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Power in Numbers: Student Participation in Mathematical Discussions in Heterogeneous Spaces

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In this article, mathematics classrooms are conceptualized as heterogeneous spaces in which multiple figured worlds come into contact. The study explores how a group of high school students drew upon several figured worlds as they navigated mathematical discussions. Results highlight 3 major points. First, the students drew on 2 primary figured worlds: a mathematics learning figured world and a figured world of friendship and romance. Both of these figured worlds were racialized and gendered, and were actively constructed and contested by the students. Second, these figured worlds offered resources for 1 African American student, Dawn, to position herself powerfully within classroom hierarchies. Third, these acts of positioning allowed Dawn to engage in mathematical practices such as conjecturing, clarifying ideas, and providing evidence.

Key words: Classroom interaction; Discourse analysis; Equity/diversity; Gender issues; High school, 9–12; Race/ethnicity/SES

During group work among culturally or racially heterogeneous students, researchers have noted that some students access greater learning opportunities than others by dominating group discussions (Kurth, Anderson, & Palinscar, 2002), becoming positioned with more authority or competence than their peers (Gresalfi, Martin, Hand, & Greeno, 2009; Langer-Osuna, 2011), or becoming more influential group members (Engle, Langer-Osuna, & McKinney de Royston, 2008). Often, students who become marginalized from such learning opportunities are those from nondominant racial, cultural, linguistic, or gender groups (Kurth et al., 2002).

Elsewhere, we have written about the ways in which students' *social identities* (identities linked to social categories such as gender or race) intersect with their *practice-linked identities* (identities that develop through participation in a particular practice such as a mathematics class) in ways that influence issues of power between students (Esmonde, 2009; Esmonde, Brodie, Dookie, & Takeuchi, 2009; Langer-Osuna, 2011). Although students may not always speak explicitly about their social identities, in our research in mathematics classrooms some girls have

reported that boys do not listen to their ideas during cooperative work (Langer-Osuna, 2011), and some students of color have described greater levels of comfort with other students of color for similar reasons (African-American, Latino, and multiracial students in Esmonde et al., 2009). There is a need for further research that provides a detailed look at classroom interaction to investigate how these dynamics do or do not play out at a micro level.

Understanding power dynamics (to be defined subsequently) among students in heterogeneous classrooms is essential if educators are to gain tools necessary for managing issues of equity that emerge, specifically in learning contexts characterized by cultural diversity (Diversity in Mathematics Education Center for Learning and Teaching, 2007). After all, in diverse classrooms in which students from historically dominant groups learn alongside students from historically marginalized groups, issues of power and privilege arise that are distinct from the issues that arise in more culturally homogeneous contexts. Valuable research-based strategies and insights that address managing issues of equity in classrooms, including the need for teachers to bridge students' home and school discourse practices (Cobb & Hodge, 2002), or strategies to involve parents and local communities in mathematics learning (Civil, 2007), are presented as broadly applicable to both culturally homogeneous and culturally heterogeneous school environments that include students from historically marginalized communities. Although we believe these techniques are indeed powerful, implementation will surely differ across homogenous or heterogeneous classrooms.

This article investigates power dynamics between students in a racially heterogeneous classroom and the effects of these dynamics on students' learning opportunities and forms of engagement. We highlight three key points: (a) the construction of the focal classroom as a cultural space was fraught with conflict among students, (b) student interactions (including conflictual interactions) gave rise to resources that students drew on as they managed their participation in mathematical tasks, and (c) these resources allowed students opportunities to engage in valued mathematical practices, in sometimes surprising ways.

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UNDERSTANDING POWER DYNAMICS OF FIGURED WORLDS

The theoretical assumptions that guided our analyses derive from sociocultural theories of learning (Cole, 1996; Vygotsky, 1978) and of identity (Holland, Lachicotte, Skinner, & Cain, 2001; Wortham, 2004). We draw on Holland et al.'s (2001) framework of *figured worlds* to conceptualize the construction and enactment of classroom interaction.

Figured worlds are defined as "socially and culturally constructed realm[s] of interpretation in which particular characters and actors are recognized, significance is assigned to certain acts, and particular outcomes are valued over others" (Holland et al., 2001, p. 52). In other words, figured worlds are interactively constructed narratives that give meaning to the actions of participants within those narratives. In the figured worlds of classrooms, these participants include teacher and students, who relate in specified ways. For example, a teacher who offers a solution to a student may be interpreted as teaching, whereas a student who offers a solution to a student may be interpreted as cheating. The actions appropriate to the teacher are considered inappropriate to the students, and consequences arise when a student's actions cross this line of privilege.

Mathematics classrooms in the United States can be seen as particular kinds of figured worlds (Boaler & Greeno, 2000; Horn, 2008; Jurow, 2005; Langer-Osuna, 2009), defined in part by tensions between the "traditional" and "Standards-based" approaches to teaching (Schoenfeld, 2004, 2007). The two approaches shift more than just teaching styles—they shift how the characters of teachers and students are defined, how actions are interpreted as either acceptable or unacceptable, and what it means to do mathematics. In other words, at stake in the "math wars" (Schoenfeld, 2004) is also how to define the figured world of U.S. mathematics education. One of the central conflicts in the math wars can be seen as conflict around how dynamics of power should be structured in classroom figured worlds.

Attention to power is a centerpiece of the figured worlds framework. Within figured worlds, not all characters have the same actions open to them; power is made visible in the ways in which people are positioned in relation to one another, in the ways in which they are given or denied access to particular physical and social spaces or kinds of actions, and in the ways in which issues of status and hierarchy are constructed and challenged (Holland & Leander, 2004). In the figured world of traditional mathematics classrooms, the teacher is the mathematical expert, has the authority to decide what is mathematically correct, and can initiate or end conversations among students. In the figured world of classrooms described in *Principles and Standards for School Mathematics* (National Council of Teachers of Mathematics [NCTM], 2000), students also can be positioned as experts, decide what is mathematically correct, and initiate conversations among students in small groups. Boaler and Greeno (2000) studied traditional and discussion-based classrooms as two kinds of mathematics classroom figured worlds. Students in discussion-based classrooms described mathematics as creative, social, and challenging, whereas in the traditional classrooms, students described mathematics in exclusive

terms, saying that few students could be good at mathematics. The differences in these two classroom figured worlds influenced who participated in the classroom and the power dynamics between participants.

Drawing on the work of sociologists and social theorists such as Bourdieu (1973) and Foucault (1980), Holland et al. (2001) argue that power in figured worlds is not preexisting and is not owned by a particular person or group. Rather, power is constructed relationally and made visible through interactions. Although some markers of social status may cut across a number of figured worlds (e.g., masculinity vs. femininity in the work of Holland & Eisenhart, 1990), the specific meaning of any social act is interpreted within a given figured world. For instance, in the figured world of heterosexual romance, a masculine woman might be positioned as lower in a hierarchy, even though masculinity may be positioned with greater status in a workplace figured world.

