

Narrations of Race in STEM Research Settings: Identity Formation and Its Discontents

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ABSTRACT: This paper discusses conceptions of identity in relation to science education and presents material from a series of interviews and focus groups with graduate students in science and technology. Given difficulties in retention and levels of significant participation by minority students indicated by aggregate data, the issue of race, as it informs critical interactions at a majority research university, is explored in terms of its effects on identity formation. It is argued that we need to look at “real-time” science to see how subtle interactions affect minority graduate students. These interactions reveal how identity is established through the positioning inside or outside of the laboratory culture. Three themes were explored regarding the tensions of identity formation in the context of race and science education: (1) the issue of isolation, marginalization, and invisibility; (2) being valued through recognition of one’s contributions to the community of scientists; and (3) reading race as an additional burden for minority students. Two participants’ stories and their positioning as outsiders are explored in detail. The authors contrast building an identity as a scientist through one’s educational experiences against being positioned as the “only one” representing his or her race at a primarily White institution. © 2008 Wiley Periodicals, Inc. *Sci Ed* 93:485–510, 2009

INTRODUCTION: THE ONLY ONE

In a television series from the 1980s, called *Frank’s Place*, Frank Parish (played by Tim Reid) has inherited a restaurant and moves to New Orleans. Frank is an African American college professor who comes to confront a number of unexpected racial issues that

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emerge as he acculturates to the working class, racially thick culture in his neighborhood in New Orleans. The recipient of much critical acclaim, this television show foregrounded racial issues from a minority viewpoint rather than one that kept the majority viewers comfortable. In one well-known episode, Frank is off to see about joining the “Capital C Club.” He has been asked to consider membership in this prestigious organization of professional African Americans. As he leaves for the dinner, the headwaitress at Frank’s restaurant makes a remark about his being “too dark.” Frank is astonished. “Too dark?” he asks. She informs Frank that the capital “c” in “Capital C Club” refers to being a Creole of light complexion as distinguished from a lower case “c,” referring to those Creoles of dark, or darker, complexion and are historically more oppressed as a group.

As a recent invitee to the Capital C Club, Frank was going to be the first darker skinned African American in this Creole club. Following the remarks by Frank’s employee, Frank confronts the friend who has invited him to join the club:

- Frank: . . . and so what was I gonna be. . . the first darkie in the Capital C Club?
 Friend: Man, look, I am sorry. I should have been more up front about it. . . .
 but there’s a group of us in the club that are trying to change things.
 Frank: And I’m the guinea pig?
 Friend: Well, sorta. You see you got all the credentials to put an end to this
 whole color thing. You’re. . .
 Frank: . . . let me cut to the chase. Okay? All my life, I have been quote the
 only black. I was the only black in this class. I was the only black in
 this organization. I was the only black on this team. . . . I am not about
 to become the only black in a black club. That’s going a bit too far don’t
 you think? (Williams & Barnette, 1987)

In less ironic circumstances, many African Americans find themselves in the position of the “only one.” A participant in the study from which we will be drawing, a postdoctorate in engineering, described her experience as being like “a speck of pepper in a sea of salt.” But being the “speck of pepper” or the “only black” is not just a category in the visible register, although the history of this visibility and the way in which it is marked renders it both subjectively and socially fundamental (Alcoff, 2006; Fanon, 1952/1967; Weigman, 1995).¹ The point of the above anecdote, however, is that being the only Black is not about skin tone, but precisely about how history and context create a meaning to skin tone, a racial identity, and inflect the lived experience of African Americans in both obvious and subtle ways.

For purposes of this paper, it is noteworthy that one of the places that Frank distinctly recalls being the “only black” is in a classroom. Research in science education substantiates that many African Americans acutely experience their singular status in science classrooms with effects on participation in classroom and laboratory activities. A minority student’s participation may be adversely affected by his or her sense of being the “only one,” which entails the burden of representing the race and is accompanied by feelings of isolation

¹ The ways in which the visible trace of race is initially inscribed through representation has been proposed from two vastly divergent paradigms; there are others. Seshadri-Crooks (2000) discusses how the formal features of representation become entangled in the symbolic and visual apprehension of racial difference, whiteness being the unexamined master signifier that produces the meanings attached to the images of persons of color. She notes that race was first evoked in terms of language groups (German, French, and so on). Hirshfeld (2001) also discusses the production of race in the social epistemology of children as initially founded on representations and on the sort of categorization of kinds and theories that must presume representation. Seshadri-Crooks (2000) works from psychoanalysis and Hirshfeld (2001) from experimental cognitive research, yet both point to this representational priority over an inherent visual intuition of difference.

(Carlone & Johnson, 2007; Johnson, 2007; Moody, 2004; Seymour & Hewitt, 1997). For most persons of color, the sense of being the “only one” is also literally true. The percentages of minorities have remained “virtually flat” in engineering at all levels of education and within the ranks of engineering faculty; at every level, the situation in most sciences mirrors this grim picture of underrepresentation (Gibbons, 2006; Hamilton, 2004; Leggon, 1997; Mannix, 2002; Moody, 2003; Nelson & Rogers, 2002; Schiebinger, 1999). It is as if the literal and psychosocial dimensions of being “the only one” reinforce each other, with the latter affecting retention in academe and thus affecting the potential for more minority faculty and peers for such students.

Thus, we explore issues of identity and education through the experience of being the “only one” not as merely the registration of a visual difference, but as a position in relationship to a community of practice with significant subjective effects for the person being so positioned (Wetherell, 2001). Many students, like Frank, “walk in” to an identity where the social meanings of race infiltrate and are performatively enacted in numerous quotidian interactions; it is nearly impossible to simply eschew one racialized identity (Alcoff, 2006; Fanon, 1952/1967). Being racialized can be pernicious for such students primarily insofar as it is linked with being somehow excluded from educational resources and experiences or is more salient than other identities such as being a STEM (science, technology, engineering, and mathematics) student or researcher. We cannot assume that being racialized is simply a matter of skin tone and perception (and what that perception symbolizes). We must also ask how race itself is performed as a positioning that occurs in an educational context. Then we can ask whether such positioning enhances the possibility of a person of color successfully finishing his or her graduate degree and continuing research, or whether such positioning is deleterious for such a future.

One can see how positioning and race are conjoined in the following remarks made in one of our focus groups made up of STEM graduate students who are women of color. Regarding a lack of cultural sensitivity in the White majority toward particular attributes that she sees as typical of African Americans, one participant notes, “But I do think it’s something that we [African Americans] have not voiced our opinion about sometimes because we don’t want to set ourselves apart and be different from the people we’re around.” There is reluctance, or at least a problem, about being set apart, outside of the group, different or isolated in relationship to the others. In the following extract, the phrase “only one” comes up in terms of the risks of being racialized in a certain way that is experienced through “everyday” interactional impasses (Nasir & Saxe, 2003). Another participant echoes the hesitation to speak up because she is part of a group marked as the “only ones” (the “we” to which the first participant refers) rather than assumed as a member of a larger community. Her speaking is inescapably tied to her race, rather than her personhood (Hook & Howarth, 2005; Valian, 1998). This racialization belies the benign inclusion of the participant’s membership in the broader, ostensibly color blind, community. She also believes that her remarks will be earmarked as an appeal for “special treatment,” again suggesting her being positioned in a manner outside of a community of practices and the normative social pact.

Participant A: I think we’re scared to.

GB: The risks?

Participant A: Yeah, the risks. ‘Cause like you said, sometimes we’re the only one, or the only ones.

[later in the discussion]

Participant A: I don’t want them to put me in a category as just another African American. I want to be myself, a person. I don’t want to be just another black woman. Just another person trying to voice an

opinion. . . 'cause when we voice our opinion to them it's like, Oh she wants special treatment.

