperative

[4]Many of the studies documenting the existence of themes such as communalism in African-American culture have drawn their sample populations in the southern United States and/or among low income participants, leading some to suggest that claims about African-American culture should be more appropriately labeled claims about southern Black culture or phenomena of the "culture of poverty" (Young, 1974). Recent investigations have sampled from among Black Americans in the northeast (Marryshow et al., 2005; Bailey & Boykin, 2001), in the midwest (Dill & Boykin, 2000), and among middle- and upper-middle class African Americans (Sankofa, Hurley, Allen, Tyler & Boykin, under review) **Q1** supporting the contention that such themes transcend regional and socioeconomic boundaries.

[5]Aside from within group variation in socialization experiences, it is also likely that some African Americans whose initial socialization included Afrocultural themes, go on to become acculturated and/or engage in code switching in order to function in the competitive and or individualistic value structures of mainstream-dominated institutions (including for example higher education and competitive sports) (Ogbu, 2004). We view those who successfully adopt such coping strategies as exceptions, if highly visible exceptions, to the more general trend of African-American children who struggle with the tension between incompatible cultural systems. Moreover that some do succeed by such choices does not imply that all should be expected to make the same compromise.

learning research. Suggesting that many African- American children benefit from cooperative learning because it is compatible with communalism in African-American culture, these researchers have sought to determine the effects of learning contexts designed specifically to support the expression of communalism. These investigations demonstrate how relatively simple and malleable elements of an environment (that would not alone be sufficient) can be coordinated to exert a significant influence on students' thinking and behavior. Elements such as physical layout (close proximity), instructions, distribution of materials (shared), task structure (cooperative), and instructions are coordinated to communicate the priority of communal thinking and behavior among students (Boykin & Allen, 2003). Coleman (1996), Hurley et al. (2005), Dill and Boykin (2000), Boykin, Lilja, and Tyler (2004), and others have reported, across a variety of task types,[6] that on average African-American students learned more in and showed a greater preference for contexts designed to prioritize the expression of communal tendencies over those supporting individualism or competition.

These investigations of communalism raise questions relevant to the debate about reward structure and cooperative learning. The reward structure literature seeks primarily to identify which reward contingencies optimize cooperative learning outcomes independent of student characteristics. Such a goal presumes that students' default orientation toward group learning is standard, at best neutral, and perhaps negative. While certainly not true for all students nor even for all European-American children, this assumption may be justifiable for the many students whose home-based socialization is congruent with the well documented individualistic and competitive priorities of mainstream U.S. culture (Triandis, 2001). The literature makes little meaningful consideration, however, of student variables such as cultural background that might render such an assumption inappropriate for significant numbers of students.

We conjecture that communalism leads many Black students to a particular functional relationship with group settings. For example, the definition implies that for the communally oriented, duty to one's group is part of the concept regardless of individual accountability, and that group goals have primacy over self-interest. The definition also asserts that social bonds and interconnectedness are prioritized and, as such, motivate group centric action. As related to cooperative learning, this definition reframes the discussion of motivation since communally oriented students should find group-work motivating in itself. Beyond issues of motivation, being cognitively and interpersonally socialized communally should also lead many Black children to master thought and behavioral patterns appropriate for group learning. Children socialized to prioritize autonomy and independence over other concerns would be less likely to develop the same facility with such skills.

Although said functional difference is implied in theoretical writings, the related empirical data have yet to address the question directly. The studies consistently report the superiority of communal learning, which includes no extrinsic manipulation of reward or accountability, over individual learning with various types of reward and accountability. The study by Hurley et al. (2005), for instance, reported the superiority of communal over individual criterion learning on a math estimation task among 78 African American fifth-grade students. Similarly, Dill and

[6]Coleman (1996) employed an open-ended creative problem-solving task; Hurley, Allen, and Boykin (2005) used a math estimation task; Dill and Boykin (2000) employed a text recall task; Boykin, Lilja, and Tyler (2004) examined weekly quizzes and a unit exam; both assessments required students to provide definitions and complete short-answer items from a geography text.

Boykin (2000) reported superior average text recall for 24 fifth-grade Black students who studied in communal groups over 24 similar students who studied in a peer tutoring context and 24 who studied in an individual criterion learning context. Such studies support the idea that many African-American students prosper in communal learning contexts but do not speak to whether the simple use of "group" drives the effects or whether manipulating the reward structure of the groups might moderate or mediate them in ways predicted by the general cooperative learning literature.

An examination of Black students' performance that holds group constant while varying reward structure would begin to address these questions. There is one relevant study. In an unpublished doctoral dissertation, Albury (1993) had African-American fifth-grade students study vocabulary words in one of four learning contexts. Two of the contexts were comparable to cooperation with group competitive rewards and pure cooperation described earlier. Students in the group competitive context were instructed that they could earn a reward if they outperformed the other groups on a posttest. Those who studied in the pure cooperation (communal) context were not offered a reward incentive but were told that they should work together because it is good to do so. Albury reported that Black students who studied communally retained as many of the word meanings on a posttest as those who studied in the contexts with a group competitive reward structure (and better than those who studied in two individualized contexts).

The literature on reward structures is ill prepared to explain this finding. Within the parameters of the ongoing debate, one might have predicted that the addition of reward contingencies would have enhanced students' performance, as suggested in Slavin's 1983 review. That literature might have otherwise predicted that the addition of intergroup competition would have galvanized the groups, and again enhanced performance, as suggested by Johnson and Johnson's group cohesion work (1985, 1999). Optionally, the group competitive context might have undermined the students' intrinsic motivation to cooperate by its inclusion of an extrinsic reward.