Classrooms are further complicated by the existence of other figured worlds that students draw on in interaction. Since figured worlds are "realms of interpretation" (Holland et al., 2001, p. 52) that people use to make sense of and structure their interactions, multiple figured worlds can be evoked in any physical space. Although these figured worlds are analytically treated as distinct, they may be experienced by participants as overlapping. Drawing on Foucauldian discourse analysis, Walshaw (2001) has made a similar point highlighting how within a single interaction, multiple discourses can be invoked, "offering [a student] competing ways of organizing and giving meaning to her mathematical work" (p. 487). In classroom contexts in which femininity was devalued, girls positioned themselves with respect to other discourses (or figured worlds) in which they had more access to power.

The constructs of discourse and figured worlds are similar in that both capture socially organized and constructed ways of thinking, interacting, interpreting, and identifying. Holland and colleagues (2001) build on Foucauldian perspectives on discourse by bringing in Vygotskian and cultural–historical theories of learning. In this article, we use figured worlds as our analytic framework to emphasize the narrative aspect of social interactions (that is, the characters and stories associated with a particular social space). Within a figured world, there can be many different kinds of characters to play, and there is an emphasis on the active and ongoing construction of the figured world. In addition, Holland et al. (2001) have emphasized that figured worlds that are marked by hierarchical power relations often exhibit high levels of conflict, because some participants may seek to maintain those power relations whereas others undermine them. This focus allows for an analysis of the different possible positions, and the relative privilege of each position, that becomes constructed and made available within a particular figured world. In this sense, our understanding of power dynamics is related to the idea of identities as subject positions within particular figured worlds (see Esmonde, 2009; Langer-Osuna, 2009). These power dynamics play out at the classroom level, but may be associated with broader systems of power in at least two ways. First, perceived mathematics competence has more social "clout" than some other forms of competence (Cobb & Hodge, 2002, 2011). Second, classroom power dynamics

may be influenced by race, gender, language, and other categories of social identity.

Our current research goes beyond prior research in mathematics education that is framed by figured worlds. Although past research has considered figured worlds that are conceived as applying equally to all participants in a space, in this article we will highlight some of the consequences of students taking up different positions or roles within multiple figured worlds. In particular, we will discuss how dynamics of power, through acts of positioning, made particular forms of engagement in mathematical activities possible.

In this article, we analyze a single racially heterogeneous group of students interacting together over several weeks. We first describe the mathematical and social figured worlds that we observed during student interactions and analyze how these figured worlds became racialized and gendered. Second, we analyze how these multiple figured worlds provided resources for students to position themselves and others within specific power hierarchies and to participate in mathematical practices.

CONTEXT AND DATA SOURCES

The data for this article were drawn from an 8-month study investigating cooperative learning practices in three high school mathematics classes in a small, urban school district in the San Francisco Bay Area (Esmonde, 2006). These mathematics classrooms, in contrast with many others in urban areas, were socioeconomically, racially, and linguistically diverse. The major racial groups at the school included White, African-American, Asian-American and Pacific Islander, Latin@, and significant numbers of multiracial students. The classrooms followed the Year 2 of the Interactive Mathematics Program curriculum, a Standards-based, integrated, and problem-based mathematics curriculum with an emphasis on reading, writing, and speaking about mathematics (Fendel, Resek, Alper, & Fraser, 1998).

Major data sources for the larger study consisted of video recordings of cooperative-group work and of whole-class discussions and field notes from these class sessions. Two to three video recordings were made per week. A single video camera was used, and for each recording, a single group was filmed. The camera was positioned behind and close to the group, raised on a platform to allow all group members to be captured within the camera's frame. A microphone was placed at the center of the group to capture the group's conversations; during whole-class discussions, this microphone was disconnected in order to more easily capture the voices of other groups. In addition to the video and notes, supporting data sources include selected student work, interviews with the teacher and some focal students, and other classroom artifacts.

For the study reported in this article, we focused on a single group and analyzed the power dynamics at play in their interactions. The focal group was selected because of the particularly dramatic nature of their disagreements, which provided a revelatory case of power dynamics among students working collaboratively in mathematics classrooms (Yin, 2003). During the 3 weeks that this group worked together, six sessions were video recorded. Although the video was the primary

resource for analyses conducted in this study, classroom artifacts such as copies of student work were used to help the authors make sense of the discussions taking place in the group and in the classroom more broadly. We also made use of previous analyses of this particular classroom of students to lend ethnographic detail to our portrait of the figured world of this classroom.

We focus on 3 focal students who worked as a group during a 3-week period in February. These students were Riley, a White ninth-grade boy, who was recognized by most students as one of the highest achieving members of the class; Dawn, an African-American 10th-grade girl, who was passing the course but often struggled with the material; and Shayenne, an African-American 10th-grade girl with a similar academic profile to Dawn. Dawn and Shayenne were good friends, and had many friends in the class.[1] A fourth student, a biracial, African-American ninth-grade boy was the group's fourth member. However, due to his frequent absences he was not considered a focal student for this analysis.

Indigo Esmonde is queer, White, and middle-class. Jennifer Langer-Osuna is a married, middle-class, first-generation American-born, Spanish-speaking Cuban-American. Both of our personal/professional experiences have made us wary of essentialist analyses of race and gender as they pertain to educational experiences and identities as learners. Our analytic lens on the data was influenced by our points of connection to and difference from the three focal students.

ANALYTIC METHODS

We drew on a variety of analytic tools in order to understand the figured worlds at play in the focal mathematics classrooms, and students' interactions within these figured worlds. Field notes served to guide our understanding of the classroom figured world, including typical classroom structure, mathematical interactions, and the role of group work, which was then analyzed in greater detail through video analysis of the 6 focal days (February 1, 3, 4, 8, 10, and 15, 2005). After repeatedly viewing all 6 days of video, the authors created analytical narratives (Angelillo, Rogoff, & Chavajay, 2007; Yin, 2003) that focused on describing the focal students' group interactions for each of the days. These analytical narratives were then used as a basis from which to abstract major themes in the classroom figured worlds (Langer-Osuna, 2009). Transcripts of video recordings were also created in order to analyze how these major themes were constructed and taken up by the focal students and teacher (Barron & Engle, 2007; Derry et al., 2010).

We identified the figured worlds at play during our focal group's interactions through their talk, gesture, and embodied interactions (Erickson, 2004, 2006) as they participated in discussions involving mathematical tasks (Clark, 1996). Figured worlds constitute interpretive frames used to make sense of one's own and

[1] At the end of the year, students completed a questionnaire in which they were asked who they felt was "good at math" in the class and to indicate students with whom they were friends. Riley was ranked first in the "good at math" category, and both Shayenne and Dawn tied for third in the "friends" category.

others' interactions, and so evidence for a particular figured world could be found in the content of students' and teacher's talk, in the ways students positioned one another's activities as appropriate or inappropriate, and in paralinguistic cues such as tone of voice, body positioning and gesture, and so forth (Holland et al., 2001; Jurow, 2005; Leander, 2002). In keeping with an approach grounded in interaction analysis (Erickson, 2004, 2006), body positioning and gestures were also helpful in identifying shifts between different figured worlds. Students' eye gaze and body orientation (Leander, 2002), for example, often changed as they moved from one figured world to another. Thus, this analysis was done primarily from the video; transcripts were used only for annotation purposes (Derry et al., 2010).