Often, as in the above excerpt, interracial interactions within science settings exist at a nexus of historical meanings that are complicated and contradictory for the underrepresented minority students and where “one [exists] as a subject *who is always secondary to a racial designation*” (Hook & Howarth, 2005; authors' emphasis), for example being “the only one”—which positions one “as representing the race” or requiring “special treatment.” One can see how Participant A vents frustration at an impasse where addressing her community of fellow scientists intersects with racial connotations. Thus, being the “only one” entails, as we will try to show both theoretically and from our data, ways in which a racial identity is *reenacted* in the everyday and intertwined with other meanings and positioning(s) that impact one's status and effectiveness as a science student in higher education. The “only” one is the one who has been “raced” through social interactions where a racial identity has been recognized, instead of a professional identity, within one's learning environments. Racialization is also communicated through experiences of invisibility, a lack of recognition and resultant isolation. Here, the laboratory replicates symbolically forms of social segregation and devaluation that repeat legacies of racism in miniature. Invisibility, not feeling valued, and isolation or marginalization are common themes in the research literature and were common in the experiences recounted to us by our research participants.

In terms of broader conceptual framing for these themes, we will primarily approach this complicated racialization of identity in STEM education settings as a particular failure to be recognized or to be positioned as one who possesses certain rights and obligations as a future scientist with regard to his or her fellow community of research scientists (Harré & Moghaddam, 2003). Like notable scholars in science education, we use the lens of identity to explore the process of recognition within education—a particularly valuable perspective with respect to minority students (Brown, 2004; Brown, Reveles, & Kelly, 2005; Carlone & Johnson, 2007; Gee, 2001; Johnson, 2007; Kozoll & Osborne, 2004).

CONCEPTUALIZING IDENTITY

Science and Identity

The importance of identity in understanding the processes of education has received increasing attention, especially as the intersection between identity and pedagogical strategies may indicate both a place of significant possibility and resistance with implications for the student's future (Brown, 2004; Carlone, 2003; Mahoney & Yngvesson, 1992). Lei (2003) refers to identity construction as “an active and dynamic process through which an individual identifies himself or herself in relation to how he or she is constituted as a subject by dominant discourses and representations” (p. 159). Gee (2001) refers to identity as being recognized as a certain kind of person within a given context. Gavey (1989) notes that most current definitions of identity are nonessentialist, and refers to the matrix of meanings activated within an interaction rather than preexisting properties of the units of interaction (see also Endedy, Goldberg, & Welsh, 2005; Butler, 2004). Alcott (2006) explores the question of identity in contemporary thought through an interdisciplinary lens and highlights that identity is always a matter of perceptual access to a certain social world; identity is lived experience based on a particular and collective history and produced through interactions where one is seen and heard as well as seeing and listening. Identity is not totally at the disposal of the subject in the sense that it is lived in relation to layers of social representations. But for all that, identity is not determined. It adumbrates our possibilities as well

as marks our location. Hollway (2004) refers to the tension of possibility and attribution in examining the etymological origins of identity. She writes,

Although the Latin word *idem* comes from same and self identical with semantic application to ideas, numbers, and persons, there is another Latin word *ifcus* that can be found in identification that is related to making and in the context of identification implies a “making the same with.” (p. 2)

As Hollway deftly notes, identity entails something of the same, yet something that is done, made or created, a nuance that is kept in the term identification. Following the more dynamic meanings to the terms, she notes that identification historically signifies a process of going together and making a sameness in difference, indicating an etymological recognition that identity can be forged within difference (marriage comes to mind). Regarding whether identity is being expressed as a self-same entity or reflects the experience of sameness within difference, it is emergent within numerous social exchanges (Alsop, Fitzsimmons, & Lennon, 2002; Carlone & Webb, 2006; Connell, 2005; Devos & Banaji, 2003; Steele, 2003). The dynamic kernel within identity has been highlighted by discourse analysts throughout the social sciences (Wetherell, 2001) and by constructionists within cultural studies, social psychology, race studies, feminism, and gender studies, where nonessentialist ideas of identity are referred to intersubjective and discursive negotiation.

Such an approach is certainly congenial with movements within the field of science education research, where one may be working from notions of identity such as those espoused by James Gee. Bryan Brown and Heidi Carlone conceive of the question of identity in learning at the point of its enactment, what Brown calls *micromoments* (see also Endedy et al., 2005; Johnson, 2007). Brown argues that identity is too often condensed into broad macrocategories that ignore how identity is lived, recognized, and enacted. Identity must be tracked in its contingent, subjective,² and momentary emergence. At the same time, it is widely believed that identity exists at the cusp of the social and the individual (Stryker & Burke, 2000). This combination of approaches seems to be an extremely fertile way to both conceptualize identity and harvest its potential for capturing opportunities of transformation and learning within science education settings.

Thus, to sum up,

- Identity is produced at the cusp of the social and the individual.
- Identity is contextual, nonessential, and temporally develops; it is made together.
- Identity entails recognition from the other (a point we will develop).
- Identity involves possibility as well as attribution—the two moments of identity are intertwined.

Science and Identity in the Research Laboratory

Before we turn to the data, we must address the question of research laboratories. Despite evidence that research experience and laboratories are important places of learning science and developing a science identity, they are vastly understudied in terms of how they teach and address the social and intellectual demands of their operation (Conefrey, 1997; Johnson, 2007; Malone, Nersessian, & Newstetter, 2005; Rosser, 1999; Seymour, Hunter,

² Drawing from scholars on race and culture, Alcoff (2006) writes that Black identity requires that “not only that one is treated as a black person, or that one is objectively black,” but that one is “subjectively black as well in the sense of actively interpreting the implications of this imposed category for one’s sense of self and community life” (p. 244).

Laursen, & Deantoni, 2004). Rather than offsite support groups or preparatory programs, the community life of the laboratory is a “natural” site for the evolving socialization of a future scientist (Hunter, Laursen, & Seymour, 2007). Ten of our 14 participants who were individually interviewed noted how important their research experience was to their disciplinary and vocational choices and frankly to their motivation and desire to do further research. It is clear that participation in such a community is important to a future scientist and her sense of herself as a scientist, that is to her identity (Greeno, 1998). Thus, it is unfortunate that there is noteworthy lack of research on the processes in research laboratories where one encounters such a fertile blend of “real science” and education (Hunter et al., 2007; Knorr-Cetina, 1999; Traweek, 1988).

Even as laboratories are critical learning sites, they are also places where research, particularly the principal investigator’s funded research, is ongoing. As such, there is a more general scientific ethos, what Carlone (2003) calls prototypic science, here in its “authentic” or ordinary place of enactment. cursory knowledge of the ideology of science would suggest that science sees itself as beyond identity. There is the identity of the scientist, but that is an abstracted identity. Rationality is presumed to demand a distance from any viewpoint; it is neutral, a matter of rational and individual perception. Scientific method means anyone occupies this position and in so doing eschews his or her specific identity (Harding, 1993; Nelson, 1993). Thus, Alcoff (2006) can talk about rationality presupposing the transcendence of identity; identity is linked both to the social and to a particular viewpoint. Rather than seeing the social as enabling or even as relevant (other than distorting an objective viewpoint), traditionally science sees identity questions as distracting from the work of science. This presents even more problems in the case of minority students, particularly African Americans. Persons of color have been historically cast as less rational and as objects of scientific study rather than as scientists (Alcoff, 2006; Stepan, 1996; Weigman, 1995).

Identity Formation and Recognition

We add to the above formulations about identity and science by suggesting that identity requires a symbolic foundation, a sense that one is deemed worthy of participation in a cultural qua symbolic network or institution. The currency in this institution—a research university—is knowledge and prestige, the latter being reflected by the “accoutrements” of identity and by recognition from others within the symbolic field of meanings relevant to science practices, for example, invitations to conferences by faculty (Carlone & Webb, 2006). This sense of symbolic recognition is important in science because science, as one participant bluntly put it, is “ninety percent failure.” In the face of arduous work and failures, it is an important question whether one feels more or less entitled to such recognition and/or knowledge, or if one feels that the recognition is being withheld or given unfairly to other students.