That none of the aforementioned possibilities manifested in Albury's 1993 study suggests that group effects may have driven Black students' performance irrespective of the two reward structures operationalized in the study. It raises the question of whether the same would be true for group learning contexts with other reward structures. It also raises the interesting possibility that reward structure and student ethnocultural background interact in group learning. A direct comparison of African-American and European-American students' performance across group learning contexts with systematically varied reward structures would help to clarify these relationships. Toward that end, this study examined Black and White students' performance on a math estimation task after learning in a group context with group competitive reward or communal-no reward contingencies, as in Albury's study, or in a group learning context with interpersonally competitive reward contingencies. We also observed students' behavior during the group learning sessions in the hope of gaining insight into how the variables of interest come to influence learning outcomes.

We predicted that Black and White students' aggregated performance on a math estimation task would differ from each other depending on the configuration of the learning context in which they participated and that their exhibition of group-positive behavior during the study sessions would similarly reflect an interaction between student characteristics and the configuration of the learning contexts.

METHOD

Participants

Participants were 132 African-American and European-American, female and male, fourth- and fifth-grade students sampled from Title 1 urban public schools in the northeastern United States. The sample included students from two grade levels for convenience and, as such, no hypotheses were advanced with regard to grade. All of the students sampled were low income as indicated by their participation in the schools' free and reduced lunch program. None of the schools included placed particular emphasis on group learning or math estimation in their curricula.

Instruments

Math Estimation Task. Because math skills in general tend to be cumulative, prior knowledge can be a difficult confound to control in education research. Computational estimation was chosen for this study because the prerequisite skills are basic and emphasized in school whether or not estimation itself is a focal point in math instruction. As a result, estimation may be similarly accessible to students with a range of prior achievement. Lefevre, Greenham, and Waheed (1993) found that although most fourth-grade students had attained and surpassed the prerequisite knowledge, few could estimate, but that sixth- and eighth-grade students provided reasonable estimates. Pilot testing with an earlier 50-item version of the estimation task with 50 students in a northeastern urban elementary school indicated that at initial testing students performed with chance accuracy. Following a study session, performance was well above chance levels with a mean improvement of better than 40%. This supports the supposition that students generally lack the skills for the estimation task at the outset but that the skills are within their reach academically.

The math estimation task used in this study consists of a short introduction to estimation and 15 estimation-in-multiplication problems presented in a multiple-choice format. Using an item from the task to illustrate: $20 \times 97 =$ a) 21000, b) 2000, c) 2700, d) 3100; the correct choice (b) was generated using the estimation strategy that is taught in the study session materials. Incorrect choices were different in magnitude (a) or number (c and d) from the best choice. The task is scored by a simple count of correctly answered items. Pre- and posttests are the rotated split halves of a 30-item measure developed for this research. The two test forms are designated 1 and 2 and were counterbalanced in the study.

Study Session Materials[7]*.* The study packet is an 11-page workbook designed to teach the basic concepts of the *nice number* estimation strategy (Reys, Reys, Trifton, & Zawojewski, 1985) through examples, activities, and narration. Nice numbers are numbers such as 5, 10, 20, and 100 that allow easy mental computation because they are easy to count by. The nice number

[7]The original study packet (revised for this work to include more of the micro-skills that undergird estimation) was used in the pilot test with the task. Pilot data indicated that it was an effective tool for conveying the desired skills and that those skills were accessible to fourth- and fifth-grade students.

computational estimation strategy involves rounding the numbers in a problem to the nearest nice number and then calculating mentally to make an estimate for the original equation. Using the nice number estimation strategy to solve the example presented earlier ($20 \times 97 =$), one would round 97 to 100, solve the simplified equation ($20 \times 100 = 2000$) and use the solution as an estimate for the original problem.

The workbook format was designed from a survey of literature in mathematics instruction, manuals for teachers (Reys et al., 1985; Rubenstein, 1985; Ockenga & Duea, 1985; Hazekamp,1986), and with input from active teachers (N. Bordelon, personal communication, February 2000; D. Sauve, personal communication, February 2000). All sources stressed the use of verbal introduction, interesting examples, simple practice exercises, stimulating graphic presentation, and review of the microskills that undergird the target skills. The workbook activities primarily teach estimation as a way to reason about quantities but also identify procedures (rounding) students can use to reconceptualize problems in terms that are easy to manipulate mentally.

Group Rating Scale. As an exploratory measure of behavior that might contribute to and provide insight into group learning outcomes, we employed a behavior rating protocol to code videotapes of the study sessions.

Four categories of behavior were adapted from Ashman and Gillies' Group Ratings Scale (GRS), a measure designed to assess the general group learning behavior of trained versus untrained cooperators (1997). The categories were: *involvement*, which includes students' expressed understanding or their active engagement; *communication effectiveness*, which includes behaviors like listening, explaining, and making eye contact; *participation*, which includes behaviors that indicate working in an organized way as well as things like seeking consensus; and *positive affect*, which includes behaviors like smiled/frowned or comments of a specific affective valence.

The four GRS categories formed the basis of a protocol for rating participants' general group-positive behavior during the study sessions. The definition of each category included a number of exemplar behaviors. The categories and their exemplars are presented in Figure 1. Pilot observations of five learning groups whose reward structure was either communal, inter-group competitive, or group criterion based indicated that the categories were readily identifiable among group participants and that inter-rater agreement was high.

Procedure

Sessions. Teachers provided lists of students with gender and ethnicity denoted. They were asked to provide only the names of students whose grades and behavior were within the normal range for the school. Experimenters then selected groups of three students from the list within the criteria that each study session group was racially homogeneous and that gender was always mixed. The groups of three students were then randomly assigned to a learning condition.

The experimental sessions were conducted in unused classroom spaces in which three individual student desks and one table with three chairs around it had been arranged. Participants were made aware that some of their activities would be recorded as part of their initial introduction to the activities. This was done so that they could get used to the idea before the relevant segment of the session.