In the first section of our results, we offer analyses of the major figured worlds that were evident in classroom interaction, through a discussion of how Riley, Shayenne, and Dawn's talk served to highlight particular assumptions about mathematics learning, being a student, and friendship (Boaler & Greeno, 2000; Holland & Leander, 2002). Excerpts for the article were selected for several reasons. First, we selected excerpts that epitomized the characteristics of a particular figured world, in which the narratives were particularly apparent. Second, we selected excerpts in which conflicts of interpretation within a figured world were apparent. We then reviewed the transcripts to ensure that our claims did not contradict patterns in the broader corpus of data (Erickson, 2004, 2006). For the excerpts we included, we give detailed information about body positioning, gaze, and gesture to provide more information to the reader than that conveyed by talk alone.

Based on these results, we focused deeply on the mathematical figured world that students enacted in the latter part of the 6 days of video. The second part of our results focuses on the students' (and especially Dawn's) participation in mathematical discourse practices such as explaining, making conjectures, being precise, and defining terms (Moschkovich, 2002). We identified how each student's participation in these practices was related to the nature of the classroom figured worlds and selected excerpts that typified Dawn and Riley's mathematical discussions.

In the next section, we discuss three claims that emerged from our analysis. First, the focal students drew on two primary, interacting figured worlds: a mathematics classroom figured world, which itself was marked by conflict, and a figured world of friendship and romance. Both of these figured worlds were racialized and gendered, and both of these worlds were actively constructed and contested, moment by moment, by participants. Second, these multiple figured worlds provided resources for one focal student, Dawn, to position herself powerfully within classroom hierarchies. Third, these acts of positioning within multiple figured worlds influenced the nature of the learning opportunities made available to Dawn, allowing her to engage in valued mathematical practices such as conjecturing, clarifying ideas, and providing evidence.

TEACHER-LED MATHEMATICAL FIGURED WORLD

We begin by describing in some detail the mathematical figured world of this classroom. To do so, we contrast what we viewed as the *teacher-led* mathematical

figured world, the one overtly espoused and implicitly enacted by the teacher (and by students in the teacher's presence), with the *student-led* mathematical figured world which was enacted by students working collaboratively in the teacher's absence. As we will show, there were some interesting tensions and conflicts between the teacher-led and student-led spaces of the classroom that resonated with tensions between the traditional and Standards-based approaches to teaching in the figured world of U.S. mathematics education. With regard to the teacher-led figured world of the mathematics classroom, which generally aligned with Standards-based approaches to teaching mathematics, we will describe typical classroom tasks, typical interactional styles and roles, and the ways in which the teacher tried to support equity.

Classroom Tasks

The classroom teacher, Ms. Delack, was a White woman with a working-class background, in her 1st year of teaching. She made concerted efforts to align her classroom with the recommendations and goals of *Principles and Standards for School Mathematics* (NCTM, 2000). In particular, Ms. Delack used cooperative groups and relied on the Standards-based textbook *Interactive Mathematics Program* (Fendel, Resek, Alper, & Fraser, 1998), which engaged students in reading, writing, and problem solving. The textbook did not contain the typical series of definitions, theorems, and worked examples that can be found in many texts. Instead, problem-solving methods were developed as a class and were then captured on posters displayed around the room.

During the weeks from which the data for this article are drawn, the class began a new unit, entitled "Cookies." The key mathematical ideas in those initial weeks included creating linear inequalities in two variables and graphically locating a feasible region that satisfied a set of inequalities. In a typical day's work, students encountered some fairly straightforward procedural problems (e.g., graphing a linear inequality) and some problems that were more conceptual in nature (e.g., describing in words the process for finding the feasible region, and explaining why the process works). However, it was not simple to classify problems as "procedural" or "conceptual." Given a problem with no prescribed solution path, the class might reason through a solution, or might follow a prescribed procedure. In the teacher-led space of the classroom, the teacher typically emphasized sense-making and required students to justify their assertions. She usually did not give them procedures to follow. However, as we will discuss, in the student-led spaces of the classroom there was quite a bit of variability in terms of how students tackled the problems.

The "Cookies" unit was intended to take 6–8 weeks of class time. It was introduced with a unit problem involving a bakery deciding how many of two kinds of cookies (plain and iced) to make, while trying to maximize profit given a set of constraints on production. Most of the problems in the textbook were word problems set in a variety of contexts, including the bakery problems, a painter deciding what types of paintings to create, a pair of twins deciding what cereals to eat, and a person deciding which pet foods to buy.

Norms for Group Collaboration

Ms. Delack used group work on a daily basis, and considered collaboration to offer critical opportunities for students to engage in mathematical problem solving and sense-making. She was concerned about groups that were dominated by one or two "expert" students and experimented with different ways of grouping students to try to prevent this from happening. Although her students had all experienced group work in mathematics classrooms in prior years (because this was a widely used strategy in middle schools in the district), several students reported that Ms. Delack's way of doing group work was quite different. She insisted that they work together and ask one another questions before asking her, and she devised several strategies to try to ensure that they did so. One such strategy required questions to come from the whole group rather than from one individual; if Shayenne, for example, had raised her hand with a question, Ms. Delack might approach the group and ask Dawn what Shayenne's question was.

The video data contained numerous examples that highlighted students' awareness of Ms. Delack's norms for group collaboration, in which students explicitly described what she wanted them to do or publicly imitated her style of group interaction (e.g., by repeating her questions, by reminding each other of her expectations).

Encouraging Equity

Ms. Delack's efforts to establish a more equitable mathematics classroom was also supported by the high school, which had a particular focus on social justice. Families in this district could choose to send their students entering high school to the major comprehensive high school or apply to one of the smaller high schools, each of which had a theme. The themed schools' students were then selected by lottery. All students in the school participated in a core class in which they analysed and studied forms of oppression such as racism, homophobia, and sexism. Several students reported relatively high levels of tension and open arguments between African-American students (including Dawn and Shayenne) and White students around these issues. Although in many high schools race, gender, sexuality, and socioeconomic status are highly visible to students and form part of the informal context of schooling (Pollock, 2004), in this school these topics were also part of teacher-led discourse.

Ms. Delack participated (and presented) in local and regional teacher professional development programs on equity in mathematics education. She placed a high priority on creating an equitable classroom. Indeed, far from what might be considered a typical mathematics classroom, she integrated social justice-based mathematics problems into the curriculum. Ms. Delack and the first author of this article collaborated to modify some of the "Cookies" problems to be more social-justice oriented. The new problems concerned sneaker production in sweatshops in developing countries, and asked students to consider how mathematics could be used to help corporations become more profitable, or to help unions negotiate for fair working conditions.

A main strategy for achieving equity in Ms. Delack's classroom was to explicitly privilege multiple forms of interactional and discourse styles among students, thus publicly valuing the heterogeneity that already was present in the classroom (Gutiérrez, Baquedano-López, & Tejeda, 1999). There were several ways in which these forms of diversity were explicitly valued in Ms. Delack's classroom. For instance, classroom tasks sometimes invited students to discuss their lives outside of school. She also encouraged students to use their own words to describe mathematical phenomena, and supported them by suggesting specific mathematical terms alongside the more informal talk.