Symbolic recognition is not simply the recognition of given attributes or the management of linguistic or other social markers to have one’s identity perceived in a particular fashion. Brown writes that “individual agency provides us with the power to select discourses to communicate our political, ethnic, and cultural identity” (p. 813). Carlone and Johnson (2007) write that “It is much easier to get recognized as a scientist if your ways of talking, looking, acting, and interacting align with historical and prototypical notions of scientist” (p. 1207). From this angle, the notion of identity leans toward the negotiation of attribution and social representations. Although the authors of this essay are much in accord with this view, we might add that the discursive exchanges through which identity is staked involve the subject as well as attributions about the subject. “Among the products of

discursive practices are the very persons who engage in them” (Davies & Harré, 2001, p. 262). Discourses position individuals, and each utterance implicates the right to speak and the right to be heard. Following Hegel, hermeneutic and constructionist thinking (Alcoff, 2006; Harré & Moghaddam, 2003; Kojève, 1947/1969), we see any interaction as entailing a metalevel wherein the question of the subject’s desires and very sense of herself as a subject here and now may be at stake. Thus, being ignored indicts the subject as well as her competency. We do not urge simply building “confidence” or “self-esteem” in order to bolster a person’s sense of identity; this sort of approach presumes that these dimensions can really reside outside of broader discursive formations. Rather, we merely point out that in instrumental, social, and academic interactions, a subject bids for recognition through and as an identity; that is, recognition and positioning occur within concrete interactions although they are not reducible to the specific semantic meaning of an utterance (Gee, 2001; Koborov & Bamberg, 2004; Wetherell, 2001). We could speculate that this recognition is the bond of trust that builds the social epistemology that founds the possibility of science (its social contract). Understanding this level of speaking and positioning may permit a better understanding of who succeeds in science and how that success is brokered.

The Evolution of the Research Question

In light of the above theoretical reflections on identity, which helped organize our analysis of the themes that emerged in our findings, it is equally important to articulate how our research evolved conceptually and methodologically. From this evolution, one can see how identity as related to the issue of recognition becomes central and see the ways in which racialization impedes full participation in laboratory life. Our research on race, gender, and laboratory life among minority women at various levels of their educational career in STEM disciplines was conceived as a preliminary foray into this terribly understudied domain with significant potential for positive interventions. As the research progressed, we focused more on graduate students who were women of color.

As we collected data, we realized that the intersection of race and gender proved tricky. Our participants wanted to talk about race (and their work, interests, advisors, and so on), but gender was less salient. This is not to say that it is not important to study gender and race, nor that issues of gender did not emerge (Collins, 2004; hooks, 1995), but that the research responded to a certain urgency in the community that, in this case, related to race (Jaworski & Coupland, 2006; Spradley, 1979).

We first wanted to discover the sorts of issues that minority students face in a mostly White majority school in the specific context of a STEM research laboratory. We wanted to provide a space where such issues were discussed and articulated by the students. After establishing recurring themes that emerged as these issues were discussed in our first two focus groups (led by Gilda Barabino), we became increasingly interested in the way in which questions of race intermixed with other research educational activities (e.g., e-mails, conferences, social activities, laboratory division of labor, collaborative projects, professional networks, research laboratory hierarchy, and so on). For example, two minority participants mentioned that their minority fellowships were not recognized at laboratory meetings while other students’ scholarships, fellowships, and awards were collectively recognized and noted publicly by the principal investigator (PI). When this issue emerged in-group discussion, it was clearly recognized as problematic by other subjects. In our view, this omission racialized these awards rather than treating them as an achievement in an academic competition. Many may associate racism with explicit racist remarks or exclusion from resources and power. In the laboratory where students have been outwardly welcomed into the community, and the resources are putatively equally shared, the challenges for these

women were more often interactions that were subtle, emergent within other interactions, and slippery rather than explicitly demonstrative of racism.

In a spectrum of interactions, our participants reported feeling as if they were being subjected to a subtle racism from White majority faculty and peers that would take forms that we attempted to track and interrelate into patterns. We became increasingly interested in how race (seemingly grounded in racism) was performed/enacted and created within laboratory activities themselves and in the interactions between race and other interactions that were important to our participants. As a way to better grasp the contingent and emergent enactment of (racial and science) identities, we sought to understand how minority students are “positioned” within interactions in terms of race and the science laboratory community, at least from the point of view of their social reality (Harré & Moghaddam, 2003). The integration of identities, the way in which race is constructed in White majority situations, is an ongoing issue for underrepresented minorities who bear the brunt of countering this racialization in a situation in which race supposedly does not exist.

METHOD

Participants

Participants were drawn from a large research university. Those working in biomedical engineering and neuroengineering made up the primary population from which we drew, but other fields in the sciences and engineering were also tapped. This is by no means a representative sample, but rather our study was intended to open the window to a world experienced by a cohort of underrepresented minority students in research laboratories—primarily women—as they navigated science education, their goals of successful careers as scientists, and the climate of their research laboratories. In all, there were 24 participants, all from underrepresented minority groups ($n = 24$). All were working in a science laboratory setting. Eighteen of the participants were graduate students studying engineering or science, two were postdocs, two participants were working in laboratories where participating students were working, one participant was an undergraduate (contacted early in the study), and another was a minority faculty. As noted, our focus increasingly narrowed to women of color in graduate school. Table 1 breaks down the sample in terms of ethnicity and gender.

Procedures

Participants heard about our study primarily through word of mouth. We made contacts with underrepresented minority students through faculty referrals and referrals from student participants. We collected data from participants in two ways: focus groups and individual interviews. Because our study targeted gender and race, the focus groups were made up exclusively of women of color, primarily African American. Nineteen of the 24 participants attended one or more focus groups: The three men, the one faculty member, and the one

TABLE 1
Sample by Ethnicity and Gender

	Women	Men
African American	17	2
Caribbean	1	1
African	1	
Other	2	

undergraduate did not attend. Of the 19 who attended the focus groups, 10 were also individually interviewed. In addition to these 19 participants, the 5 additional participants noted above were individually interviewed.

In all, 15 participants were individually interviewed. Of the 15 participants interviewed, 5 participants who agreed to a first interview participated in a second interview. Thus, we ultimately had 20 individual interviews. From both focus groups and individual interviews, we generated approximately 690 pages of transcript for analysis and review.

The Focus Groups

In all, five focus groups were held. They were announced by e-mail and ran for 2 hours, with lunch provided. Given our initial focus on gender, these groups were limited to women. Students dropped in and out of the focus groups, although there was a core group from a set of interrelated laboratories who attended most of the meetings. Students viewed the focus group as an opportunity to share experiences and gain support, and news of the groups spread among graduate minority students. The question of starting such groups for male minority students as well came up repeatedly in the focus groups. Here is an excerpt that gives a sense of the reputation and significance of these focus groups:

Can I bring up one thing? So I was talking to [a male student who is a minority] and he was like, Oh ya'll getting together again? So his whole things is, don't forget the brothers. Don't forget the brothers because they're lonely too.

Focus groups served the dual purpose of providing a mechanism for networking and support as well as a mechanism to collect qualitative data drawn from narratives that illustrated the collective experience of the participants. We began the work for our study through an initial gathering where Gilda Barabino, a faculty woman of color, led students from engineering, mathematics, and science, in discussions that focused on shared experiences and strategies for success in their graduate education. Prepared questions (see Appendix A) were used to stimulate and guide discussions, and free discussion was encouraged to follow important emergent threads, enrich the experience for participants, and gather more detailed qualitative data. A substantial number of recurrent themes emerged from the conversations within and across focus groups as the authors cross-checked the transcripts and noted commonalities and patterns.