1. Involved a. Understanding task demands b. Being actively engaged c. Working cooperatively d. Working on task	***3. Participated*** a. Responding to group needs b. Working in an organized way c. Seeking agreement on answers
2. Communicated effectively a. Listening to others b. Keeping eye contact with speakers c. Seeking opinions/contributions from others d. Accepting ideas from others e. Explaining to others	***4. Affect appeared to enjoy/not enjoy the study session*** a. Smiled or frowned b. Expressed enthusiasm/dislike c. Made positive/negative comments d. Other

FIGURE 1 Group Rating Scale categories and exemplars.

Students were pre- and posttested on the math estimation task at individual desks before and after participating in a 15-minute study session. For the study sessions, groups of three students were seated around one small table while they worked on the math estimation study packet. An experimenter was present but did not participate in the study sessions. After the posttest, participants responded to a manipulation check item.

Because some participants were expected to demand interaction beyond the instructions, experimenters were trained for appropriate limited interaction with the study groups. For example they were instructed to redirect students attention to the task using phrases from the condition prompt if asked task-irrelevant questions. If asked direct questions about the materials or the task, they were instructed to answer briefly and/or remind students to read and follow the workbook instructions. As additional insurance against inconsistent interaction with the groups, the experimenters were also given a list of statements to guide and standardize such contact with the groups.

Behavior Ratings. The four categories of behavior from the Group Rating Scale were rated for each child using video recordings of the study sessions. Three trained undergraduates participated in the rating process. The training consisted of three sessions. In the first, raters were asked to memorize the category definitions and exemplars and then were shown a brief segment chosen to display characteristic behaviors in each category. In a second session, raters were quizzed on the definitions and exemplars and then rated three 5-minute segments of video alongside the primary investigators. After each segment these ratings were compared and specific incidents that contributed to the ratings were discussed to consensus. In the third session, raters independently rated two 15-minute sessions and their ratings were compared to ratings that had been made by investigators.

Raters watched one child at a time and then rated the child on each of the four categories of behavior. This rating was done on a 10-point Likert-type scale ranging from *not at all characteristic* to *very characteristic* for involved, communication effectiveness, and participation. The affect category was rated on a scale from *very positive* to *very negative*. Thus, each of the GRS

categories was rated three times for each participant, and an average rating for each was created. The correlation between the ratings was .76, .76, and .79 for the participated, involved, and communicated categories, respectively. The inter-rater reliability estimate for the affect category was .59.

Independent Variables

Type of group study session was the major independent variable. The study sessions differed by reward structure and in the associated instructions. The three reward structures employed were communal, group competitive, and group interpersonally competitive. In every other respect, the study sessions were the same. That is, all participants worked together in groups of three regardless of reward structure. Group members sat together at a table small enough for them to be in close proximity with one another, and each group shared one copy of the study materials.

Instructions for the communal study sessions included the *communal prompt*, a scripted statement developed by Dill and Boykin (2000), intended to encourage the expression of communal tendencies in participants. The experimenter sat with the participants at the table to read the prompt. Each child was asked to hold hands with their neighbor on either side. The communal prompt reminds participants that they are a group and that they should work hard and help each other by virtue of that fact and because of their common bond of school and community. The prompt stresses identification with their group and the duty they have to each other. In emphasizing social contact, identification with/duty to group members and sharing, the communal context is designed to encourage the expression of communal attitudes and behaviors among students who participate in this learning context. No reward is mentioned in the communal condition instructions; however, students are told that the activities they will do during the study session can help their group do well on the second task.

The group competitive study session instructions included the *group competition prompt*, a scripted statement designed to encourage the expression of competitive attitudes and behaviors and to emphasize the competitive reward structure. As with the communal prompt, the experimenter sat with the participants at the table to read the prompt. Each child was asked to hold hands with their neighbor on either side. In the competitive prompt, students are told that the activities they will do during the study session can help their group do well on the second task. Students are told that if their combined performance is better than that of other groups at their school they will earn a reward. They are encouraged to work hard to be the best group so that they might earn the reward.

In the group interpersonally competitive study sessions, participants were read the *interpersonal competition prompt*, a scripted statement designed to emphasize the interpersonally competitive reward structure and to encourage participants to work hard to earn a reward. As in the other conditions, the experimenter sat with the participants at the table to read the prompt. Each child was asked to hold hands with their neighbor on either side. Students are told that the activities they will do during the study session can help them do well on the second task. They are told that on the second task they will be competing against each other to earn the reward. They are each encouraged to work hard to outperform the other students so that they might win the reward for themselves.

After the prompt was read for a given group, the experimenter passed out one set of materials and read an illustrative example of an estimation problem and solution before allowing the

participants to begin working. Aside from the instructions and condition-appropriate prompt, the study sessions were unscripted and students were allowed to make use of the time and materials in whatever manner emerged among them.

Dependent Variables

As a check on our implementation of the learning groups, we analyzed participants' responses to a single item that asked whether they felt that other group members had paid attention to them during the study session. The item is intended to assess whether students perceived the study session as participation in a group activity. Participants responded to the manipulation check on a 4-point Likert-type scale with options from *never* to *very often*.

The major dependent variable considered was posttest performance on the math estimation task. The range of possible scores on the posttest was 0 to 15. The ratings for the four categories of the Group Rating Scale were used to generate scores for the dependent variable GRS.

RESULTS

Manipulation Check

The mean rating on the manipulation check item was near the scale midpoint of 2.5 (between the choices *sometimes* and *often*) and means for the three conditions were not significantly different from one another at 2.66 ($SD = 1.02$), 2.59 ($SD = 1.14$) and 2.38 ($SD = 1.05$) for the communal, group competitive and group interpersonally competitive groups respectively F (2,131) = .86; $p = .424$. These ratings indicate that students in all three conditions perceived their participation and membership in the groups to which they had been assigned similarly.

