Chapter 2. Lifting the Curtain: Working With, and Against, White Institutional Presence in Science

In Chapter 1, I presented a framework for—my orientation to—how I am presenting and analyzing the student experiences in this book. In this chapter, I offer an explication of how White Institutional Presence manifests in STEM disciplinary and educational spaces. I follow this explication with a discussion of mentor understandings of how (if at all) these factors materialize in their work, student orientations to the field, and considerations and applications for this knowledge. This chapter sets the stage for a more detailed look at mentor-student interactions in Chapters 3 and 4 and the impacts on student writing and scientific identity.

A key tenet of critical race theory is that race and racism are central fixtures of U.S. society. They are so endemic to U.S. institutions that they become nearly invisible in everyday practice, creating "institutional and ideological superstructures that are not presented for what they [really] are" (Lefebvre, 1991, p. 349). Bonilla-Silva (2018) notes that racism itself is a "a network of social relations at the social, political, economic, and ideological levels that shapes the life chances of the various races" (p. 18). In order to understand this institutionalized structure, however, we have to begin by acknowledging the White Institutional Presence (WIP) that is pervasive and how it creates space to mask inequity. In her 2010 concept paper on WIP, Gusa examines how White cultural ideology is embedded "in the cultural practices, traditions, and perceptions of knowledge that are taken for granted as the norm of institutions of higher education" (p. 464). Whose histories are taught (Ruiz, 2016)? Whose languages and grammars are enforced (Baker-Bell, 2020; Inoue, 2019)? Whose ways of behaving in spaces are sanctioned? Whose methods of creating knowledge are accepted (Baber, 2019; Collins, 2000)?

Though there are multiple facets to WIP, one of the most insidious is White ascendancy, "the belief that one's ideas, knowledge, values, societal roles and norms, and understanding of history are universally and exclusively correct" (Gusa, 2010, p. 472). To be successful as a member of a given field, one must conform to the dominant ways of thinking, being, and doing. It is "the expectation that all individuals conform to one 'scholarly' worldview;" a worldview that is normed on those who have historically been in positions of power and domination (Gusa, 2010, p. 475) and leaves very little room for a multiplicity of viewpoints or historical experience. In education, and specifically science education, these beliefs, knowledge, and roles are normed according to White, male, middle-to-upper-class values because, historically, that is who has been allowed to participate in these spaces (Kachchaf et al,, 2015; Ong, 2005;)—what P. L. Thomas (2017) refers to as the "white male template" (para. 17).

Though an emphasis on objectivity and the scientific method may lead some to view science as arhetorical and acultural, in reality such an epistemology is a reflection of White ascendancy in practice. Biases are present in the social structures and daily routines of scientific fields: the understanding of scientific professions, their career models, and the effects of tokenism (Bird, 2011; Britton, 2010; Haas et al., 2016;); networking behaviors and professional selection processes, particularly in leadership roles (Hansen et al., 2019; van den Brink & Benschop, 2014;); and the stereotyping and disparaging of women and female qualities (Faulkner, 2007, 2008; Gilbert, 2009;). As Ann E. Cudd (2001) has argued in her ethno-feminist critique of the sciences, in order for science "to be objective with respect to its race and gender biases, it will need to constantly challenge those biases by bringing in scientists from race and gender minorities" (p. 81). This argument needs to be extended beyond representation, however, to include alternative ways of knowing and constructing knowledge (see Baber, 2019, for an excellent discussion of this).

Sexism, racism, and other forms of discrimination can be difficult to identify and change once they have become institutionalized; they become ingrained into everyday practices, as well as a part of assumptions that are unstated and unrecognized. As Cudd (2001) explains,

> Androcentrism infects a scientific theory when the theory assumes that the experiences, biology, and social roles of males or men are the norm and that of females or women is a deviation from the norm. Ethnocentrism infects a scientific theory when it assumes that the experiences, biologically based or socially created physical attributes or medical problems, and social roles of people of a particular ethnic or racial background are the norm and those with other backgrounds are deviations from the norm. (p. 86)

This homogenizing based on White and male experiences and values by default 'others' BIPOC and women by seeing them as an exception to the rule. These biases show themselves in science as epistemic values, argued by Ernan McMullin (1982) to be values "we have reason to believe will, if pursued, help toward the attainment of. . . knowledge" (p. 18). These values include, for example, the belief that simplicity is best in research design or the valuing of quantifiable data over qualitative. Biases also present as non-epistemic values (i.e., deciding which research projects to pursue or fund or identifying practical limitations of methodologies) (Diekmann & Peterson, 2013). Furthermore, not including sex or racial differences in parsing research data in study design and analysis, for example, "creates a situation where guidelines based on the study of one sex [or race] may be generalized and applied to both" (Holdcroft, 2007, p. 2).