Even as Ms. Delack actively and explicitly privileged a variety of interactional styles, she still drew boundaries around what she considered appropriate talk for the classroom. For example, cursing and racial- or gender-based slurs were explicitly not allowed in the classroom. She did not allow students to use hairbrushes, makeup, and mirrors during class time, sometimes exhorting girls (the only students to use these materials) that they shouldn't care about what they looked like. Thus, some aspects of social figured worlds were deemed off limits in the classroom. In addition, the teacher sometimes interpreted off-task conversation as inappropriate and unfocused, even if students were simultaneously engaging in mathematical work.

STUDENT-LED MATHEMATICAL FIGURED WORLD

We use the term *student-led* to describe the group's mathematical work when the teacher was not present; this distinction grew out of our analysis as we began to observe that there was quite a bit of variation in students' mathematical interactions when the teacher was not working directly with a group. We observed much more conflict within the group around normative interactional styles when the teacher was absent. In this section we describe the two competing interactional styles we observed in the focal group.

Consider Excerpt 1,[2] which exemplifies the conflict within the student-led mathematical figured world. In this excerpt, the group was reading through one of the "Sneakers" problems, which included a lengthy description of the various constraints faced by the sneaker manufacturer. Students were asked to find at least one combination of different kinds of sneakers that the company could make, given constraints on various materials, shipping, and so on. In their discussion, Riley asked Dawn leading questions, to which he already knew the answer.

In this example, when Riley asked Dawn to find a piece of information needed to solve the problem, Dawn turned his question back to him, stating that he should

[2] Transcript conventions include the following: Numbers in subscript correspond to and index the onset of an action, the boundaries of overlapping talk are shown with square brackets at the beginning ([ ) and end ( ]) of the overlap, and elongated pronunciation is shown with a series of colons. Actions (including gestures and gaze) are included in the transcript because they are helpful to interpret the ongoing flow of interaction, especially in moments of conflict; onset of a gesture is marked by a subscripted number, with a written description of the gesture placed below the talk for that turn.

Excerpt 1. February 4, 2005
Conflict in the Student-led Mathematical Figured World

1	*Riley*:	No, that's how $_{1}$much it costs to $_{2}$ship a case of sneakers [but how
2		much money have they $_{3}$set aside for shipping?
		1. *Riley moves his hand towards the instruction sheet on Dawn's desk*
		2. *Taps pencil on Dawn's sheet*
		3. *Raises right hand to forehead*
3	*Shayenne*:	(laughing) $_{1}$[ooh my gosh
		1. *Raises hood and puts it over her head*
4	*Dawn*:	$_{1}$I don't know
		1. *Gaze fixed on the papers on her desk*
5	*Shayenne*:	[Oooh $_{1}$it's warm in my [jacket] hood
		1. *Raises hands to adjust hood, then drops them back on her desk*
6	*Riley*:	$_{1}$[Then
		1. *Right hand moves slightly towards Dawn's papers*
7	*Dawn*:	What?
8	*Riley*:	$_{1}$It's in here, it's:::
		1. *Holding pencil raised over Dawn's papers*
9	*Shayenne*:	It's warm in my h[oo::d
10	*Dawn*:	[Well, find $_{1}$it! I don't know where it's at!
		1. *Quickly points with right hand to her paper, then drops hand again*
11	*Riley*:	It's $_{1}$here.
		1. *Points with pencil to a spot on Dawn's paper*
12	*Dawn*:	Okay!
13	*Riley*:	So.
14	*Shayenne*:	He's trying to have us $_{1}$think! [That's what we] need… the motivation.
		1. *Raises left fist and makes small emphatic gestures*
15	*Riley*:	[Yeah, $_{1}$think.]
16		$_{2\ 3}$Cuz I can find it. I- cuz I've read it=
		1. *Raises pencil from Dawn's paper*
		2. *Looks at papers on his own desk*
		3. *Looks back at Dawn*
17	*Dawn*:	=Well, I'm not $_{1}$stupid, so you can go ahead and (*inaudible*)
		1. *Gaze still down at papers on her desk, pushes up her sunglasses with one finger*

find the information for himself (lines 4, 10). Shayenne's defense of Riley's behavior (line 14) displayed her interpretation that Dawn's comment was a criticism of Riley's methods. She argued that these sorts of questions serve to motivate students to "think" through the problems collaboratively. The implication of her remark was that Riley was in a position to try to manipulate or correct Dawn and Shayenne's behavior in class, much like a teacher would. Shayenne's tone, however, was sarcastic and joking, thus complicating the meaning of her utterance. In the next turn, Riley agreed with Shayenne's interpretation of his behavior (though he missed or ignored the sarcasm), telling Dawn that he had already read the passage, but he wanted *her* to do it (lines 15–16). Dawn then articulated even more clearly that she had a problem with Riley's approach: "I'm not stupid!" (line 17). Through her interjection, she further positioned Riley's talk as inappropriate.

This excerpt was both typical and atypical for this focal group. It was typical because Riley acted as the group's mathematical guide and was positioned as expert, as was the case in every mathematical task the group encountered. It was typical because Dawn challenged Riley's interactional style and urged him to treat her differently. However, it was atypical in that Dawn was unusually explicit in her criticism of Riley's methods. At other points, she displayed opposition more subtly, through tone or body positioning (looking away, ignoring Riley's contributions to the discussion). This episode also marked a turning point for the group, in that on days prior to this one, and on the day prior to this excerpt, Riley interacted with Dawn primarily by guiding the help-seeker toward understanding rather than answering the question directly. After this excerpt, Riley shifted to a more didactic style, in part through Dawn's urging. (We provide several additional examples of this didactic style in subsequent sections of the article.)

Our interpretation is that Dawn and Riley were constructing two different interactional styles for peer group work. Riley's interactional style was reminiscent of the teacher's, with guiding questions used to help support mathematics learning. In contrast, Dawn pushed Riley to answer his own questions ("Well, find it!"), and to tell her the solution rather than ask her guiding questions. Dawn's reaction to Riley's style also echoes her reaction to the teacher's style of helping; while the teacher was present, Dawn would usually answer her questions, but would complain after the teacher left that Ms. Delack had not really helped her. Dawn outwardly tolerated this interactional style from the teacher, but not from Riley.

We do not know students' interpretations of what was occurring. However, we find it interesting that Riley's style closely imitated that of the teacher. One interpretation of his behavior could be, as Shayenne said, that he was "trying to make [them] think" by asking questions. This could be seen as respectful, in that he assumed that they could reason about the problem on their own. On the other hand, another interpretation of his behavior could be that he was treating them as if they were "stupid" by acting like a teacher, rather than acting like a peer. On several occasions in our data, Shayenne and/or Dawn told Riley he was acting like a teacher. Sometimes this naming of the phenomenon seemed prompted by his "guiding" style of interaction, at other times by his choice of words or phrasing.