Performance

Preliminary analyses of variance were run on pretest scores to test for group differences that might be due to test-form order or grade level. Means and standard deviations are presented in Table 1. There were no significant interactions of grade level or test-form order with gender, F (1,131) = .007, $p > .94$; F (1,131) = .57, $p > .45$, ethnicity,F (1,131) = 2.71, $p > .10$; F (1,131) = .003, $p > .95$, or learning context, F (2,115) = .154, $p > .86$; F (2,115) = 1.42, $p > .26$, on pretest scores (MSE = 7.69). Although pretest performance scores were similar in all of the subgroups, their range and standard deviations did indicate considerable variability in the level of estimation skills that participants brought to the task. Because of this, pretest scores were covaried in all subsequent analyses of performance. Similarly, although there were no differences related to grade level, the possibility of undetected differences between fourth- and fifth-grade students led us to covary grade level in subsequent analyses as well.

Mean pretest scores for the sample were better than expected by chance alone at 5.13 ($SD = 2.79$) or 34% correct. Thus, participants appeared to have some basic number competency if not prior experience with estimation, but were not skilled estimators. Pretest mean scores

TABLE 1
Means and Standard Deviations for Pretest Performance

	Ethnicity		*Gender*		*Condition*		
	AA	*EA*	*Female*	*Male*	*C*	*G*	*I*
Pretest							
Form 1 Mean	**4.82**	**4.88**	**4.67**	**5.03**	**4.33**	**4.81**	**5.22**
n	39	33	37	35	18	27	27
SD	2.37	2.71	2.61	2.43	1.64	2.54	2.95
Form 2 Mean	**5.36**	**5.63**	**5.68**	**5.19**	**6.15**	**5.42**	**4.62**
n	36	24	34	26	27	12	21
SD	3.07	3.13	3.02	3.17	2.69	3.17	3.38
Total	**5.08**	**5.19**	**5.15**	**5.10**	**5.42**	**5.00**	**4.96**
n	75	57	71	61	45	39	48
SD	2.72	2.79	2.84	2.75	2.48	2.72	3.13
Grade							
Grade 4 Mean	**6.02**	**5.19**	**5.7**	**5.55**	**5.86**	**5.76**	**5.35**
n	36	32	37	31	21	21	26
SD	3.10	2.84	3.34	2.57	2.82	3.01	3.20
Grade 5 Mean	**4.21**	**5.20**	**4.56**	**4.63**	**5.04**	**4.11**	**4.50**
n	39	25	34	30	24	18	22
SD	1.99	3.01	2.06	2.89	2.13	2.08	3.05
Total	**5.08**	**5.19**	**5.15**	**5.10**	**5.42**	**5.00**	**4.96**
n	75	57	71	61	45	39	48
SD	2.72	2.89	2.84	2.79	2.48	2.72	3.13

C = **C**ommunal, G = Inter-**G**roup Competition, I = **I**nterpersonal Competition.

across learning conditions were similar at 5.42 ($SD = 2.48$), 5.00 ($SD = 2.72$), and 4.96 ($SD = 3.13$) for participants who were to study in communal, group competitive, and interpersonally competitive study conditions respectively, F (1,129) = .153, $p = .86$. Means were also similar across gender groups at 5.15 ($SD = 2.84$) and 5.10 ($SD = 2.75$), for female and male subjects respectively, F (1,130) = .017, $p = .90$. The mean pretest performance for Black subjects 5.08 ($SD = 2.73$) was similar to that for White subjects at 5.19 ($SD = 2.89$), F (1,130) = .05, $p = .82$.

A 2 × 3 × 2 analysis of covariance with ethnicity (Black/White) learning condition (communal/group competitive/interpersonally competitive) and gender (male/female) as factors was used to test our predictions. The dependent variable was performance on the posttest. Posttest means and standard deviations are displayed in Table 2. Pretest scores and grade level were entered as covariates. No significant main effect emerged for any of the covariates or independent variables (MSE = 14.80). Female and male subjects performed similarly on the posttest at 8.59 ($SD = 3.94$) and 7.56 ($SD = 4.07$), respectively F(1,130) = 1.20, $p = .28$. Black subjects' posttest average was 8.09 ($SD = 4.08$), whereas White subjects averaged 8.17 ($SD = 4.06$) on the posttest F (1,130) = .004, $p = .95$. Finally the posttest mean scores by condition were 8.53 ($SD = 3.79$), 7.90 ($SD = 3.88$), and 8.06 ($SD = 4.49$) for the communal, group competitive and interpersonally competitive conditions, respectively F (1,129) = .84, $p = .43$.

A significant two-way interaction between ethnicity and learning condition did emerge F (5, 115) = 9.2; $p = .000$, eta squared = .13. Figure 2 depicts the interaction. Post hoc analyses were

TABLE 2
Means and Standard Deviations: Posttest Performance

	Condition			
Ethnicity	*C*	*G*	*I*	*Total*
African American				
Mean	**9.63**	**8.46**	**6.41**	8.09
SD	3.27	4.19	4.14	4.08
n	24	24	27	75
European American				
Mean	**6.72**	**7.0**	**10.19**	8.28
SD	3.79	3.25	4.08	4.07
n	21	15	21	57
Total				
Mean	**8.53**	**7.90**	**8.06**	8.17
SD	3.79	3.88	4.49	4.06
n	45	39	48	132

C = **C**ommunal study condition.
G = Inter-**G**roup Competition study condition.
I = **I**nterpersonal Competition study condition.