Just as Crenshaw (1989) argues that an intersectional approach is necessary in legal spaces to account for compounding impacts of multiple vectors of oppression, so too is it necessary in STEM spaces. For example, research into coronary heart disease, autism, and stroke has predominantly focused on males, despite the knowledge that symptoms of each present very differently in females (Keville, 1994; Lee et al., 2017). Biomedical research studies on environmentally related diseases (e.g., asthma, cancer, diabetes) are less likely to include people of color in their participant cohorts than White counterparts, despite the reality that BIPOC communities are disproportionately affected by such health issues (Burchard et al., 2015; Konkel, 2015; Oh et al., 2015;). In fact, though Black and Latinx individuals make up over 30 percent of the U.S. population, they account for only six percent of the population in federally-funded clinical research trials (Oh, et al., 2015). Thus, we can see from a focus on research interest alone—what is funded and what is investigated—that there are important representational gaps.

Importantly, such value biases extend to the ways individuals and institutions decide how scientific knowledge is communicated and circulated in social spheres. Cherice Escobar Jones and Genesis Barco Medina (2021), for example, used corpus linguistic methods to analyze the conflation of race and biology in medical texts produced by the National Institutes of Health, highlighting the persistence of this conflation despite genomic understanding that race and biology do not correlate. These "bio-racial rhetorics" (as they have named the practice) perpetuate historical myths that there are biological differences between racial groups. Layer onto this a history of objectification, experimentation, and negation (e.g., the Tuskegee Syphilis Study and forced sterilization; Brandt, 1978; Ramírez, 2017), as well as misinformation campaigns, and it becomes apparent how science (and medicine, particularly) have been structured to privilege White, male, heterosexual bodies and diseases as the norm, and all others as outliers.

One need not look any further than the messaging surrounding SARS-CoV-2, the virus that causes COVID-19, and race/ethnicity to see not only the pseudo-scientific information circulated in the public sphere but also the consequences of the resulting distrust (Kreps & Kriner, 2020). In the early stages of the pandemic, for example, rumors circulated on Twitter and in major cities like Chicago and Atlanta that Black people were immune to COVID-19 (Armstrong, 2020). Conflicting information from scientists about mask-wearing and ways to contract the virus exacerbated doubt in many Americans and disproportionately impacted BIPOC communities, as they represent a significant portion of workers deemed "essential" and as such were placed in situations that put them at higher risk for contracting the virus. Throughout the first two years of the pandemic, Black Americans consistently had a COVID-19 mortality rate that was more than twice that of White Americans (Gawthrop, 2022). Combined with predominantly White faces providing the messaging from the scientific community, the result has been both a skepticism of science by communities of color as well as a perception that individuals from these groups do not do science.

In addition to social messages pushing faux science, individuals who pursue scientific fields are also exposed to academic microaggressions in the form of educator and institutional ideologies (discussed in Chapter 3). Such microaggressions present themselves in campus and disciplinary climates (in the form of who is visible, "color-blindness," how racial or gender bias-incidents are handled, etc.), instructional methods and the presentation of knowledge (including the pathologizing of cultural values and communication styles), and instructor beliefs (such as ascription of intelligence, myths of meritocracy) (Cooper et al., 2011). Any and all of these factors can push newcomers away from a discipline or institution. As Keels (2019) has explained, the

> prototypical student is White, male, middle or upper class, and has been validated in educational institutions and in broader societal representations through his life. In sharp contrast, many historically marginalized students come to college with a lifetime of negative interactions with those in positions of power in educational spaces. Those experiences are not erased upon entering college. (p. 16)

In education, WIP is manifested in policies and procedures that take into consideration the needs and resources of the prototypical student and that treat all others as outliers in need of remediation. It also plays out in the moment-by-moment interactions students have with peers and mentors. For example, for first-generation college students, the newness of college and the often-invisible academic expectations can be difficult to negotiate without the aid of a parent or mentor who can serve as a guide. As Keels (2019) noted in her case studies of women of color at a predominantly White university, something as simple as having an adult confirm the difficulty of college work for all students—to advise students to stick with it and not drop out—can play an important role in student success. Similarly, for many students from low socioeconomic communities, the lack of a rigorous high school curriculum or strategies for success can negatively impact their experiences engaging with college coursework. Instructors and peers who do not recognize such differences can unconsciously create environments that reinforce inequitable belief systems where microaggressions exist and where racial or gender performativity becomes an issue.