The Interviews

The authors conducted individual interviews with 15 individuals. The interviewer used an ethnographic approach, which attempted to understand the social reality of the interviewee and the cultural scene (in this case, of race/minority status within a White majority school science laboratory) that he or she inhabited. Following ethnographic interviewing principles and in consultation with Wendy Newstetter who does ethnographic research on learning in science, we crafted interview questions with a variety of aims in mind (Spradley, 1979). First, we explained the research, pointing out current data on the status of minorities and science and the interviewer (Malone) spoke of our specific interest in laboratories. Second, in light of the sensitive nature of discussing race in a situation where careers were at stake and the interviewer was White, we always began with a "grand tour" question where we asked the student to describe his or her history and interest in science, her laboratory, and then her experiences in the laboratory. These descriptive questions helped establish rapport and also served to help ground our later questions. Follow-up questions were developed

in advance in relationship to the themes that emerged in the focus groups and in view of the current literature (see Appendix B). Although we had a set of prepared questions, the interview protocol was individually tailored and there was a dynamic relationship between the answer and follow-up questions. This procedure accords with ethnographic interview protocol as outlined by Spradley (1979). Questions were thus often formulated in terms of events surrounding a particular student, for example, "I know that last time we talked about your preparing for the orals. . . How is that coming along?"

Data Analysis

With a small sample size that, nonetheless, generated lengthy and sometimes in-depth recounts of significant educational experiences, we were well positioned to investigate *how* these female students experience race as a factor in their research experiences. Our first step was determining themes that were explicitly articulated in the focus groups and were also recounted in interviews. As our analysis of the recollections and accounts of the participants progressed, we became more interested in seeing how race, in interaction with participants' experiences of subtle racism and/or racialized encounters, was created in various micromoments, and would flare-up and recede, probably before the majority person noticed that a situation had been racialized. Thus, we looked at themes that we found recurring in many narratives through a limited number of principles derived from discourse analysis. Drawing from a discursive perspective, we were interested in how these themes were enacted in the context of everyday activities and interactions, rather than casting themes as experimental variables or as correlates to given sociological categories (Giorgi, 1970; Harré & Moghaddam, 2003; Spradley, 1979). We looked to how interactions positioned the interlocutors within an interaction from the point of view of the participants.

Thus, following a careful categorization of remarks about race discussed in the focus group transcripts in terms of themes and careful classification of particular stories in terms of the developing thematic categorization, we reexamined salient and telling stories found in both focus groups and individual interviews to see how (and if) the subject was positioned by herself or himself and through interactions with others. We wanted to particularly focus on events in which interactions in the laboratory environment co-constituted the participant in terms of race while implicating her position as a future research scientist. Working together, both authors read and reread transcripts paying careful attention to those moments when a participant reported that she felt she or another underrepresented minority had encountered a situation in which her racial identity was somehow salient, (created and) then connected with a problem in being seen as, treated as, or recognized as a competent research scientist/student. Obviously, the analysis of "in vivo" creation of positioning is important (Wilkinson & Kitzinger, 2003), but we did not have the resources for undertaking such a task. Rather we examined remembered events in which the participant felt put in a place or category and recounted to us how that experience unfolded. We recognize that discourse analysis tries to capture and reiterate the speakers' positioning and identification in modalities such as conversation analysis, and on the main it does not presume an experienced reality that can be thematized except through its interactional construction. Thus, within our work, there is a tension between our desire to give a voice and further articulation to the experiences recounted by our participants in an arena where very little research has been done and our awareness that race is not an attribute carried around but created in moments, interactions, remembered, and often created through positioning that may not seem directly racial to all interlocutors.

The reading and analysis of the data presented in the next section reflect the research question as to how interactions and experiences described by participants show the interaction

of race and science education in terms of whether it is a racial identity that is highlighted in the research laboratory or one's identity as student or scientist. We are looking at how one's racial identity is included or not (often called *being out of the loop*), how one is accorded symbolic recognition (loop, marginalization, invisibility), and the way these dimensions are enacted in a manner that positions the student as being raced.

The following section draws primarily on two specific participants' narratives, although passages from other subjects will also be included. We chose these two participants as particularly illustrative of the sorts of challenges that we have described earlier. Both vividly discussed issues around marginalization, invisibility, being out of the loop, racialization, and feeling undervalued. Both of these students were emotionally engaged with both the focus groups and the interviews. One is finishing her dissertation, and the other is preparing for her qualifiers as she finishes up classwork.

The material in these students' interviews spoke poignantly and represented typical ways in which students would describe and respond to feelings of invisibility, marginalization, being out of the loop, and racialization. The evolution of the educational careers of these students is not necessarily typical nor do these narratives represent the only way our cohort responded to such challenges. However, the coherent relationship between challenges faced by these two participants and their increasing disidentification with the vocation of research scientist is particularly striking. Furthermore, we have more extensive data on them as these two students were two of the five who were interviewed twice.³ As we always asked the interviewees to catch us up on their work at school, we have a little bit of a story line on these two students. Story lines better reveal positioning through the logic of their unfolding (Harré & Moghaddam, 2003). If, as we argue, positioning occurs through micromoments and interactions, following a story will better show the accumulated effects of such positioning as it is created within identifications, through difference, and "congealed" into identity (i.e., as a perspective from which we perceive the future). It is important to recall our earlier theoretic discussions of identity, which considered identity as contingently created, as important to science research, and as founded in a dynamic of recognition. We have named the two participants, whose stories are the backbone of the following section, Tamara and Jocelyn.

FINDINGS: NARRATIVES, STORIES, AND THEMES

Regarding challenges faced by underrepresented minorities in STEM graduate settings, themes that we derived from the focus groups could be broadly categorized under the headings of invisibility, marginalization, undervaluation/recognition, representing the race, added taxes of being a person of color, exclusion (out of the loop), and racialization (related to stereotypes and never being able to escape being seen as a Black persons). In terms of invisibility and exclusion, for example, different stories shared by different individuals spoke to the same issue: One student mentioned that her advisor routinely walked through the laboratory and held individual conversations with all of the laboratory members present except her; another student described a case where fellow laboratory mates were discussing abstract submission to an upcoming meeting and she was the only laboratory member who did not know anything about it. In each case, these women were also the only African American member of their laboratory groups. The themes that emerged from focus groups were consistent with literature documenting the experience of women and women of color in the academy at the faculty level, and they were confirmed as significant challenges in

³ One of the double interviewees was male, another left suddenly for academic reasons, and another worked in (an atypical) primarily African American laboratory.

the individual interviews and in the experiences of one of the coauthors (e.g., Rosser, 1999; Jordan, 2006; Myers, 2002; Seymour & Hewitt, 1997; Conefry, 1997; Clewell & Campbell, 2002).

Of these recurrent issues, the following examines only those themes that the authors have seen as constitutive of what we earlier discussed as symbolic recognition in relationship to identity formation (both one's identity as a scientist and in terms of race). Such factors include *being invisible*, *being in, or out of the loop* (of knowledge transmission), *being valued and recognized for one's work*, and forms of racialization, which impact the ability to *integrate various attributions of the self into one's identity as a scientist* (Johnson-Bailey, 2004; Nosek, Banaji, & Greenwald, 2002; Turner, 2002). Thus, we will bring attention particularly to students' articulations of their experiences of invisibility, marginalization, exclusion (out of the loop), and racialization in relationship to identity formation and symbolic recognition. After analyzing the transcripts in terms of types or classes of experiences, the authors came to the conclusion that the idea of symbolic recognition was an important way to theorize the themes of undervaluation, marginalization, invisibility, being in or out of the loop, and the performative dimensions of being racialized. We saw the acts and events to which these themes refer as ultimately positioning a student and constituting an identity for her in relationship to science. In the research literature on race within university settings, identity is not always addressed directly but plays out in terms of certain themes that we also ascertained in our own narrative.

Being Invisible

Students in our study remarked that they felt invisible when it came to their contributions as scientists. Students remark that their contributions to laboratory meetings are sometimes passed over, but when the same idea is expressed by a White peer, the contribution is acknowledged (see also Jordan, 2006; Myers, 2002). Noting this pattern, one participant, an African American finishing her doctorate, cynically remarked, "Could we press rewind and hear me say that?" Jocelyn, the doctoral student on whom we focus, recalled a number of experiences in which her work was not recognized (she feels invisible). These remarks are from a focus group:

When I first got in my lab, I had that a lot [invisibility] and I look, like didn't I just. . . [Didn't you] hear me say that?? I just said that (Jocelyn sounds incredulous). You changed just one noun, maybe one adjective and everyone jumps on it.