performed to make pair-wise comparisons using the Fischer's LSD statistic. These indicated that while the difference between Black participants' performance in the communal and group competitive conditions at posttest did not reach significance ($p = .09$, $d = .31$), mean scores for Black participants who studied in the communal context were higher at posttest than the performance of Black students who studied in the interpersonal competition condition ($p = .002$, $d = .86$) 460

Conversely, White participants who studied in the interpersonally competitive condition scored significantly better at posttest than White students in the group competitive and communal

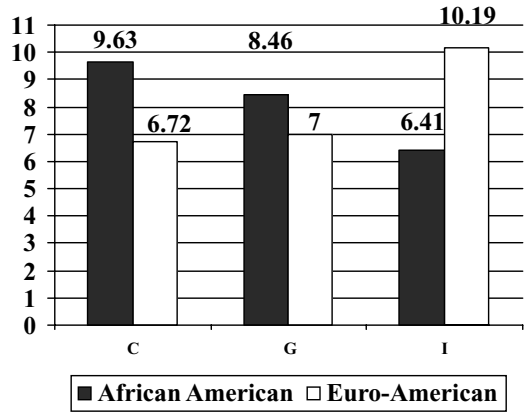

FIGURE 2 Posttest performance-learning condition by ethnicity interaction, $F(5, 115) = 9.2$; $p < .000$.

conditions ($p = .03$, $d = .86$,) and ($p = .03$, $d = .88$). In addition, Black participants scored significantly higher than White participants in the communal condition ($p = .03$, $d = .82$) and White subjects scored significantly higher than Blacks in the interpersonal competition condition ($p = .002$, $d = .91$). The best performances of Black participants (communal) and the best for White participants (interpersonal competitive) did not differ significantly ($p = .95$, $d = .15$). The same is true for worst performances of each group ($p = .41$, $d = .08$). Finally, Black and White participants' performance did not differ in the group competitive condition ($p = .45$, $d = .38$).

Group Ratings

Data from the four rated categories were subjected to an unrotated principal components factor analysis. The single extracted factor accounted for 79% of the explained variance among the categories. Table 3 displays the factor solution. The factor solution is supported by the data for commonalities, which were high in the range of .9. According to MacCallum, Widaman, Zhang, and Hong (1999) , a factor solution with communalities in the range of .5 should be replicable when the factors are well determined and the sample is relatively large (100–200). These data meet both criteria since the extracted factor is consistent with a strong theoretical base. As previously reported, the sample size used here is within the recommended range for stability.

Using the factor solution as a guide, mean scores were generated for each subject by computing the mean of the four GRS categories. Mean scores and standard deviations on GRS broken down by ethnicity and gender are displayed in Table 4.

Mean GRS scores were compared in a $2 \times 2 \times 2$ univariate ANOVA with ethnicity (Black/White) learning condition (communal/group competitive/interpersonally competitive) and gender (male/female) as factors. The dependent variable was mean ratings on the GRS variable.

The analysis indicated no main or interaction effects of ethnicity or gender on GRS; however, there was a main effect for learning condition, $F\ (2,120) = 11.76$; $p < .01$. The means and standard deviations were 5.52, std. (1.65); 4.71 std. (1.60); and 5.31, std. (1.44) for the communal, group-competitive, and interpersonal-competitive conditions, respectively. Post-hoc analysis confirmed that the participants in the communal condition received higher GRS ratings than did those in the group competitive condition. No other mean differences by condition were significant.

The marginally significant interaction of ethnicity and condition on GRS, $F\ (2, 120) = .2.85$; $p < .058$ is depicted in Figure 3. The pattern of means bears mention. Black and White participants

TABLE 3
Group Rating Scale (GRS) Factor Loadings

Unrotated Factor Matrix Item	*Factor*
	1
Involved	.950
Communicated	.964
Participated	.973
Positive affect	.619

Extraction method: Principal Component Analysis.

TABLE 4
Means and Standard Deviations: Group Rating Scale (GRS)

	Condition			
Ethnicity	*C*	*G*	*I*	*Total*
African American				
Mean	**5.83**	**4.84**	**4.91**	5.18
SD	1.25	1.78	1.25	1.50
n	24	24	27	75
European American				
Mean	**5.18**	**4.50**	**5.76**	5.21
SD	1.99	1.28	1.55	1.71
n	21	15	21	57
Total				
Mean	**5.52**	**4.71**	**5.31**	5.20
SD	1.65	1.60	1.45	1.59
n	45	39	48	132

C = **C**ommunal study condition.
G = Inter-**G**roup Competition study condition.
I = **I**nterpersonal Competition study condition.

achieved their highest ratings for these group-positive behaviors in different contexts. For Black students this was the communal condition, whereas for White students it was the interpersonal competition condition. Both groups achieved their highest GRS scores in the same condition that also yielded their best performance. As mentioned, the interaction was only marginally significant, thus post-hoc tests were not computed. 495

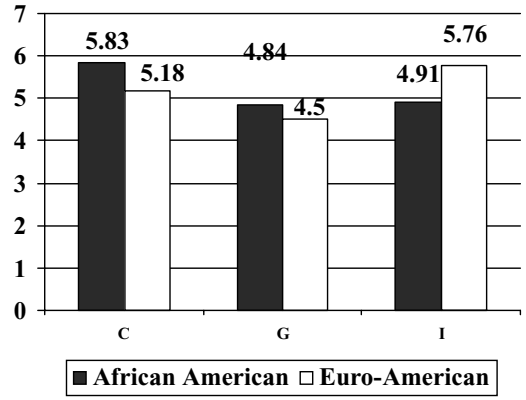

FIGURE 3 GRS—learning condition by ethnicity interaction, $F(5, 115) = 2.85$; $p < .058$.