While I focus on mentor ideology explicitly in Chapter 3, it seems pertinent to take some time here to provide insight into how PRISM mentors conceptualized the culture of the scientific community broadly and the ways in which these practices and policies reified and responded to systemic bias. Doing so helps clarify how students and mentors were oriented to their fields and provides insight into the ways in which systemic bias seeped into the spaces explicitly meant to create access.

PRISM's Response to Inequity

PRISM was created in direct response to the inequity faculty members were seeing on the John Jay campus. There were clear demarcations in attrition based on racial demographics, and it was apparent that students from low socioeconomic backgrounds and BIPOC communities did not have access to the resources needed to participate in non-funded internships or externship opportunities outside of the college. Opportunities for undergraduate research that are common at R1 institutions were outside of the realm of possibility before this program was created.

Until the late 1990s, the institution offered its undergraduate students the opportunity to learn laboratory skills within the confines of specific courses and an external internship only. The support system for undergraduate research was lacking, active mentorship between the faculty and students was rare, and students were exposed minimally if at all to basic scientific research (Carpi, et al., 2013a). As the struggle to retain students in the science major became more and more apparent, so also did the expectations and aspirations of students who were successful academically. The proportion of students pursuing graduate school was miniscule; most saw the program as vocational training and considered their next logical step to be an entry-level job placement as a technician in a crime laboratory. Junior and senior forensics students were failing to see themselves as scientists or capable of getting post-graduate degrees, and many could not see where such degrees could lead them. As a result, a small group of faculty within the Department of Sciences recognized the potential to create opportunities that would increase student understanding of what it means to have a career in the sciences, feel part of the academic and scientific community, and actively engage with the scientific process. It was believed that, by increasing opportunities for mentorship and social connections as well as by building an academic support framework, upper-level students would be more engaged and the institution would see higher incidences of academic success in STEM, including an increase in women and BIPOC students going on to post-graduate programs leading to high-level careers.

As noted in the Introduction to this book, the pedagogical goals in creating the program were three-fold: (a) to facilitate the engagement of students with the forensic science curriculum so as to assist their passage through the major; (b) to increase graduate/professional school acceptance rates and career success for graduates; and (c) to assist in the creation of a professional community that would extend beyond their years at the institution (Carpi et al., 2013a). These goals in-and-of-themselves are laudable. What was not taken into consideration at the time, however, was the systematic, institutionalized racism and sexism that exists in the STEM disciplines as a whole. It was assumed that teaching women and BIPOC students how to conduct research would be enough to increase their presence in the various STEM disciplines the college offers. The onus of discrimination in STEM was placed on individual practitioners—an occasional bad actor—and not the system as a whole. Though there was no conscious attempt to do so, what was enacted was more a program of assimilation than one of acculturation. It would fall on individual mentors to enact the program in more equitable and inclusive ways.

In my interviews with mentors, when they discussed the culture of science broadly, there was enough consistency across program mentors to conclude that they generally saw STEM as being meritocratic. One mentor explained that the only way to develop "street cred" was through publishing papers. For example, when discussing molecular biology, this mentor explained that

> it's a discipline that is much more meritorious than society in general. If you're from a crappy school or crappy, even, country, that doesn't necessarily hurt you. It's the quality of your work. Every once in a while, you'll see a paper in the biggest journals from countries you've never heard of, even, that discovered something really cool and they were really, truly given a shot.

From this quotation alone, it is evident that some WIP persists. While people can recognize that "crappy schools" (meaning, underfunded) exist throughout the US, what exactly is a "crappy country"? If somebody from such a place—somebody from a country we have "never heard of"—is able to publish in a top journal, does that mean that the process is meritocratic? Or, does it mean that that author managed to overcome barriers and find a way through? Though this mentor felt that the system was "not perfect," they also felt that "it's better than society as a whole in terms of how you earn respect." The unconscious assumption this mentor made was that following the rules of how science is done is enough, mirroring scientific ontology that anyone should be able to conduct a procedure and acquire the same, or similar, results *as long as they follow the rules*. But little consideration is given to who makes these rules, how explicit they are to newcomers, or how easy they are to enact.