If identity requires some recognition from others, that is, if identity is a dynamic process of negotiating within a community of practices and of being recognized as proficient in them, then we can assume that being treated as invisible disrupts identity formation by negating one's status as a member of the learning community. While in the above, invisibility is experienced in the context of saying something that is only heard when it comes out of someone else's mouth, we also categorized a particular unresponsiveness to the student as invisibility. In her first individual interview, Tamara responds to a question about if she has ever felt invisible by replying,

I can relate. . . . [the P.I.] sent e-mails out about things we can do, like extra stuff, and I've e-mailed him back. He's never gotten back to me. Like this has happened, well, only twice it happened in particular, but he said, Okay, I need someone to write code to do this, and I have some ideas, and I e-mailed him my ideas and he doesn't get back to me. He writes another e-mail, Okay, I need someone to present, you know, it would be great if

we had posters here or something like that, and I'm like, I'd like to present and he didn't get back to me. Of course another student got back to me and asked if I was a member of the organization that I had to be a member of in order to attend the session and who my sponsors were. I had no idea I needed to become a member in order to, you know, deliver abstracts.

Invisibility is the feeling but the student is excluded from important networking information, what yet another participant refers to as the “mechanics” of getting the degree and doing research. At one level, one is talking about pragmatic mechanics, trafficking in knowledge and circulating in networks. The flip side of access to the mechanics of being successful is the symbolic recognition by a given learning community and being accorded rights and duties by that community. In fact, both dimensions are combined in the above anecdote. The second interview suggested that Tamara's sense of invisibility has continued. But the occasional position of being invisible has transformed into a deeper isolation and into a psychosocial barrier that may recreate a racial division, in that Tamara associates her isolation with being an African American female. In a later interview, she confides about her future participation in a discipline specific workshop where students must be accepted to attain admission. Regarding this, Tamara notes,

Tamara: Uh huh. But I know I've got to really perform up to par, because I'm representing the whole lab, so you know, or I'm not sure who else is, if anyone else has applied for it.

KM: Did your PI [Principle Investigator] help you with this?

Tamara: No, he didn't know that I applied. I just I just saw the poster and I applied, and I figured if I don't get it, then no one will know (laughs) But, I got it so, you know. But I mean, you know, part of it is, you know, you wanna do well, and. . . and you wanna make those you know, whom you work for, proud for some reason.

Tamara seems at a stage of proving something to her laboratory rather than belonging to it and achieving within it. The “only one”—a theme to which we will return in the conclusion—here is played out in the sense of being alone and having to legitimate oneself by oneself. The significance of Tamara's bid for symbolic recognition is evident in her desire to “make those . . . whom you work for, proud for some reason.”

Being Valued and Being in the Loop

A theme that seems to run through *all* of the interviews with graduate students is the importance of perceiving one's work as “valued.” Jocelyn, the student working on her dissertation research, talks glowingly about an internship in industry where she felt her work was valued and how that experience altered her career trajectory toward working outside of academe. There appear to be two levels at which the issue of being valued is significant, one related to research or work and another related to the subject producing the research. The prospect of being valued (for one's talent, for bringing diversity, for skills) may be promissory during recruitment, but it may or may not be sustained at later stages in one's STEM education, for example the laboratory or in the class. Minority students may be recruited, but many participants were less than sanguine about the university's ultimate commitment to minority concerns. One focus group had an animated discussion regarding how minorities were sought out by administrators or advisors for admission brochures and special events, but underrepresented minorities' descriptions of their situation are often dismissed after they are in the program.

Being valued for one's work is reflexive. In one laboratory, a participant was floundering until another faculty took up helping her with her work. Referring to this visiting professor who was a woman of color, the student described Professor X as someone who "came and that really, really, like, lifted me up and you know, was really, um, the real reason why I got through." This sort of faculty intervention is often called being mentored. Having a mentor means that one has a link to a system of knowledge and relationships. It also means that students can assume an identity wherein they merit attention/recognition and thus are grounded in a symbolic pivot that allows them to function with more faith in the system. Being given access to knowledge and being treated as if you possess and are deserving of knowledge is a symbolic emblem of your right to be in a certain social network. The student above refers to being "lifted up." "Lifting up" and "getting through" are metaphors of movement, suggestive of perhaps the subjective and motivational dimensions of mentoring. Conversely, "lower expectations," and invisibility also have subjective and structural effects that can ramify beyond the given moment, any set of competencies, or knowledge.

The ways in which a learning community responds to a student always carry the additional message about one's place in that community, implicating one's value. In two laboratories, minority women are tutored in their qualifying examinations. When they must retake a portion, they are encouraged, consoled, and mentored. In other instances, students report a sense that one's failures are observed by faculty and fellow students, yet one is left in the lurch when it comes to outreach and mentoring. Below is an instance where we can see the simultaneous absence of the symbolic support necessary to have faith in the face of failure and the absence of proper "objective" feedback to prevent the failure in the first place. Here a fellow laboratory mate who reflects on a difficulty experienced by Jocelyn. Note that the postdoc refers to both objective (information, data, and so on) and subjective components to this moment:

- Participant: Another example is. . . you were at the lab meeting weren't you? [Jocelyn] was presenting last time and, ah, she said that she was using a metal mesh and she should have been using a biopolymer earlier.
- KM: A biopolymer is, I don't know what a biopolymer is. . . .
- Participant: Biologically compatible synthetic material. . . [There are people in] that room [that] . . . if we had known what she was doing, at least three of the 8 people in there would have said use a biopolymer.
- KM: Right.
- Participant: Right! So the time she spent on. . .
- KM: . . . figuring out. . .
- Participant: . . . was killing her cells, was a waste of her time. If we had [an] infinite amount of time, you could think about that as a learning process. We all have to have failures in order to learn and that's fine, but these are months of time ill spent and it was clear from her presentation that she was frustrated with this. To me that is indicative of a deeper problem that her research is not going very well objectively and also that's maybe less relevant. What's more relevant is that subjectively for her, her research is not going well for her, her research is not going well. . . . The lab seems to have symptoms of suffering from neglect and that's what it comes down to. . . Well, but, I think that that's, you know, the difference between academics and industry is that I think people in academics don't realize that facilitators are necessary and people don't step up into those roles.

The reader may recall that Jocelyn has already spoken of how in industry her work was valued. The laboratory mate quoted here also makes note of differences between industry and academe in terms of facilitators whose interventions apparently entail both subjective and objective effects. At one level, Jocelyn is out of the informational loop: “. . . if we had known what she was doing. . . people would have said use a polymer.” But there is a simultaneous reflexive side in that one’s sense of competence and feeling that one’s work is not valued here is also implicated. This participant, a hard-nosed science student, talks about a subjective effect as “more relevant” for Jocelyn. As we will see, “neglect” contributes to a positioning that gives Jocelyn a sense that her research is a low priority for her advisor and to questions about subtle racism in the laboratory. Again, “being out of the loop” carries both symbolic social meanings about being valued and recognized and has pragmatic consequences. The fact that the subjective side is perhaps more relevant, at least in the above reflections, is because in the face of cognitive activities where students must face stretches of time when cells die, experiments fail, and programs do not work, there must be resources and a certain symbolic leverage to sustain the student’s cognitive activity.

We have focused on instances when cognitive/academic activities or knowledge transmission intersect with subjective elements in a manner that compromises the effectiveness of the laboratory as a research and learning environment. However, whether one feels valued as a future scientist or as a current member of a learning community can be communicated in a myriad of laboratory interactions. In the passage below, Tamara, whose positioning as an outsider to the laboratory is painfully obvious in the individual interviews, has deflected a question about “shifting”—changing behaviors to suit a situation and keep Whites racially comfortable (Jones & Shorter-Gooden, 2003)—and moved into a discussion of not doing well in the laboratory “objectively” and how she wants to represent the race and not fulfill stereotypes of African Americans being less intelligent. She then speaks of how her laboratory mates are condescending. Malone asks about her response to her laboratory situation, what she does, how she experiences it internally. Tamara responds with this anecdote:

Yeah, I just, you know, don’t, I don’t talk you know, it’s just like okay well, I actually didn’t mean it that way, whatever, you know, I don’t care to explain this situation to you. You know, I mean, even when you know, everyone’s in the lab trying to joke, you know, if I crack a joke like someone will freakin’ respond to it like I’m some kind of idiot, you know, okay, come on, you know, I’ve got news for those people, I’m not a complete idiot, but you know, it happens like that, you know.