Intercorrelation

Finally, performance was examined for intercorrelation with GRS scores separately for each ethnic group. Although the zero order correlation patterns were essentially the same, the effects of pretest performance were partialled out to control for prior skill with the task and to be consistent across analyses. Tests of predicted relationships were one-tailed. This analysis indicated a positive correlation between GRS scores and posttest performance for Black, ($r = .27$; $p < .01$) but not for White students ($r = –.13$; $p < .18$).

DISCUSSION

This work has suggested that the presence of inconsistencies in the cooperative learning literature and the gap between laboratory and classroom results may be due to overgeneralization of the basic principles of group learning without careful consideration of student and other variables that must interact with elements of a group learning context. The debate over which reward structure leads to optimally beneficial cooperative learning groups, for example, ignores the possibility that groups of students might respond differently to a given reward structure. We have asserted that one such student variable, often predictable by their ethnicity, is students' culturally based orientation toward group interactions. This research predicted that African-American and European-American participants' patterns of performance after studying in groups would differ from each other depending on the reward structure of the study session in which they participated. The strong interaction between ethnicity and study session type on posttest performance supports that prediction.

As suggested in much of the cooperative learning literature (Chapman, 2001; Johnson & Johnson, 1999; Slavin, 1983), the interpersonal competition for rewards and accompanying salient accountability emphasized in the group interpersonally competitive context seems to have been motivating for our European-American participants in the aggregate. The average performance of African-American participants, however, was as good in the condition that had neither of these as in any other. This finding replicates Albury's (1993) finding that African-American students performed well on a vocabulary task learned in either communal or group competitive learning contexts. It also suggests that whatever accounts for the facilitating effects of communally structured learning may be present in some other configurations of group learning as well. At the same time, neither did group learning singly determine African Americans' performance.

Although the performance of our African-American participants was better predicted by Boykin's (1994) suggestion that group learning structures provide support for the expression of communalism, the fact that their performance also differed across group learning contexts raises interesting questions about which context elements determine the dominant mode of thinking and behavior in a group. Our observations are consistent with the assertion that a communal orientation in and of itself can motivate group-centric effort for many African-American children. The presence of a reward contingency in the group competitive condition did not significantly undermine this effect; however, the reward contingency in the relative absence of social demand for cooperation in the interpersonally competitive condition did not seem to enable the majority of our African-American students. This interpretation maps on to the findings of some of the cooperative learning studies, described earlier, which compared cooperative

learning reward structures among African-American students (Garibaldi, 1979; Widaman & Kagan, 1987). In each of those studies as in the present work, African-American students performed best in learning contexts whose confluence of structural elements could be seen as combining to actually promote group centric interpersonal thinking and behavior (as compared to nominally group contexts which actually demand highly individualistic and competitive interpersonal behavior).

The present study provided only a limited exploration of student attitudes and behaviors that might mediate learning during group work. Our ratings data give reason to suppose that the differences in performance outcomes are related to participants' group-positive behaviors during the study sessions. If this is true, then the critical issue might indeed be motivation to exhibit such behavior. What varied between our groups of African-American and European-American participants then, might be *what* they found motivating. That conclusion would be generally consistent with the model of culture presented here, but would be better justified if the relationship between the behaviors and performance had been more straightforward. Despite the similar pattern of performance and behavior observation means, there was only a significant relationship between group-positive behavior and performance for African-American participants.

Although the group ratings shed some light on the processes underlying the performance outcomes we observed, the measure was derived from categories of behavior that are themselves conceptual and so remains ambiguously once removed from the interaction processes that determine students' group learning outcomes. Other researchers examining small learning groups have scrutinized transactional behaviors that could be more informative, including sharing knowledge (Coleman, 1998), help seeking and help giving (Webb & Mastergeorge, 2003), resolving incongruous perceptions of the problem (Bearison, Magzamen, & Filardo, 1986), participant observation (Rogoff, Moore, Najafi, Dexter, Correa-Chavez, & Solis, 2007), and collective strategy building (Azmitia, 1988). Although mediation by any of these would be consistent with the theoretical framework behind this study, we can only speculate that the effects we have observed are related to such variables.

That there was no relationship between group ratings and performance for our European-American participants might indicate that a mechanism other than motivation, perhaps something procedural, is (also) at work. Boykin and Allen's description of how themes like communalism are socialized, for example, refers to "opportunities to develop and practice emerging skills" (2000). Collaboration-specific skills can certainly be expected to influence students' group learning outcomes. Indeed, the title of a well-known cooperative learning book, *Learning to Cooperate, Cooperating to Learn*, suggests this very issue is of concern to the broader literature on this topic (Slavin, Sharan, Kagan, Hertz-Larowitz, Webb, & Schmuck, 1985). In that scenario we might expect communalism to advantage many African-American students over their European-American peers in the development of group interaction skills.

There is vast group process literature in social psychology that could be instructive (Battisch, Solomon, & Delucci, 1993) and that we expect will influence our own subsequent efforts. That scholarship seeks to understand group interaction dynamics (as byproducts of the types of transactional behaviors just named) that influence group outcomes. It may be feasible to assess group processes as they operate in learning groups by coding, not broad conceptual categories of behavior, but specific micro-behaviors that are the building blocks of group interaction. Such work could help to identify the most basic procedural mechanisms through which group learning leads to learning outcomes.

Limitations

Given the many factors that can be manipulated to create and emphasize competition (Tjosvol et al., 2003) the competitive reward manipulation used in this work can be considered a weak form, in that it used only brief verbal instructions concerning competition and because the reward was unspecified. Because our predictions concerned interaction effects, this operationalization could have weakened our design mainly by decreasing the differences between conditions and thereby increasing the likelihood of a Type II error. Despite this possibility, our manipulation of the learning contexts had a clear effect on the performance outcomes of our sample and, as predicted, African-American and European-American participants responded differently to the three group learning configurations. These findings contradict the notion that there is a single optimal reward structure that will optimize the potential benefits of group learning for all students.