These two interpretations have different implications for an analysis of power dynamics within the group. On the face of it, Riley's habit of asking questions, gently guiding, and urging Dawn and Shayenne to construct mathematical meaning for themselves may appear to be less hierarchical. In a figured world based on guiding, telling others what to do could be considered an overt display of power. Yet, when Riley's talk was more didactic, Dawn did not complain. If peer interactions were characterized by the free sharing of information, it could be considered an overt display of power to withhold from a peer. The power dynamics of these interactions cannot be analyzed separate from the interpretive realm of the figured world.

These dynamics can also be considered in light of broader societal issues of power. Teachers often think of and position boys and White students as the smart ones in classrooms (Fennema, Peterson, Carpenter, & Lubienski, 1990; Ferguson, 2003). And while we are careful not to assume what our students were thinking, research has highlighted how a deficit discourse about Black students and girls normalizes them as inferior in mathematics classrooms (Gutiérrez, 2008; Martin & McGee, 2009).

Before we go on to consider issues of power more fully, we must consider the presence of other figured worlds in the classroom. During interactions within this group, we observed what we called *social* figured worlds in which students evoked their identities from out-of-school pursuits. In the next section, we focus on a figured world of friendship and romance (cf. Holland & Eisenhart, 1990) as it was evoked in this classroom.

FIGURED WORLD OF FRIENDSHIP AND ROMANCE

Shayenne and Dawn were, at the time of the study, both 10th-grade African-American girls who were friends, had several classes together, and spent time together outside of school. Riley was a ninth-grade White boy, and was not part of the same social circles. Dawn and Shayenne engaged in social talk about other classes, friends outside of school, and other students in the class. They talked about their hair, borrowed lotion and lip balm from one another, and listened to music together. They both frequently sang snippets from R&B and gospel songs, and talked about their favorite artists, sometimes recommending music to one another. We agree with Nasir et al. (2009) that these performances of a stereotypically African-American music style were one way to invoke an African-American racial identity (whether or not Dawn was consciously doing so), and further argue that the focus on appearances (e.g., hair) and the talk about social events were evidence of the racialized and gendered nature of this figured world.

Riley did not participate in these discussions about hair or makeup, nor did he offer lotion or lip balm. He did not sing along with them, and his personal style did not align him with R&B or hip-hop culture. Even though he made several attempts to join their conversations, or to affiliate with them, these attempts were routinely rebuffed. Dawn and Shayenne often ignored Riley, teased him, or made other

comments that helped construct social distance between him and them. In these conversations, power within the figured world of friendship was displayed through affiliation between the two girls, and distance from Riley.

In Excerpt 2, Shayenne and Dawn discussed a previous conversation with friends about racial relations and dating. They included an off-camera African-American boy (Joshua) in the conversation, teasing him about having a White girlfriend (a girl who was not in the class, and who was light-skinned, bilingual, Spanish-dominant, and Latina). They evoke a metaphorical narrative about the off-camera student "being saved" by dating Black girls. When Riley attempted to join, he was rebuffed and effectively silenced for the duration of the conversation.

There were several figured worlds at play in this excerpt. When the substitute teacher walked by, and Shayenne abruptly stopped listening to the music playing over the cell phone, Riley took up a position that was prominent in the teacher-led classroom figured world—that of group leader bringing the students back on task—with his habitual use of the phrase *all right* . . . . However, Dawn and Shayenne did

Excerpt 2. February 4, 2005
Evoking Figured Worlds of Friendship and Dating

1	*Riley:*	[All right 1. *Gaze moves towards the substitute teacher, who is approaching their table* 2. *Sits up straight, looks at Dawn and Shayenne*
2	*Dawn:*	[Hold on, let me check my answering machine 1. *Reaches hand across the group towards Shayenne* 2. *Takes phone from Shayenne, gaze begins to turn towards substitute teacher*
3 4	*Shayenne:*	Joshua, she said that you was hecka cute and you was going with Alex, Ale::: 1. *Picks up her cup, looks at Joshua (at another table), and shakes her cup*
5	*Dawn:*	Who <u>say</u> that? 1. *Gaze fixed on Shayenne*
6 7 8	*Shayenne:*	They said (who? cool?) because she White and you Black, and even if you was mixed you was [considered Black] or something like that? 1. *Continues to shake her drink back and forth, looking towards Joshua*
9	*Dawn:*	[Who said <u>that</u>?]
10	*Riley:*	Did you know your tongue [is ri-] is bright red? 1. *Gaze towards Shayenne*
11	*Shayenne:*	[Cristina.] I know that my whole mouth is red. 1. *Gaze moves from Joshua, to Dawn, to Riley* 2. *Moves straw of her drink to her mouth* 3. *Stops smiling*

4. *Puts straw in her mouth, drinks*
5. *Holds hand in front of mouth*
6. *Gaze moves to Dawn*

12 *Dawn:* Who said that?

13 *Shayenne:* *Removes straw from her mouth, inaudible talk, gesturing towards her mouth*

14 *Dawn:* Who said that, Cristina?

15 *Shayenne:* Yeah she did$_1$.
1. *Laughs, then puts straw into her mouth again, drinks*

16 *Dawn:* $_1$We::ll… $_2$He too far $_3$into it, he $_4$can't be saved$_5$
1. *Turns behind her, looks towards Joshua, then turns back to Shayenne*
2. *Left arm gestures behind her towards Joshua*
3. *Repeats arm gesture towards Joshua*
4. *With right hand, puts phone down on her desk*
5. *Sits back in her seat, briefly throwing both hands up in gesture of surrender*

Shayenne: *Laughs loudly with straw in her mouth but not drinking*

Dawn: *Throws head down towards her desk, laughing, then sits back up, looks at Joshua, repeats laughter and puts head down on desk again, head turns towards Joshua, then turns back, laughing, throws head down towards her desk*

17 *Shayenne:* She said he- he's too far$_1$ into it, he can't be $_2$saved
1. *With drink to her mouth in right hand, repeats Dawn's gesture by throwing left hand up, then bringing it back down*
2. *Repeats gesture with left hand, gaze on Joshua*

18 *Dawn:* $_1$Can you be $_2$saved, Joshua? (1.5 *s*) Do you $_3$wanna be saved?
1. *Turns body in chair towards Joshua*
2. *Lifts left hand up briefly and brings it back down*
3. *Briefly opens both arms outwards, then brings them back down*

19 *Shayenne:* $_1$Can we $_2$bri::ng [ya back in, or have you ever] $_3$been back in?$_4$
1. *Puts drink down on the desk*
2. *Opens both arms wide with beckoning gesture*
3. *Repeats beckoning gesture with right hand only*
4. *Picks up drink and brings it to her mouth*

20 *Dawn:* $_1$[I wanna be sa:::ved!!] $_2$I don't think he been there
21 before!
1. *With body still angled towards Joshua, head turns towards Shayenne*
2. *Shakes head slightly as she talks*

22 *Shayenne:* He like-

23 *Dawn:* $_1$Have you ever dated a Black girl?
1. *Turns head and body back toward Joshua*

not take up his act of positioning to engage in mathematical work with him. Instead, they evoked a heterosexual romantic figured world, in which the appropriateness of one's partner revolves around race and gender relations, and implied that Black–White romantic relationships were inappropriate ("Can you be saved [by dating a Black girl]"). While Shayenne, Dawn, and Joshua talked (though we cannot hear Joshua's responses, as he was off-screen and far from the microphone), they laughed and teased, even as the two girls critiqued Joshua's choice of partner. They playfully invoked the discourse and intonation of preachers, asking Joshua if he could be "saved" (lines 17, 18, 20). When Riley tried to enter the conversation—by pointing out that Shayenne's drink had dyed her tongue "bright red" (line 10)—Shayenne's smile disappeared, she answered in a flat monotone, and she quickly turned her attention back to Dawn, her smile and laughter reappearing as she did so. Riley remained silent for the rest of the discussion, only speaking again when Shayenne (probably prompted by the sustained presence of the substitute teacher) suggested that the group get back to work. Only when Shayenne initiated mathematical work was Riley positioned as a mathematical leader.