Tamara’s comments emerge in the context of being seen as less able as a scientist, but also we see the performative aspect of attribution in an exclusionary act. Tamara talks about making a joke, a linguistic act that deeply depends on shared meanings and recognition of the speaker’s subjective place in those shared meanings. Even at this fundamental level, Tamara is out of the loop: Laboratory members do not get her jokes. Historical and current interactions can lead one to assume that such exclusions are embedded in racist attitudes that still linger in the university setting.

Racialization and Reading Race in the Laboratory

Symbolic invalidation versus symbolic recognition, being kept in or left out of the loop, being or not being valued, can be coded by Black students as motivated by race and racism. No one can be sure that the “invisibility,” or one’s sense of being out of the loop with respect to one’s intellectual contributions, is racially coded consciously. But it is provisionally assumed by a number of participants that many of the themes we have touched

upon are related to race. A master's level student from Africa presents the conundrum quite succinctly. When asked whether she ever felt like an outsider among African Americans, she responds in the negative, at least not at this university. Her remarks slide into the question of how various events get marked as racially motivated:

Participant: I'm not going to lie. If something happens, I'll take an African American's side over someone else's side, and that's just I guess instinctive. . . I mean, there are things that come up and we both [tape inaudible] have stories and most of the time, I'll just be like, I'll just work it out, you know, keep doing what you're doing. Especially like if it's another grad student talking about their advisor, thinking that maybe their advisor doesn't let them do certain things, because they're black. I'm like, you know, don't think about it that way. You've got to do your work, but in the back of my mind, I do wonder if it's a race thing.

Furthermore, there are a myriad of interactions where one must negotiate the issue of race from the viewpoint of majority students. This maneuvering complicates identity formation by foregrounding race in unpredictable ways and in ways that intimate racism and objectification. As Jocelyn said, with regard to changes in her hairstyle, "What reaction are you gonna get? Spoken or unspoken. You know what I mean, from people that um, you know." Mentioned in a focus group, this remark elicited much assent and discussion of White inquiries into hair, overall appearance, and lifestyle. In another instance, Tamara, whose Black peers have teased her about her serious expression, remarks how she feels the White reading of her visage has contributed to her isolation in her laboratory:

Tamara: You know, and being in the lab, uh, my group has about ten people and the lab has about a hundred people in it. I'm the only African American female. You know there's several other males, but I mean; I don't know. I'm noticing in engineering that males are. . . seem to be accepted a lot more than, than female, particularly, black females, you know.⁴

KM: What do you think that's about?

Tamara: Well, I don't know. Uh, maybe it's the engineering environment, I mean, you know, I mean at least they're a man, you know. I don't know. . . But um, I don't know what it is. Uh, I mean, I know that black women aren't portrayed as the nicest people on the planet, you know, and um. . .

KM: Those are the stereotypes. . .

Tamara: Those are the stereotypes and uh, me, I, I, I think I'm a very nice person, but people may not know that because my normal facial expression is, is, is somewhat stoic or, or, or you know, sort of, you know, just kind of I guess it looks sad or, or angry or something, and I don't really know this, you know. So I try to smile more, but I mean when, when I'm working. . . It. . . You know, it's a pain in the neck, because, I mean, technically I shouldn't be so concerned about this. In the same sense, I think it would help me get my work done better having more of a relationship with other people in the lab.

Later in the interview, Tamara expresses how her laboratory mates and PI are surprised when they see her in other contexts where she is vivacious and involved. She is an officer

⁴ This is one reference to the conjunction of race and gender. One other participant talked about gender extensively. She was very light in skin tone. For most African American women participants, gender issues emerged more in relationship to dating and social life not in terms of laboratory life.

in a major Black student organization on campus and highly involved in social mentoring. Her stoic or angry facial expression is apparently seen as intrinsic to her personality. In this way, her isolation is compounded and partly created by her sense that she must sift through representations that characterize her visage in a way that Whites might read differently if she were of another race. As she interprets the White reading of her race, she thinks that being nicer and smiling more would help her work through improving relationships in the laboratory.

For the minority student, reading race is filtered through one's own familial history, cultural representations available outside of science, and through sensitivity to the meanings of those in power or in the majority. For example, in one interview a participant who had finished her classes told of her father's experiences in academe. Her father's dissertation proposal was rejected in the 1970s in a reaction that was obviously prompted by racism. After much struggle, he eventually gave up in the face of such palpable prejudice. She now must reflect upon her own struggles with her advisor's reactions to her ideas for a proposal; their vague feedback stirs memories of her own father's earlier encounter with racism. In an interaction that seemed to be saturated with cultural stereotypes about race and academic achievement, one master's level participant reported being required to take the final even though the syllabus clearly states that all students with an A average are excused from the final. She was a Black student who had an "A" average and was the only "A" average student asked to take the final (to her knowledge). Given this, it is no wonder that race may be the cause in the "back of one's mind."

The results of being positioned in terms of (rarely discussed) racial and racist discourses that impact one's place in the laboratory and one's identity as a research scientist can be quite discouraging to a student. The following is from the final segment of Tamara's interview. Note how her being shaken in her ambitions is linked with race in that the contrast to her current situation is an academic situation in which "people of all different colors" are doing "outstanding" work:

Tamara: It's not like I'm getting my Ph.D., so I can make more money, you know. But hopefully I will make something, you know. I mean it, it, it's for improving the situation, you know, for everyone. You know, that's what the scholarship program I did in undergrad stressed and I believe in it wholeheartedly, you know? It was a very good situation. People of all different colors, sexes, doing outstanding, you know, going to Graduate school and getting, hopefully getting Ph.D.'s, you know. That was the dream. Come here and it's, it, it's been shaken a little bit . . . but it hasn't been shattered, so, hopefully I'll still be able to (laughs) to do that and not, uh, just you know, give up, just like leave.

Once again, we are not talking about an explicit racism, but about how racial meanings are created within a laboratory and carried into educational settings in a way that affects daily interactions, how microinteractions reflect macrodiscourses and the ultimate impact of such layered interactions. Social psychological research gives us confirmatory experimental data regarding nonconscious racism, but the comparisons between experimental results and real time are speculative (Eberhardt, 2005; Nosek, 2007). Nonetheless, implicit codings and patterns of interactions, to which the participants have obviously remained alert, do result in a more densely racialized environment for these women who do not know whether they will be read as a person of color or as a scientist. One is racialized and left to do the work of integration into a "color-blind laboratory" with other persons of color or on one's own. Unfortunately, reading interactions primarily in terms of racism implies that the odds are stacked against one and one consequently has to work twice as hard to prove oneself. Such a situation is discouraging, and Tamara's story line suggests just such discouragement.

Jocelyn: Layers of Exclusion or Identity Formation in Community

The final section gives a brief synopsis of Jocelyn's career as a graduate student and her increasing disenchantment with academics and traditional research. Her issues with being valued, feeling invisible, and tiring of inquiries into her appearance have been presented in earlier sections. Her narrative illustrates many of the themes we have outlined above. When the "internal" or "natural" community of the laboratory is lacking as a resource for identity or one is not able to integrate one's outside community with the research setting where one becomes a scientist, a psychosocial racial barrier is set up. Race becomes both a skin color and a social action. In the ways outlined above, the majority community literally sets you apart. Countering this exclusion, women of color may seek support in outside networks and separate themselves from the laboratory community (Myers, 2002; Tatum, 1997).