This investigation is also limited in that we operationalized culture as a group level variable, in effect using ethnicity as a proxy for culture. Although there is research that documents communalism in a variety of African-American samples (Mattis, Hearn, & Jagers, 2002; Woods & Jagers, 2003) and especially among African-American school children from populations very like that used here (Coleman, 1996; Dill & Boykin, 2000; Hurley et al., 2005; Marryshow et al., 2005; Sankofa et al., 2005), future research on group learning should undoubtedly include direct measures of cultural orientation. We are advancing a culture rather than an ethnicity argument and so believe that communalism would have been a better predictor of student performance than ethnicity alone even as we would also expect more Black than White students to have been high in communal orientation. Our decision not to measure communalism limits our ability to address this question even indirectly. The inclusion of such a measure would allow for a direct evaluation of our assertion that such findings are attributable to the cultural orientations of participants and would allow for empirical examination of within group differences in communal orientation.

Another limitation of this study is related to mathematics. This work replicated the finding of our previous study (Hurley et al., 2005), which first generalized communalism effects to this content domain but, we must acknowledge, makes only a limited contribution to the body of knowledge that is specific to math education—that communalism is relevant and should be studied further. There are a variety of math specific variables with which culture may interact, for example: other math forms, how problems are presented, what tools are made available, task complexity, and so on. There is evidence that culture is relevant (Malloy & Jones, 1998; Hurley et al., 2005; Qin et al., 1995) but, we suppose, not identically so across a variety of such variables. We hope that other researchers will join us in seeking to integrate this basic idea with the current state of knowledge specific to math pedagogy.

Finally, this study assessed the impact of a single student variable on group learning. Although our predictions were supported, communalism is but one in an array of cultural themes and culture, broadly writ, is but one in an array of student, teacher, curriculum, and task variables that could also be relevant to group learning. There is yet much work to be done before we can hope to achieve an integrative understanding of the relevant issues. We hope that this study will encourage research that will work to clarify the relationships between cultural factors like communalism and other categories of variables. For example, in addition to home and community cultural norms, students must negotiate and become accustomed to their own role in the functioning of their classrooms and to the attitudes and behaviors of their teachers (Webb, Nemer, & Ing, 2006). Students' expectations about these things and their relationship with schooling in general can

be expected to interact with their behavior in learning groups in school. There is evidence, for example, that status differences among students working in groups are important. Low status students may benefit less from group learning than high status students (Cohen et al., 1999), perhaps due to their place on the margins of the group's activities. Within that body of work, there is indication that African-American students can tend to occupy such low status (Cohen, 1994) due to, among other possibilities, stereotypes about their academic abilities (Martin, in press). Gender is another factor that may affect student status in work groups. Although our use of race-homogenous groups that were counterbalanced by gender should have controlled for such effects as they relate to our experimental design and predictions, these and related variables have real relevance to group work in natural settings and should be examined.

Toward Integrating Perspectives

Although it may be somewhat beyond the immediate purview of these observations to do so, given that we used ethnicity as a proxy for culture in this study, we feel some obligation to anticipate readers' questions about how our rationale and findings relate to some of the well-known race-based analyses of African-American children's schooling experiences. It is certainly well documented that racial inequity and negative biases of various types remain prominent features of U.S. schooling in general, in math education specifically (Martin, 2006, in press) and perhaps specifically in group learning as well (Cohen, 1994). Nasir and Hand (2008) pointed out the importance of considering how race and culture interact as students constantly reconstruct their identities in interaction with individuals, communities, and social institutions. For example, where schooling is negatively racialized for significant numbers of African-American students, the need to cope with that shared experience may galvanize their group (racial) identity *and* reinforce and extend the attitude and behavioral mores that develop among them. Some scholars have coded this process as a source of "oppositional culture" (Ogbu, 2004); however, it stands to reason that those mores would also reflect and reinforce the (*also denigrated*) home and community orientations that many Black students already share. In light of that relationship, we would suggest that race- and culture-focused analyses should generally be viewed as complementary rather than competing in the unfortunately wide terrain that is the academic performance gap.

Prominent among race analyses are the oppositional culture model (Ogbu, 2004) and the stereotype threat model (Steele & Aronson, 1995). Although neither seeks to address group learning specifically, both models seek to describe student-level factors that bear on Black children's learning. Elsewhere we have examined points of distinction and overlap between those two models and a culture analysis in detail (Hurley, 2009; Sankofa et al., 2005). We will therefore present only a brief discussion here.

The notion that a culture of opposition (to acting White) leads many African- American students to reject learning and high achievement (Ogbu, 2004) is widely accepted among educators, perhaps because it offers an intuitively appealing interpretation of behaviors they observe among students with which they interact. In the present study, that model would have predicted that our African-American students' negative attitudes toward learning and high achievement would lead them to poor performance compared with our European-American students, overall and regardless of the configuration of their study sessions. The overall performances of our Black and White participants did not differ. Moreover, that the pattern of their performances differed across

conditions suggests that, at a minimum, performance among our African-American participants was responsive to differences among the learning and achievement opportunities presented to them. If we interpret performance as signaling effort (and thus some form of acceptance), we would say that they rejected some while engaging others with at least as much enthusiasm as did our European-American students. Studies seeking to pose this question more directly have found that, on average, African-American participants rejected peers described as individualistic or interpersonally competitive but were accepting of peers described as communal (Marryshow et al., 2005; Boykin et al., 2005). Marryshow et al. interpreted their findings as indicating that the oppositional culture model needs to be refined to specify that African-American students who appear to reject learning and high achievement in themselves may in fact be rejecting some of the specific behaviors on which success in school is unnecessarily made contingent. The current findings are consistent with that reasoning.