While all mentors described the culture in ways that emphasized grit (e.g., "you have to pay your dues"), a few drew attention to the ways in which STEM disciplines, broadly, are linguistically biased. To be taken seriously as a member of a STEM discipline, one not only needs to communicate in English ("English is the language of science right now") but also needs to use English in a way that conforms to the "cold, dry style" that is "very matter-of-fact and heavily passive voice." Only one mentor that participated in this study ever claimed a right to "write against the grain"—to push language expectations in scientific articles. Notably, this was a White, male scholar who also wrote for popular audiences. When asked if they also did this, all of the female and BIPOC mentors emphatically said "no"—that was not something they risked.

In a discussion of linguistic bias in STEM fields, Miguel Clavero (2011) argued that scholars who are non-native English speakers "support all the costs of having a [sic] English as a common scientific language" (p. 156). In addition to the extra labor required to learn English fluently enough to communicate complicated scientific concepts, non-native English speaking scientists also are confronted with linguistic difficulties as they relate to publication bias. There are strong correlations between scholars' first language and their publication productivity (see, for example, Man et al., 2004; Primack et al., 2009; Vasconcelos et al., 2008). Similarly, discrepancies in publication rates between women and men continue to be marked. Marc J. Lerchenmueller and Olav Sorenson (2018) found that, in the life sciences specifically, women become principal investigators on grants at a rate 20 percent slower than men, with publication rates and citation practices playing critical roles in the lag. While the roots of these discrepancies are different, both impacted mentors' willingness to take chances in writing because their identities marked them as other.

Despite linguistic bias in the field, though, it was quite common to hear mentors and mentees in PRISM conversing in a variety of languages and dialects (predominantly Spanish and African American Vernacular English). Program and promotional materials, as well as other outward-facing documents, were also frequently offered in both English and Spanish, normalizing PRISM (and by extension STEM) as multilingual. Notably, two PRISM mentors who were *not* part of this study ran a "Minority Women in STEM" program at the college to help break down barriers around gender and identity, as well. None of the students in this research participated, however, as this program was focused on graduate students at the time.

Because "publication is our currency" in STEM disciplines (as one mentor put it), these linguistic and gender differences would seem critical to highlight when teaching and training underrepresented minorities in these fields. Yet, they were rarely, if ever, discussed when it related to writing. Rather, the unarticulated assumptions were that students would need to work extra hard to overcome these biases, not that the biases themselves needed addressing.

Where the program and faculty mentors *did* seem aware of inequity was in regard to access to career models and understanding disciplinary networking behaviors. As part of the PRISM programming, individuals from a wide variety of relevant STEM fields are frequently invited to give guest lectures on their research. Open to all members of the college's STEM community, these guest speakers are intentionally drawn from a wide variety of career sectors to illustrate the many options available to students after graduation. Importantly, these individuals also typically represent marginalized communities in STEM. In this way, students are regularly exposed to people who look and sound like them in positions of power and who can illustrate paths to successful careers.

Similarly, efforts are made regularly to help students acculturate into the ways of participating in and performing at disciplinary conferences, a key locale for professional networking. These efforts are supported at two distinct levels. The first is through an annual symposium that asks students to create and present scientific posters explaining their research (this symposium will be discussed in greater detail later in the book). Through workshops on how to create such posters and strategies for speaking to an audience of varying expertise, students are prepared for their first encounters with academic conferences and often report feeling an increased sense of autonomy and pride with regard to their undergraduate research work. The second, more advanced level of professional networking occurs through preparing students to apply to, attend, and present at regional and national conferences. Through assistance in the preparation of abstracts and presentations as well as instruction in how to apply for conference funding to cover travel and attendance fees, students are encouraged to present their research beyond the immediate college community. In these experiences, mentors also assist students in networking behaviors typical of the field: teaching students how to make introductions and small talk, helping students connect with other scholars, and assisting them in navigating new professional spaces. By providing access to these ways of communicating and performing in a transparent way, students gain access to critical information that contributes to career success: making connections, becoming known, and sharing scholarship with disciplinary experts for immediate feedback. These conference experiences not only can lead to graduate school opportunities and professional positions after graduating, but also provide students an opportunity to peek behind the curtain of how professionals in their field present new scholarship and work on new ideas. Through this exposure, students have opportunities to reevaluate how they are oriented to their fields as well as reconsider their places within them.