Jocelyn, the engineering student who is finishing her dissertation, sets up her laboratory desk at some remove from her mostly White colleagues. Her desk is decorated with sayings of noted Black scientists and scholars. She has spent many years in this laboratory, but she is now looking forward to just getting out. In Jocelyn's literal location of her desk in the laboratory, she reenacts her experience of the community of practices that is her research laboratory and how she has been positioned/positions herself. She has apparently, spatially at least, given up on integrating her racial and research identity within a research one setting. She tells Malone that later she will return to teaching—not, as she emphatically states, at a "research one university" but at a place where there is both teaching and research, where she can bring others along in the field of science.

In an early interview, Jocelyn appreciated the many discussions of diversity in her laboratory. Two of her White peers commented to Malone that Jocelyn had taught them a lot about Black sororities and other aspects of Jocelyn's community. However, in the most recent interview and focus groups, Jocelyn had become less patient. She remarks that she "no longer has the time to educate them." One might recall Hollway's discussion of the etymology of identification wherein there is making of the same within difference. Somehow, in this laboratory, despite what we must assume are the best of intentions, this has not happened.

Initially, Jocelyn was more closely aligned with the laboratory, even if she still indicated subtle ways in which she was excluded from the networking of her peers:

I mean, there's some differences, you know like when I come into the lab, they really like drinking. I don't like drinking. I don't think that's a cultural thing. That's just, I don't like drinking, so they're gonna go to a bar; I'm not going to go. . . You know, everyone in my lab likes Asian food. I don't like Asian food whatsoever; I don't care if it's Thai, Chinese, Japanese, whatever, and they know, they know. They ask me to be polite, but they know I'm gonna decline, so. . . I don't know, that's, that's not a cultural thing, that's just, [Jocelyn] doesn't eat that. And, I think, I think I'm, it's kind of my personality. I just, I kinda just try to go with the flow and I don't try to get too stressed about too many people or too many things. . .

In later interviews and discussion, Jocelyn is more adamant about the issues with her laboratory mates. They ask too much about her hair or culture. Although not a cultural studies scholar, Jocelyn is clear that such inquiries are about a certain racist regime of visibility and an articulation of White discomfort with her difference. She further laments that in academe, she has to do "everything herself" (interviewer failed to follow up here for examples but the laboratory incident with the biopolymer may be illustrative). Although this observation about academe, she notes, may simply reflect her particular laboratory, this doing everything oneself is yet another way of expressing oneself as positioned as an "only one."

As we noted above, in her internship in industry, Jocelyn felt valued, but in her research laboratory, it is a different matter. After her internship, and as she turns to her dissertation, she remarks,

I guess I have a new focus. I am not even thinking about you because you are not in my way of getting my degree so right now as far as I am concerned I have one more year with you and I . . . fine don't listen to me as long as it is not hindering what I have to do then fine. . . I got to the point where I don't want to give my input anyone. I don't care. . . If I have to show up, I'll show up. If you ask me a direct question, I will give you a direct answer. . . but as far as putting input I don't care. . .

Here we can follow Jocelyn's sense of her position in the laboratory, which entails increasing withdrawal from interactions with others. In part, we can surmise the reason. Jocelyn has told the researchers that the laboratory did not seem to listen to her or value her contribution. This is a matter of symbolic recognition. We might also recall that, as told from another's viewpoint, Jocelyn was not in a knowledge transmission loop; the information contained in that loop might have helped her research move more quickly. Jocelyn's academic trajectory and research-scientist identity were further compromised by what she feels were oversights of faculty in mentoring her research (see also Myers, 2002). The lack of mentoring is interrelated with a sense that one's research is marginal to the PI's main interests. This conjunction of no mentoring and marginalized research appeared with other graduate students especially in the advanced stages of getting their degree or when finishing research became more central to their careers. This is when subjective recognition and support in the context of arduous research so clearly intersects with "objective" knowledge production and transmission. Jocelyn describes her mentoring—a topic that implicates one's sense of inclusion and identity within a community:

Jocelyn: Mine was very haphazard. My project, I feel, was just very side—not focused, not a priority. So I did a lot of fumbling and I think that's why I'm bitter.

KM: For whom? When you use those words, for whom was it not a priority?

Jocelyn: For my collaborator, my advisor.

She comments that she brought in independent funding and that because of this her work may have been of less interest to her PI as she is not part of his "bread and butter":

That's not all labs but I think it's a very mature lab and again I don't—in a sense, I'm not needed. My research is not the bread and butter. It's not the major grants. You know, he doesn't need my publications. He's not new and up and coming. He's not trying to make a name for himself. He's kinda winding down and I, my project's not a priority project. It's kind of a, "Oh, this will be cool if it happens and if not whatever. . ." You know, I wasn't costing anything. I brought in all my own funding or whatever. So, then I kinda got left over there.

Note the words "left over there" and the reference to not being needed. These are spatial and emotional metaphors of exclusion and isolation. Near the end of her tenure at the laboratory, Jocelyn discovers from laboratory mates that she gets less face time with the PI than other finishing doctoral students. It is not until the dissertation that she finds out her data are questionable in her PI/advisor's eyes. She exclaims,

I've been presenting this same freaking data at lab meetings. This has been one of my staple graphs . . . and now you want to change it. What the hell have you been doing in my lab meetings for the last year and a half?

Again this experience, although her advisor has been encouraging and a moral support, leaves Jocelyn bitter. The advisor's support is best appreciated within the context of her research. She does not attribute her advisor's seeming indifference to malicious racism, but she does talk about this exclusion being possibly related to race. Here yet again, we see a positioning that occurs at the intersection of race and educational and science practices. Jocelyn says, "Sometimes it's unconscious and they don't know that, that they're not as forthcoming with information as they are with other people. And it's not like they're—you just didn't cross their minds."

Toward the end of her final interview, Jocelyn speaks of the ways minority students are treated within the "science" group that makes up the community of practices (including academic). Do they belong or are they treated as foreign to it? Jocelyn's observations abut against the question of symbolic recognition accorded within and through everyday discourses and practices:

But it looks like the African American community is being more adversely affected by it. There are people who are getting screwed over because some of the policies are stupid and they are very subjective. There are no concrete rules but it just seems like those concrete rules—when you don't have rules, it's easy to bend those non-rules and it looks like the minority population is the ones getting hurt most. There's a lot of people getting hurt but when you look at the number of people graduating in a certain number of years, yeah, you're bringing in all of these African American students but how many of them are leaving with the degree they came for? How many people switched to a different department? Switched to an MBA? Left with a Master's prematurely?

For her part, Jocelyn has disidentified with certain attributes of being a scientist in ways that can be directly tied to her laboratory experiences and research (Carlone & Johnson, 2007; Johnson, 2007; Nosek et al., 2002). It is a painful experience for her to utterly disengage with her laboratory. Our last interview was emotionally intense. Although often angry with laboratory mates, she oscillated on whether you should trust White majority peers and desire their community or keep them at a distance. This oscillation speaks to the question of recognition; it asks whether we can join in a social contract together in the project of science or are we going to be racialized on racial and racist terms.

In a much earlier interview, Jocelyn had made a parapraxis. She had meant to say "tough" skin. She was telling the interviewer that to be at primarily White institutes, one had to have a "tough" skin, but instead she said "diff. . ." as if to say "different skin." Given the interviewer's training in psychoanalysis, she heard Jocelyn's later reference to difference in a slightly heightened manner in that the parapraxis served to alert Malone to some significance in expressing "difference" for the subject. Jocelyn spoke of difference again with respect to race in a manner that had an equivocal meaning. Regarding White peers and their trustworthiness, whether they will assume your difficulties are from "under preparation" or be able to empathize and collaborate, Jocelyn asks, "How do you tell the difference?" Given that she was telling Malone about her experience of racial difference, this question, spoken with deep emotion, can be heard as a matter of "How do you speak of the (racial) difference?" How can this difference be truly integrated into a competitive educational setting like a research laboratory? One might recall that being different or apart and how that is racialized were concerns of a focus group meeting in discussing "special treatment" and how to speak up.