In many classrooms, we believe that Dawn and Shayenne's talk would have been framed as "disruptive" and "off-task." Because the substitute teacher did not explicitly do so, the two students were relatively free to use this kind of discourse, which mitigated Riley's dominance in the group. The two girls often invoked figured worlds in which they held more privileged positions—where they were popular and socially sophisticated, and Riley was not. Although their social interactions were particularly visible on the day when there was a substitute teacher, Dawn and Shayenne routinely silenced Riley and were able to effectively decide *when* the group would engage in mathematical discussion. When Riley attempted to begin mathematical discussions, the two girls sometimes participated, sometimes did not. By contrast, when Shayenne or Dawn attempted to begin mathematical discussions, Riley always went along. In this way, Dawn and Shayenne's actions tempered Riley's dominance and, as we will show below, allowed them to shift the nature of mathematical conversation such that they participated more equitably.

MULTIPLE FIGURED WORLDS SIMULTANEOUSLY AT PLAY

Although we have discussed the mathematical figured worlds (both teacher- and student-led) and the social figured world as if they were distinct from one another, this was primarily for analytic purposes. These different figured worlds had different story characters, different narrative arcs, and different power dynamics. However, students switched seamlessly between these figured worlds, many times per day. Students could interact with the teacher according to her teacher-led figured world, then rebel against this figured world in their student-led mathematical interactions, and intersperse comments about one another's dating relationships throughout. Sometimes students embodied one figured world (e.g., keeping eyes trained on one's notebook and making writing gestures with one hand) while covertly discussing social or "off-task" topics, thus participating in two figured

worlds at once; these figured worlds sometimes also overlapped, when friendship and mathematics classroom interaction were one and the same.

The fact that the figured worlds were not always distinct is not just a theoretical point; the blurry boundaries between the figured worlds had implications for the ways in which students experienced classroom life. These blurry boundaries allow us to argue that although there was very little explicit talk of race or gender in mathematical figured worlds, these figured worlds were still racialized and gendered spaces. As we described earlier, the students shifted rapidly between mathematical classroom figured worlds and the more explicitly gendered, racialized social figured worlds as they interacted. The juxtaposition (or *lamination*; Jurow, 2005) of these figured worlds contributed to the gendered and racialized mathematical space. Further, the gendered and racialized social interactions were sometimes carried out at the same time as the mathematical interactions, as evidenced by Dawn's frequent outbursts of song while she worked.

Although we are not the first to argue that classrooms are racialized and gendered spaces, we still need more classroom studies that demonstrate how race and gender are constructed in moments of interaction. However, we would like to go further in this article to discuss how the nature of these classroom interactions influenced opportunities to learn for group members. So far we have outlined the classroom figured worlds and discussed the power dynamics that we observed at play. The variety of figured worlds meant that students had multiple narrative arcs in which to position themselves. In the next section, we focus on students'—and specifically, Dawn's—opportunities to engage in mathematical practices. We argue that the availability of multiple styles of interaction allowed her to create space for mathematical engagement.

DAWN'S ENGAGEMENT IN MATHEMATICAL PRACTICES

Over the 6 days of video that we analyzed for this article, the group engaged in many different kinds of mathematical interactions. Sometimes group members worked individually, sometimes they collaborated, and sometimes they asked for the teacher's or other adults' help. When they did collaborate, the task itself clearly influenced the nature of the interaction. For example, when the teacher instructed them to let each group member take a turn to discuss their thinking, they did so. When the teacher asked the group to make sure that Dawn was "caught up" on the material she had missed during an absence, Riley explained the material to her in a direct fashion.

Even given these interactional differences, there were some patterns in the nature of their engagement in mathematical talk. As we discussed earlier, Riley typically initiated mathematical discussions by asking guiding questions to which he already seemed to know the answer. Dawn and Shayenne both pointed out that Riley's behavior was like a teacher's (and therefore, not like a student's). By contrast, when Dawn initiated mathematical discussions, the interactions that followed tended to align with a more didactic model of interaction. That is, she asked specific questions to which she seemed to expect a direct answer, such as clarification on a particular

problem or solution path. In these moments, Riley would instruct her about how to solve the problems. We believe that in the current mathematics education research climate, this didactic style is frowned on, both as a teacher's technique and by extension, a student's. It would be easy to assume that during these discussions, Dawn was not provided opportunities to engage in mathematical practices for herself. However, when we looked more closely at the didactic conversations, we found that Dawn was able to engage in important mathematical discourse practices (e.g., conjecturing, demanding evidence and precision, challenging someone's thinking). We offer and analyze two examples here.

On February 4, after Dawn had loudly complained that Riley was treating her and Shayenne like they were "stupid," Dawn and Riley worked intently together to finish their classwork before the period was over. The problem required them to find at least two different combinations of skateboarding sneakers and basketball sneakers that a corporation could make given a set of constraints. The following brief clip of interaction is fairly typical of the group after the "stupid" incident, in which Riley gave directions and Dawn commented and questioned. Just before this brief excerpt began, Dawn was momentarily distracted by another group. She then turned back to Riley with a businesslike "Okay," and continued to work.

In Excerpt 3, Riley began by restating the point they had reached in their work, that is, they had decided that they had $1500 to spend on cases of skateboarding sneakers. Dawn confirmed this ("Right") but then questioned the amount of money he had stated (line 7). Note how she challenged Riley when he seemed to come up with a different result than hers.