Another race-based analysis holds that the threat of being judged according to negative stereotypes about their academic ability is an important contributor to the underperformance of Black students on high stakes assessments. Although well-documented among academically identified college students in testing situations, the relevance of stereotype threat to the performance gap more broadly is contestable (Hurley, 2009; Sackett, Hardison, & Cullen, 2004). First, in that stereotype threat effects have not been reliably documented on real life assessments or among grade- school students. More than that, the model asserts that stereotype threat causes students to underperform on assessment for which they are actually *well prepared*, whereas the performance gap is most often conceptualized as caused by students arriving at assessments *underprepared*. Still, because some authors and some findings suggest that stereotype threat in more subtle forms may have relevance to situations and populations like those we have examined (Morgan & Mehta, 2004), it bears discussion.

As related to our design and observations, the stereotype threat model does not present a plausible competing interpretation for several reasons. First, because all of our students were tested with their group members and all groups were race homogenous, as related to that element of the procedures, there were no systematic differences in the available stereotype threat across conditions. Secondly, in the one condition with salient individual accountability (and thus the greatest chance for individual comparisons), students were aware that they would be compared within group (and so within race); thus, again we expect that there was no special or subtle prime for stereotype threat compared to the other learning conditions. In addition, in the one condition where cross-race comparisons were possible (group competitive), students were aware that the comparisons would be based on group performance. More importantly, our African-American students performed well in that condition. Finally, because we did assess all participants' individual learning of the task, none of our groups were exposed to systematically different stereotype threat alleviating influences either.

While we believe that stereotype threat could not have been a systematic confound in this experiment, the associated model does provide an interesting explanation for the difficulties faced by some African-American students. For one thing, according to the model, the Black students who are most vulnerable to stereotype threat are those who are previously high achieving and who identify strongly with their academic success (Steele & Aronson, 1995). From the view of a culture analysis, their success (assuming matriculation in conventional classrooms) is likely an indication that such students have well-developed skills for negotiating competitive or individualistic learning contexts, either because they were so socialized at home,

have become acculturated into those values at school, or via accommodative code-switching. It remains to be seen whether those students would respond well to communal learning contexts or, put more generally, what the relationship between prior achievement in conventional classrooms and communalism might be. These questions re-raise the issue of within-group variation in cultural orientation and re-emphasize that an important next step for this line of research will be to assess those relationships directly. Clearly, there is important work to be done toward an integrative understanding of how cultural factors as described here may interact with race related factors that contribute the educational experiences of African-American children.

Relatedly, the certainty of within-group variation in communalism draws attention to another very important issue. It is tempting and common for work like this to be seen as providing complete solutions for the problems facing African-American students in U.S. classrooms. Indeed there are significant pedagogical implications of the notion that many Black children may respond well to communally structured learning environments. Still, we do not mean to offer communal learning as a singular solution for any problem. As surely as African-American culture is no monolith, attempts to implement any such solutions unilaterally would meet with much failure even in success. We argue instead that culture is an oft ignored but meaningful part of the complex interactive system of factors that bear on the utility of group (and other modes of) learning. The real utility of this kind of scholarship lies less in providing discrete solutions and more in helping to change the nature of the conversations we have about the problems facing Black children in U.S. schools. For example, Boaler and Staples (in press) reported that students in an ethnically diverse high school whose curriculum employed group work during 72% of class time were generally successful in math irrespective of racial and cultural groups. The authors of that study were emphatic in stating that while the carefully designed group leaning employed was valuable, at the heart of the school's success was the work of teachers in relentlessly pursuing and promoting equity in the transactional practice of math learning. What we find unique about a culturally rooted analysis of schooling is that, in identifying such themes and their relevance to learning, it provides a framework on which educators might reconstruct their perceptions of student behaviors and orientations that do not meet their own (often culturally based) expectations for what constitutes appropriate learning behavior. A better understanding of culture also promises to help educators develop insight into what in their own repertoire of attitudes and behaviors (and teaching practices) is culturally determined and, thus, not inherently more appropriate for educational purposes. This seems a better approach than relying on teachers, whose good will and good faith may already be overtaxed, to "relentlessly pursue and promote equity." Especially given that many educators daily observe African-American students exhibiting *what they perceive to be* stereotypically inappropriate behavior in school.

Work that demonstrates that African-American children can and will learn if and when we provide suitable educational contexts is most powerful when it persuades us to reorient and redesign educator training and educational practice with deference to the needs of children from a variety of backgrounds. When educators learn to see their students' cognitive and behavioral tendencies through an interpretational lens that takes into account the integrity of the children's home- and community-based socialization experiences, we can hope to interrupt cycles of stereotyping and bias, shape pedagogies that capitalize on their existing strengths, and, in so affirming them, contribute in consistently positive ways to their social and emotional development as African Americans.

This work contributes both answers and new questions to the study of group learning. It lends support for the idea that group learning methods must be examined and operationalized with greater deference to the variety of factors that can mediate their potential benefits to learning. Equally important, this work touches on the critical relevance of culture to all educational practice. To the extent that the cultural orientation of students may mediate the utility of group learning strategies, so will it mediate students' interactions with other aspects of the schooling process. The responsibility placed on educators for developing a sensitive understanding of these issues will only grow.

Viewed in context with the broader culture movement in psychology, findings like these bode similarly for the general study of groups and group interactions. If understanding issues of culture is important for configuring groups that can be of predictable educational value, so shall this understanding prove a necessary consideration for any theory that proposes to meaningfully describe or explain group functioning.

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