By examining program and mentor orientations to their fields, it becomes clear that even in programs designed to increase access and even at institutions that are designated as HSIs and MSIs, systemic bias can remain invisible in important ways. While representation and opportunities to conduct research are important, those efforts can be unraveled if the epistemologies grounding them are not also examined. Understanding the hidden barriers in spaces students are entering becomes a critical part of also understanding the dynamics that unfold as they negotiate their identities and reorient themselves as undergraduate researchers.

Students' Understanding of the Profession: Why Science?

Like their mentors, students were also oriented toward STEM disciplines in particular ways that impacted their development and growth as members of the disciplinary community. Why did they choose science as a career and were they aware of discrepancies within STEM disciplines in terms of racial and gender makeup? These are particularly salient questions for individuals who are largely underrepresented in their fields and do not have immediate role models.

Ruben, a single father who also worked 30 hours a week on a construction site, was very intentional about his decision to pursue science as a career. He began his academic career at one of the partnering community colleges and then transferred to John Jay after two years. When I first asked him why he chose science over other majors available, he was enthusiastic and proud of his choice, saying,

> I think science can benefit society and also can benefit me, because I think science is important. It's invaluable. And I think that's what I [want]. . . to be better and be important. Not as a selfish [sic] or as pride. I just want to be useful.

This altruism was not without its complications, though. Ruben was well aware of the academic challenges that were ahead of him:

> I was afraid at the beginning. I was afraid of math and science at the advanced level, but I realized that I'm sacrificing my time to be in college, so I'd rather do something that is more valuable than just. . . I mean other majors are *valuable*, but I just thought science will open more doors, more jobs, and that's what. . . how I came to a decision to study science.

In addition to being the first person in his family to attend college, Ruben did not have any role models in his personal life who demonstrated for him what a scientific life might look like. Like many students in my study, his exposure to science came largely from television programs and marketing materials circulating in high schools and in the public sphere. As he articulated in our first conversation, pursuing a career in science was as much about mobilizing up the socioeconomic ladder toward security as it was about contributing to the world.

When asked specifically if race ever factored into his thoughts about his career, he responded matter-of-factly: "No, I don't think about race. I mean, I know sometimes it might have an effect. It might have an effect on getting a job or whatever, maybe. But I don't. . . I feel confident enough." Ruben felt strongly that, though there may be discrimination in other parts of the US, this was not an issue in New York City because of its racial and economic diversity. His plan was to complete his bachelor's degree, follow up with a master's degree, then secure a good job.

Ruben was not alone in believing in a narrative of grit. Anne, who identified as a Black cis-female, had come to the college to study forensic science after being inspired by female scientists in television shows like *CSI* and *Dr. G Medical Examiner*. With the goal of becoming a medical examiner, Anne demonstrated a zest for life and learning from the moment we first spoke, noting, "My mom tells me all the time that there's not enough *me* to go around and do all of the stuff that I want to do." Though she was enthusiastic about pursuing this degree and what it might mean in terms of contributing to the world, Anne had absorbed some of her mother's concerns that she might not be ready for the academic work, a doubt that persisted even after her success in coursework. This doubt largely was based in not understanding the expectations that she would face in college. As a result, Anne approached each step cautiously. "I usually just take it one step at a time," she explained; "I feel like every level in life I say that the work can't get any harder than what it is, 'til I actually move up another level and be like [*in a soft voice*] 'Oh my God, it just got harder!'"

Though she claimed to be relatively unfocused prior to college—her professional interests ranged from modeling to photography, ballerina to veterinarian—Anne was committed enough in her schooling to not only attend the top high school in her district but also concentrate her academics on science. Anne's schooling was based on the British system, where students take all subjects for the first three years, then begin to "stream" according to career desires and aptitude. She earned her "O-levels"[5] in biology, chemistry, and physics. Rather than continue into the more advanced "A-levels," which are prerequisites for attending a university in the British system, Anne chose to leave school at 16 and move to the United States with her mother. Because of the differences in the schooling systems, Anne's mother wanted her to repeat high school in the US, but Anne resisted, agreeing only to "redo it" if she was not accepted into college. Her acceptance into John Jay ensured that she would not need to "backtrack." It also ensured an affordable education. Two of the key reasons she attended the college, rather than other schools that offered similar degrees, were because it was "cheaper" and because the proximity to home meant that she would have family supports. "I really can't support myself," she joked, "and I can't cook. So I need to stay home—or somewhere close to home—because I need to eat."