Excerpt 3. February 4, 2005
An Example of a Didactic Interaction: Cases of Sneakers

1	*Dawn:*	$_1$Okay 1. *Turns body and gaze towards Riley*
2	*Riley:*	All right, so
3		$_1$We have fifteen hundred dollars 1. *Gaze on his notebook*
4	*Dawn:*	Right
5	*Riley:*	$_1$That we can use on skateboarding shoes now cuz we had zero
6		skateboarding shoes in the beginning 1. *Gaze turns to Dawn*
7	*Dawn:*	Right
8	*Riley:*	But now we-
9	*Dawn:*	Hold on, we've got $_1$how much money left? 1. *Leans forward, pushes sunglasses to forehead and looks at Riley's book*
10	*Riley:*	Fifteen [Fifteen hundred dollars

11	*Dawn:*	[I thought we had-
12	*Riley:*	[One thousand five hundred
13	*Dawn:*	[A thousand yeah
14	*Riley:*	One thousand five hundred is the same as fifteen hundred
15	*Dawn:*	$_1$Shut up
16		$_2$Okay, go ahead [((*laughs*)) 1. *Waves hand in dismissive gesture* 2. *Drops hand onto notebook*
17	*Riley:*	[Um, so
18 19		We know that um it $_1$costs $_2$three hundred and fifty dollars to make one case of skateboarding shoes? 1. *Dawn orients body towards her notebook, begins to write* 2. *Riley points to the problem*
20 21	*Dawn:*	Three hundred and fifty so then $_1$divide that by three hundred and fifty? 1. *Looks back and forth between Riley and her notebook as she writes*
22	*Riley:*	Right
23		[So then we can have $_1$<u>four</u> skateboarding shoes 1. *Leans forward*
24	*Dawn:*	[he:::y!
25		$_1$Four <u>skateboarding</u> shoes? 1. *Looks at Riley's notebook*
26	*Riley:*	Four cases of skateboarding shoes
27	*Dawn:*	$_1$Four cases
28		$_2$So eighteen cases of basketball and fo' cases o' um
29		skateboarding? 1. *Turns back to her notebook* 2. *Begins writing*

Once the two seemed to be in agreement about the amount of money they could spend on skateboarding sneakers, Dawn encouraged Riley to go on (line 16), indicating that he still had responsibility for moving the problem solving forward. Riley responded by reminding her that it cost $350 to make a case of skateboarding shoes, and Dawn supplied the next step: Divide $1500 by $350 to find the maximum number of cases of shoes they could produce (lines 17, 18, 19, 20, 21). When Riley agreed, Dawn's interjection "he::y!" sounded self-congratulatory and celebratory (line 24). Riley did the computation and announced that they could make "four skateboarding shoes," which Dawn repeated in some disbelief, until Riley corrected himself to "four cases [of shoes]" She ended the excerpt (lines 27, 28, 29) by repeating the overall result they had found—that they could make 18 cases of basketball sneakers and 4 cases of skateboarding sneakers. After this excerpt, Riley and Dawn went on (under Riley's guidance) to check that this combination satisfied all the other constraints in the problem.

In this brief interaction, Dawn made some important contributions. She challenged Riley's thinking and made a suggestion about how to determine how many cases of skateboarding sneakers they could produce. This suggestion was ultimately taken up. Although Riley heavily scaffolded this interaction, we feel that Dawn's contributions should not be discounted.

As another example of a didactic conversation, consider Excerpts 4 and 5, which took place more than 1 week later, while the group was working on graphing linear inequalities in one variable. The first inequality was $x + 7 < 10$. Because this interaction is relatively long, we include two excerpts and some explanatory detail.

In Excerpt 4, Dawn asked Riley for help, and he gave her a suggestion and a reminder that the task was similar to problems they had solved 2 weeks earlier (lines 2, 3, 4). Dawn responded by elaborating and providing more detail about what Riley meant by suggesting a concrete first step: "minus seven from both sides" (line 5). Riley agreed, and then turned to his own work, while Dawn began writing in her notebook.

Excerpt 4. February 15, 2005
An Example of Didactic Interaction: Simplifying Inequalities

1	*Dawn:*	$_1$How you how you supposed to do it? 1. *Leans towards Riley*
2	*Riley:*	All right$_1$ for the $_2$warm-up?
3		You just simplify it$_3$
		(*pause*)
4		Like we did, way at the beginning of the unit 1. *Leans forward* 2. *Points towards the front of the room with his pencil* 3. *Puts pencil in mouth*
5	*Dawn:*	$_1$So, minus seven from both sides? 1. *Plays with long hair*
6	*Riley:*	Right, minus seven from both sides
7		And then you have . . .
8		$_1$Whatever you have, and then$_2$ 1. *Lifts hand* 2. *Starts writing on own paper, as Dawn begins writing*

Excerpt 5 occurred a short time later. In Excerpt 5, Riley explained to Dawn that she should graph her resulting inequality on the number line, and Dawn asked for guidance on how to create the number line, how to graph the inequality, and what symbols she should use (lines 5, 6, 12, 13, 16, 17). When Riley explained, she asked for more precision ("Is it a open dot or closed?") and challenged inconsistencies in his comments ("You just said the opposite"). Although some of this discussion concerned primarily mathematical conventions (such as the "open dot" vs. the "closed dot"), Dawn paid close attention, asked clarifying questions to make Riley's suggestions more precise, and put these suggestions into action.

Excerpt 5. February 15, 2005
Simplifying Inequalities (*continued*)

1	*Dawn:*	$_1$And then what? 1. *Was writing, sits up straight and turns head towards Riley*
2 3	*Riley:*	$_1$Then, all right $_2$so you have, *x*, is less than three. So you graph that, on a number line 1. *Finishes writing, sits up* 2. *Leans forward and gestures with right hand towards front*
4	*Dawn:*	$_1$So make a number li:::ne 1. *Begins writing*
5 6	*Ms. Delack:*	((*from off-camera, to whole class*)) You've got a minute to finish up! You've got about a minute to finish up
7 8 9	*Dawn:*	And then, what $_1$How how we make a number line? Do zero, $_2$zero one, oops$_3$ 1. *Plays with hair* 2. *Writes* 3. *Erases from her paper*
10 11	*Riley:*	$_1$Right so you do zero one two, and then you can, graph$_2$ (*pause*) um 1. *Looking at his notebook as he writes* 2. *Looks up and leans forward*
12 13	*Dawn:*	$_1$Two, negative three [and then, I forget how 1. *While writing*
14 15	*Riley:*	$_1$[so you ((*inaudible*)) so three So you put a dot around three 1. *Points towards Dawn's notebook*
16 17	*Dawn:*	What do- Is it a open dot or closed
18	*Shayenne:*	$_1$Because that would ((*inaudible*)) [yeah oh no] what? 1. *Speaking with someone off-camera, behind the group*
19 20	*Riley:*	$_1$Well, if it's great Greater than [It's open] 1. *Still learning forward, pointing to Dawn's paper*
21	*Dawn:*	No, it's equal
22	*Riley:*	If it's greater than, or equal to, it's open
23	*Dawn:*	Okay

24	*Riley:*	If if it has an equal to in it, it's closed
25		If it has an equal, so it's open
26		It's greater than
27	*Dawn:*	No it's not, it's not equal to!
28	*Riley:*	It's greater than
29		If it's greater than or equal to it's closed
30	*Dawn:*	[1] You just said the opposite 1. *Slaps both hands down on her notebook*
31	*Riley:*	Really?
32	*Dawn:*	Yeah
33	*Riley:*	Oh, sorry.
34	*Dawn:*	So if it's not equal to, then it's open?

In these two examples, while Riley provided instructions as to how to solve the problems, Dawn engaged in mathematical discourse practices: conjecturing, requiring precision and detail, respecting mathematical conventions, and applying abstract mathematical ideas (simplifying, finding out how many cases to purchase) using concrete examples and operations. Although these two examples of interaction may leave something to be desired in terms of the depth of mathematical thinking, we believe that they contain evidence of mathematical engagement.