Jocelyn's efforts to read race affect her sense of belonging to a community, her beliefs about the institution's promises to minorities, and her own sense of identity as a research scientist. In addition, her difficulty in communicating her experience within a predominantly

White community (tell the difference) further alienates her from the institutional practices and daily discourses with her White peers and superiors. We would say that the space of Jocelyn's identity formation as a research scientist was compromised by a positioning outside of the laboratory community. This positioning was racialized and marked by a lack of recognition, a sense of not being valued and marginalization of her work. The elements of her experience superseded care for and attention to her development as a scholar and scientist as evidenced by her reluctance to even consider future work in a research university.

CONCLUSIONS

We began this paper with an excerpt from a television series on race where the moniker of the "only one" was ironically relived by a male African American professional. His experiences were presented as not very far removed from the experiences of those graduate students who participated in our study of race and gender in research laboratories. The sense of being the "only one" is not always explicitly spoken, but it is translated into/translates into particular experiences and perspectives that are inherent to identity questions (being the only one is an identity) and to the themes explicated throughout the paper. Being the "only one" is implied in experiences of isolation, but also includes interactions that accentuate race. In interactions that carry this connotation, whether racist, as in blatantly patronizing attitudes, or merely racialized, as in inquiries about hair (Banks, 2000), graduate students are not brought into the general community of learners but asked to negotiate the relationship of race to this community. Therefore, they are logically and discursively separated from it. Such practices and interactions, occurring in everyday contexts such as the classroom or the laboratory, interact with iterations that emphasize the salience of race for these students. In this manner, marginalization and isolation replicate socially the racial divide as skin color, and both White and Black students continue to respond to who looks like them and who does not (Jordan, 2006).

In majority schools, the absence of faculty and laboratory mates who share one's own cultural background, the history of racism, and the strategies, both adaptive and less adaptive, that have been adopted by persons of color to cope with their social/academic environments, can strain the personal resources of minority students (Seymour & Hewitt, 1997). Being the "only one" means a singular struggle for a symbolic recognition that is seemingly taken for granted by others and a struggle for important pragmatic and intellectual knowledge. The continued racial vigilance as a student reads ambiguous peer and faculty interactions combined with a sense of exclusion and indifference eventuates in disenchantment, perpetuating a cycle of a minority student's being the "only one."

With respect to how the question of identity is important to minority students and their futures in STEM, we have already discussed one very essential point: Racial identity is not always integrated into the science identity; this failure is a function of a particular racialization that in turn reflects a discursive and institutional history, an organizational climate and its multilayered impact, as well as particular discursive formations. Previous research and our own study suggest that laboratory and educational interactions can lead to and/or provide the conditions for forming an identity as researcher, professor, and scientist; yet many times we find that underrepresented minorities face identity impasses rather than opportunities to deepen and integrate identities within a university setting. These difficulties in identity integration are one facet of being the "only one," meaning that a person is "one" rather than brought into a community of practice where one is automatically part of "we." Delgado-Gaiten describes the individual effects on minorities who work the terms of identity formation within predominantly White settings:

My life has been a . . . dance in which I have hopped between two clanking bamboo sticks, skillfully avoiding getting a foot severed as I jumped in and out. I have searched to find the space that is a synthesis. . . the borderland or meeting ground that synthesizes my identity, experience, feelings, beliefs, and dreams. (cited in Turner, 2002, p. 88)

Thematically, our narratives revealed that students struggled against invisibility/lack of recognition, being in the loop, racialization, and the integration of their identities. These struggles were often vividly remembered through particular interactions that may not be seen as important to a majority peer or faculty, but perhaps should be. The issues of race as a question posed to the community of practices called a research laboratory complicates the dialectic between the social and the individual and are often best captured in the slightest shift and movements within speech and exchanges (see Brown, 2004, or the “tell the difference” passage above).

We did want to supplement current ideas of identity to suggest that identity and subjectivity are at stake in any utterance and function at a metalevel that is implied but irreducible to any particular marker of identity. To explicate this, we drew upon ideas in positioning theory and tried to show how one’s sense of rights and belonging within a social pact and epistemology are compromised within the processes of marginalization. This dynamic, in tandem with racialization, perpetuates racial exclusions and disenchantment by minorities with university research. It puts the profile of the “only one” into relief.

If identity and symbolic recognition occur within a context and are emergent, such exclusions ask us to deeply reflect on how the everyday practices of laboratories encourage or discourage diversity “on the ground” and the degree to which we can remix the cognitive and social within the research process itself (Sampson, 2000). It is our hope that by drawing attention to these complex issues, faculty advisors, principal investigators, and others can become sensitized and better prepared to decrease the unnecessary taxes on minority students as well as nurture and encourage the continued development of students’ own strategies for success as future scientists.

APPENDIX A

Questions That Started the Focus Groups and Became the Initial Platform From Which Themes Were Developed

1. Why do you seek a Ph.D. (or M.S.)?
2. What are some of the barriers (internal or external), hidden taxes, or accumulated disadvantages that you have experienced?
3. What are some strategies for success? How can we empower ourselves to deal with the challenges that we are confronted with?

APPENDIX B

Typical Interview Questions for a Subject: Individual Interview—First Interview

Please note that not every interview “got” to all of these questions and some questions simply fell flat while other evinced a lively interest, a process whereby we became more assured of our themes. Further interview questions were tailored and so sometimes this typical format was altered.

Background of Research

Jobs at Research 1 Universities. And Research and enablement at all levels. Women and underrepresented minorities (URMs) circulate in postdocs while the number of hires is 0 to 1 in most research institutions. Have a difficult time getting into better positions in higher while at the same time, these better positions are where one can change minds and expand the vision of science. It's a conundrum.

The disproportionately low number of minorities at the full professor level or even at assistant and associate professor levels rose only about 0.5% in the Nineties. So it's a matter of jobs in education to nurture future generations & participate in the research vision.

Our research goals: Some publications that help us think this problem out. Work on a guide for students talking about underrepresented minorities and majority schools—a primer to help with orientation and for majority students to better understand their privilege.

Grand Tour-Type Questions for Participant

So you are in field X. It also looks like you are (noted achievements, awards, & outside activities related to science and education). What is your story, how did you get into Field X? What were the pivotal experiences? When did you know that you wanted to be a scientist? Accomplishments, proudest?

Background information and how you got on current project with current PI: What is it? How did you choose this lab? Who are you in it with? Did they choose this project or not? How did you choose?

You are involved in XXXX outside activities and seem to want to give back to the community. . . How does that go?

Your field is not known for lots of minority presence. What, from your insiders view, is going on with this?

Research Lab Questions

Research labs and your experiences of them:

What are they like?

What makes a good research lab?

Can you just be yourself in the lab? Or is that a luxury of others?

Thematic Questions

- Invisibility
- Proving yourself
- White advantage? Hidden taxes for being black at University X. Do white majority students get it? Have you given up on them?
- Shifting
- Representing the race: Treatment by professors; added pressure (and handling set-backs). Are you often the only black female in a class or lab? How do you find yourself handling white folks discomfort?
- Do you deal with racial myths and stereotypes? If so, how?
 - Walling off discrimination.
 - Fighting it when you see it.
 - Scanning for how one is perceived.

- Dealing with added drama. This is a common theme, but where is the added drama?
- Make sure you don't fit one?

Within the community:

Different sorts of family pressures: a little less financial cushion for black folks.

Different reactions to a black nerd.

Sexual harassment? Do URM's have to juggle different priorities?

Is the sense of service a necessity but also an added burden, e.g. example sororities and community demands?

Good to know/good to show race when applying for scholarships?

Do you feel that the treatment by professors is colorblind or gender blind? Examples of where it is and where it isn't?

How do you decide whether it is a race thing and when to shrug it off?

There is a lot of failure in science. How do you handle failure? Where do you go? What do you do?

Are there tensions between race & gender? In interactions with majority and within the black community?

Where do you turn when things don't go well? Networks of support Is this optimal? Could things be better? Black women and time for self and time for health.

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