Like Ruben, Anne was unconcerned about discrimination in scientific fields at the start of the study, though she was aware of differences in terms of gender and racial representation:

> I mean, from what I see, I think it's mostly Caucasian people. Maybe I'm not looking hard enough. I could be wrong. But what I have observed so far, I've never seen a Black teacher [in science outside of John Jay]. So maybe this is not because of race, but I feel like Caucasian people are more fortunate, they tend to pay for med. school easier than if. . . for a person who's my color. And then people who are my color are not really that smart. We might be smart, but we tend to be stupid, as well. I don't know if you know what I'm getting at. Like, they make wrong decisions.

As Anne continued to talk, it became clear that the "wrong decisions" she was referring to had more to do with Black people's understanding and accepting the cultural negotiations of academia than they did with inherent intelligence (a conflation of race with socioeconomics). These decisions had to do with their ability to successfully navigate a system that was not familiar and with less preparation than their White, middle-class peers. Some of these so-called poor choices involved things like choosing a different career path because of fear, difficulty, or prejudice, as well as not being willing to adopt the ways in which particular fields operate. Like Ruben, Anne felt discrimination was a nonissue at John Jay because of its diverse student and fac-

5. O-levels in the British system are the equivalent of general requirements to graduate high school in the United States. A-levels are on par with Advanced Placement coursework, though slightly more rigorous.

ulty body as well as its location in New York City. To Anne, gender and race were not an issue because everyone was already so different from one another.

While Natalia and Amrita had similar reasons for pursuing degrees in science (i.e., contributing to society and mobilizing upward economically), their understanding of inequity in the larger disciplinary community was different. As Amrita, an Indian American woman, explained, the diversity of the college created a space where discrimination was not an obvious issue, but it seemed like an issue elsewhere:

> I think it's lucky that we're in a school like John Jay. I think John Jay probably has one of the most diverse [groups of] professors. I think it actually becomes an issue when students are *applying* to outside graduate programs or—I don't know about jobs, but graduate programs are. . . From what I hear, it's rare for a student from John Jay to be accepted at Harvard, Yale, or you know one of *those* colleges.

Natalia, a first-generation Latinx woman, similarly approached her collegiate experience with eyes wide open. In addition to providing important content knowledge and training in research methodologies, her high school courses also offered a critical ideological lens to science fields that seemed poignant for an inner-city school:

> My teachers would always tell us, like, you know, "Here are opportunities that you can take, so take them because this is the time when you're going to learn more and see." [....] I remember being told, like, women in science was just starting to emerge now. Like, it's usually men who are in the field, who are in abundance, and then a really—few women are able to succeed in the field. And, I thought, like, "Wow, why?" And, you know, that question has always been on my [mind]. . . like, why is it that women aren't able to progress in STEM fields? And *me,* since I'm a woman, too, trying to pursue a science major. . . That question is just in my head. Why is it that women are underrepresented in the STEM fields?

One of Natalia's teachers in particular emphasized the competitions in which students at the school were eligible to participate. As Natalia explained,

> She would want to get a lot of us into competitions. . . and there were some that were only for women. . . .She would always motivate the females in the room to participate in these competitions and not let that stop us from expanding our wings.

At the same time, Natalia explained, this teacher emphasized discrepancies in race/ethnicity: "I guess that was just her way of motivating us to keep going with our research. [She pointed out] the *minorities* . . . how they—how *we*—would be called in the STEM fields" and encouraged participation. Interestingly, Natalia did not recall instances in which discussions of the double bind of gender and race/ethnicity were explicitly discussed, nor did these arise in her high school internship experiences. By the time she and I began to speak, though, Natalia had grown quite aware of the double challenge she faced as both a woman and a member of the Latinx community.

As was briefly explained in Chapter 1, counterpsaces can play critical roles in enabling marginalized individuals to push against dominant narratives of exclusion or inadequacy. One of the most immediate ways in which counterspaces are enacted is through representation. Among the participants of this study, 38 percent of faculty mentors identified as Black, Latinx, or Asian. From the outset, Ruben, Anne, Natalia, and Amrita each saw themselves represented within the PRISM community, even if such representation was not as clear in the wider STEM disciplines. While not directly counteracting Ruben's and Anne's beliefs about grit, seeing themselves represented in a community of successful scientists contributed to the process of narrative identity work—the "process through which individuals or collectives give meaning to themselves and others through narratives" (Case & Hunter, 2012, p. 262). Counterspaces become important places where narratives about marginalized individuals can be contested, where members can push back against the "pejorative societal representations related to these individuals and their reference groups" (Case & Hunter, 2012, p. 262). Natalia saw herself clearly represented in the faculty, specifically choosing a female mentor who not only was a faculty member but also was raising a young family—a future Natalia envisioned for herself. Amrita, likewise, identified with her mentor as someone who, like her, understood how to get things done.