Most important, from our perspective, Dawn was engaging in some of the very practices in which she refused to participate when invited to do so by Riley. That is, when Riley asked a guiding question to elicit a conjecture, an operation, and so on, Dawn most often refused. Yet, when Riley provided "direct instruction," Dawn was able to create opportunities to engage in these valued practices.

We now return to the question of power dynamics within these two styles of mathematical interaction—the guiding style and the didactic style. Our analysis of the didactic interactions reveals an unexpected position that was made available to Dawn (or any other recipient of direct instruction): the position of critic. We were reminded of conversation analytic research in a very different setting, the radio call-in show. Hutchby (1996), drawing on earlier work of Sacks (1992), has argued that in such shows, the host is placed in a more powerful position because callers have to state their positions first. The host, as second speaker, can critique the first speaker's position without being vulnerable to the same type of attack (Hutchby & Wooffitt, 2008). Analogously, when Riley explained mathematical concepts to Dawn, she could critique his argument rather than stating her own position.

Our analysis of mathematical discussions within the group revealed some interesting and (to us) unexpected findings. Within the student-led spaces of the classroom, there were several interesting power dynamics. First, although in most

mathematical contexts Riley was positioned with more power (because of his high achievement, his racialized and gendered status as a White boy, and perhaps also his alignment with the teacher's style of interaction), Dawn and Shayenne found ways to position themselves with power as well, to write a counternarrative to the deficit perspectives about African Americans and mathematics that are presented in the media and in many research articles in mathematics education. This was evidenced by their engagement in social talk that excluded Riley, by the way they explicitly positioned Riley's alignment with the teacher as inappropriate, and by the way Dawn took up the position of critic in mathematical conversations with Riley.

DISCUSSION

Current research in mathematics education suggests that students should engage in particular kinds of talk-intensive activities to support their development of classroom mathematical discourse practices (Cobb & Bauersfeld, 1995; Inagaki, Hatano, & Morita, 1998; Moschkovich, 2002). The presence of a diversity of cultural practices in the classroom provides valuable resources for learning, especially for students from historically marginalized communities who are often prevented from drawing on their linguistic and cultural strengths in traditional classrooms. In this article, we highlight some of the benefits and conflicts that can arise in such talk-intensive mathematical pedagogies.

For our focal students, complex dynamics of power were constructed and reconstructed in interaction, both in social and mathematical talk. Although we have demonstrated throughout that the different classroom figured worlds were associated with different hierarchies of power, we do not mean to argue that the various types of power were equal or in parallel. Riley's power within mathematical figured worlds offered him far greater learning opportunities—and greater *clout* (Cobb & Hodge, 2002)—than did Dawn's power within the figured world of friendship and romance. However, Dawn's power in the social figured world may have played a key part in allowing her to shift the nature of mathematical interactions. One of the most interesting aspects of power dynamics in the mathematical figured world was the conflict between a more teacher-like guiding style of collaboration, and a more didactic style. A didactic style of interaction is usually not encouraged in Standards-based classrooms. However, when using this didactic interactional style, Dawn took up opportunities to engage in mathematical discourse practices such as conjecturing, clarifying ideas, and providing evidence, which she did not otherwise do.

Thus, in heterogeneous mathematics classrooms, we cannot say a priori which kinds of discourse practices or interactional styles are going to work with all students. Although the mathematical classroom figured world as taken up by Riley may approximate the Standards-based approach more closely, the didactic style taken up by Dawn seemed to allow her more opportunities to engage authentically

with the mathematics and in collaboration as a group. Such a seeming contradiction allowed this group to approximate the overarching goals of Standards-basedclassrooms in ways that worked for these particular students (although we would not deny that the high levels of tension in this group were not ideal). The benefit of explicitly encouraging diversity in this classroom was that it allowed students to take up multiple ways of interacting with each other and the mathematics itself. The downside may arise if students are marginalized because their ideas about how to behave appropriately differ from those of their peers.

Although in this article we have looked critically at this classroom, we believe it was a relatively successful Standards-based mathematics classroom that was moving toward greater equity. As Gutiérrez et al. (1999) argue, conflict is a characteristic of heterogeneous learning spaces and is not necessarily to be avoided. However, we believe that these conflicts need to be managed well if they are to be productive for learning. Although Dawn was willing to confront Riley directly, many students might not and would continue to be marginalized by classroom norms that did not support their authentic engagement.

We have argued that this classroom was a racialized and gendered space, and we have also described in some detail the conflicts that arose between Riley, Dawn, and Shayenne. We wonder whether this conflict around interactional styles was also in part related to students' racialized and gendered identities. Because we restricted our analysis to observable aspects of the interaction, this is impossible to say. Within this particular classroom, students did not explicitly mention race or gender within mathematical interactions (although they did so in social interactions within and across groups). To build stronger connections between student identities and our findings of observable interaction, other analytic methods would be required. For example, we and others have drawn on interview methods to discuss the ways in which some students view classroom interactions through racialized and gendered lenses (Esmonde, Brodie, Dookie, & Takeuchi, 2009; Langer-Osuna, 2011; Martin, 2006).

We believe that this study has implications for research in mathematics education, as well as for classroom teachers. For researchers, we stress the importance of looking at both teacher-led and student-led spaces of the classroom. In this focal group, much of the conflict about mathematical interactions took place in the student-led space, and we believe that a focus only on teacher-led space would have provided a very different picture about how students went about learning mathematics in this classroom. Second, we also believe it was important to focus on both task-relevant (i.e., mathematical) and non-task-relevant (i.e., in this case, social) talk. These two figured worlds interacted and overlapped with one another.

For teachers, we believe this article illustrates both promises and challenges of heterogeneous classrooms. The teacher created spaces in which Dawn was able to insist on didactic interactions, and thus engage authentically in mathematical practices. Indeed, given that most students experience didactic teaching in their mathematics education, it is not surprising that this was a style preferred by at

least one focal student. We caution the reader not to conclude that all African-American students, or all girls, or all lower achieving students, would require or benefit from this didactic style. Instead, we believe that the power dynamics made evident in the interactions are the key to understanding what was going on. Riley's interactional style (which we called *guiding*) may seem to support equitable power dynamics between students, but Dawn responded as if he were trying to display his own intelligence and her stupidity. Dawn's interactional style (which we called *didactic*) may seem to position Riley as more powerful. Yet we believe it is no coincidence that Dawn participated fully in didactic discussions in which she positioned herself with power, as the critic of Riley's ideas. This example highlights the importance of listening closely to student interactions, and not mistaking style (e.g., a style that sounds Standards-based) with substance (e.g., actually engaging in mathematical practices).

In our experience, teachers often spend little time observing groups at work, preferring to visit groups briefly to discuss their mathematical progress. Our analysis of the group interactions highlights the importance of listening carefully to student groups to understand their interactional styles as well as students' mathematical thinking. Power struggles such as those we detailed here are likely commonplace in many classrooms; rather than shying away from issues of power, understanding the complexity of classroom or group power dynamics is key. Dawn was able to use multiple figured worlds to position herself with power in a situation in which she could have been marginalized or ignored. If she had not been able to do so, the classroom figured world would continue to privilege those who were already seen as smart.

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