Up to this point, I have presented the initial disciplinary orientations of the students of color in my study. Equally important to consider are the perceptions of the two White women—both from low socioeconomic backgrounds and both first-generation college students. Chloe, who was interested in biology as well as forensic science, travelled two and a half hours each way to attend classes. Like Anne, she chose the college because of its affordability. Though originally she had wanted to attend a school in Boston, commuting from home was the "more affordable" option, even with the cost of daily bus tickets. Despite being in the honors program, Chloe struggled to see science as a discipline she could pursue, largely because of the costs and rigor of graduate programs. She pursued undergraduate research only as a means of fulfilling her requirements to graduate: "It's just easier for the fact that I don't have to commute to the city, then all over the city for an internship or something. It's just easier to stay at John Jay."

Chloe's orientation to scientific research was such that she expected to struggle, and she saw limitations to *who* can be a scientist (largely connected to economics and status). "It's not just like a high school lab," she explained; "it's a little intimidating because you're working with people with their PhDs and you're just the little undergrad." But at the same time, she was "excited" about the opportunity to be part of a research laboratory doing important work:

> I feel like, if you *can* be in science, you should use it for *good* science, and use it to help people. Like [my mentor] is doing. She's using this research to maybe guide doctors in some type of treatment. I feel, with science, you're supposed to help people, or you're supposed to help the planet. You're supposed to help with *something*. It sounds ridiculous to me to get some type of education and then just use it to make money.

Like Ruben, Chloe's altruism was palpable. As she explained to me, she felt enormous pressure from her immediate family to "go for something that will make money," but her desire to contribute to the good of the whole could not be suppressed. Also, like Ruben and Anne, Chloe's experience with regard to discrimination in science fields was limited. Chloe was aware that her mentor ran a program at the college for BIPOC women, but it was not something that was open to her as a White woman. "It's not something we usually talk about," she explained, "but it would be cool if we did. Actually, I hear more about stuff like that in my Lit classes. . . Like, the pay gap between women and men." Her only recollection of gender being discussed in the context of science was when a class discussed the discovery of the double helix: "The main thing the teachers even mention (and it's only briefly) is Rosalind Franklin. That's usually during lecture where they'll say, like, she was a brilliant scientist and didn't get the credit she deserved. But that's basically it." Race/ethnicity was never discussed.

As a computer science major, Madalyn's orientation to the field was slightly different from Chloe's. She had earned a degree in art at another institution years earlier, despite her interest in and aptitude for programming. For her, gender discrimination in computer science was far from hidden:

> I don't know if it has to do with being female. I think it does a little bit because I was very good at math when I was in middle school, and I had no problem understanding what I was looking at. I think when I got into high school, I got a little bit more self-conscious and wasn't interested in it, maybe, and then just stopped paying attention. I got okay grades, but suddenly I felt like I hated math. . . . When I went to college the first time, I was in art school—but it was an art school in a big technical university, so there were lots of [computer] guys there. They were just really unfriendly, socially awkward, kind of mean to girls and stuff. I just associated computer science with people who never got out and just liked playing video games—that sort of thing. I guess I just put it out of my mind. But at John Jay, there's quite a few girls in the computer science major. Girls who are

> not dorks; who actually have social skills and are friendly. . . . I think there're a lot more girls that are interested in computer science and math and engineering, now, or that are pursuing it. They're encouraged to pursue it more now than in the past. It's just that [attending art school and then pursuing science] was a roundabout way of coming back to what I was originally interested in. I'm not blaming anybody. . . I don't regret having an art background and I feel like that's actually helping what I'm doing. It's enhancing what I'm doing.

Madalyn continued to speak about her experiences with computer science at the college, noting that students were not as competitive with one another as she had seen at other institutions, that they supported one another, that the faculty was diverse and there were female instructors (though mostly adjunct) who taught the computer science courses. But she was not completely naïve to the realities of the workplace. She explained that one of her female student colleagues at the tutoring center was also a computer science major:

> She's told me how she's encountered quite a few professors that she said were sexist and were trying to give her special treatment; were trying to make assignments easier for her and giving her easy As. She wasn't respected for her abilities. A lot of guys don't like the fact that there are girls learning how to program. They're very possessive over it and resentful. She's encountered a lot. When she has to work in groups, people will try to talk over her or she'll offer a comment or advice and nobody will listen to her. That sort of thing.

Despite these different orientations to the field of science broadly, none of the students in my study interpreted possible challenges and difficulties as being *institutionalized*—as something attributable to anything other than the residue of past discrimination, the rigor required to do good work, or the occasional "bad" instructor. They did not recognize how racism, sexism, or class could be woven into the fabric of how a community functions, its norms, or its discourse. All ascribed to a narrative of grit—if they worked hard enough and proved their abilities, they would be successful. There was no recognition that working hard might mean having to work *harder* than their White, middle-to-upper-class, male peers. Aside from Anne, none were aware that there might be differences in their academic preparation that could impact their performance; any fears about skill with math and science had been internalized as personal deficits. The invisibility of the reasons behind existing disparities meant that very few ever interrogated the *why* of it. It became too easy to make a false connection between lack of representation and lack of ability: "There aren't a lot of women and BIPOC in science because they aren't interested or capable." This thinking impacted not only how these student participants engaged with scientific spaces and artifacts, as examined in Chapters 3 and 4, but also how they navigated academic spaces broadly.

Considerations and Applications

It is easy, in the process of living our daily lives, to not notice what does not affect us as well as to attribute obstacles to causes other than what is truly responsible (much like we can talk away the symptoms of sickness as being due to stress or weather changes). It isn't until the challenges accumulate enough to create noticeable discrepancies that we begin to realize something is not right.

In this chapter, I have examined the ways in which White Institutional Presence has been institutionalized to the point of near invisibility as well as presented the orientations of program, faculty mentors, and students to STEM, broadly. In this exploration, I have also begun to unpack why it is necessary to turn our magnifying lens back onto ourselves, higher education, and our pedagogical and disciplinary practices. There will always be individuals who persist despite the added barriers, who will be held up as examples that anyone can accomplish anything if they have enough grit. But as educators, we must stop and ask ourselves why so many others do not make it through and what psychological effects linger as a result of that added hardship. We must ask ourselves what our pedagogical and disciplinary practices accomplish, where they might cause harm, and whether they can be accomplished through alternative approaches.

This chapter has largely served as the foundation for understanding the ways in which the day-by-day interactions between student researchers and faculty mentors impact not only disciplinary literacy in terms of understanding content and ways of knowing and being but also rhetorical skill development as a way of enacting disciplinary identity. In order to enact effective change, however, it is incumbent on members of disciplinary spaces to take stock of their practices and think about what will happen when students leave our classrooms and laboratories and begin to interact with other members of the discipline. How can disciplinary members change publication and review practices in their fields, for example? Or support female faculty as they transition into their own laboratories? This work needs to go beyond simply providing stipends and opportunities to do research. It needs to incorporate strategies for navigating hostile spaces when they are encountered and making meaningful changes when in positions of power.

Lifting the curtain on systemic bias is not only for the benefit of BIPOC and female students. Because of the invisibility of systemic bias, it is even more critical to do this work with White, male, and otherwise privileged groups who will not feel its effects. As part of educational frameworks, it is important to normalize examinations of the history of scientific practice and knowledge-making. Discussions about how research agendas and funding decisions are impacted by bias can be interwoven into methodology coursework and laboratory instruction.

Recognition of White language supremacy and linguistic bias in publishing can be integrated into discussions about how research findings are disseminated and can also be taken into consideration when designing disciplinary writing assignments and assessment rubrics. Explicit acknowledgment of gender bias in both publishing and career advancement can be incorporated throughout a curriculum as can discussions about how to circumvent and dismantle such barriers. Avoiding discussions about the ways in which bias is systematized in disciplinary spaces only reinforces their invisibility, leaving it to students to interpret struggle as the result of an internal deficit.

In the next chapter, I extend the investigation of WIP in laboratory spaces through a lens of race-evasive ideology and microaggressions, continuing considerations of application. Race-evasion, or "color-blindness," allows meritocratic thinking to persist and for programmatic band-aids to be applied repeatedly without ever addressing the wound. Race-evasiveness also allows people to attribute differences in performance and ability to the individual, rather than to the systems in which that individual was raised. Because of this individualistic thinking, small slights or indirect, subtle remarks and actions can wear away at students' disciplinary identities and impact both their orientations to their fields and how they position themselves within those fields.