Chapter 3. The Psychosocial Costs of Race- and Gender-Evasive Ideologies

In the previous chapter, I presented White Institutional Presence (WIP) (Gusa, 2010) and discussed the ways in which it manifests in STEM educational spaces broadly and PRISM specifically. I also presented the orientations to STEM disciplines held by mentors as well as the research participants as they entered the program. In this chapter, I take a closer look at how these forces impact instructor ideologies and pedagogy and their effect on student writing and identity.

In his 2002 article, "The Linguistics of Color Blind Racism," Bonilla-Silva argues that "color blind racism, the central racial ideology of the post-civil rights era, has a peculiar style characterized by slipperiness, apparent nonracialism, and ambivalence" (p. 41). Color blind ideologies—or, to avoid ableist discourse, *race-evasive* ideologies—are those that position skin color and ethnicity as irrelevant or insignificant while ignoring the institutionalized systems that create and continue to reinforce racial inequality. They include the ideas that education is politically neutral and devoid of culture (Gay, 2010; Giroux, 1988; Shor, 1986), that to acknowledge difference is to reinforce divisions or to offer unfair advantages (Dee & Penner, 2017; Delpit & Dowdy, 2002), and that to cater to difference among student populations is to place barriers in their path toward successful assimilation into mainstream society—a belief that also rebuts the idea that to succeed in the mainstream often means mobilizing toward Whiteness, male-ness, and middle-classness (Gay, 2010). These myths and misconceptions are the primary evidence Geneva Gay (2010) uses to support her argument that many educators—no matter how well-meaning—are "culture blind" and see "color-blindness" as a positive thing (p. 22).

Such ideologies manifest in language, pedagogy, and curriculum. Scholars such as Geneva Smitherman (1986), Keith Gilyard (1991), Jacqueline Jones Royster and Jean C. Williams (1999), and Vershawn Ashanti Young and colleagues (2018) have well-interrogated White meritocratic discourse in educational settings, including its impact on self-conception, academic performance, and educational policy. In their examination of White students' race-talk at a PWI, for example, C. Kyle Rudick and Kathryn B. Golsan (2018) identified how students' descriptions of "civil" academic discourse marked race-evasive ideologies as hallmarks of being a "good White person," which included the "expectation that students of color should talk like White students," emphasize race-based similarities over differences, and conform to expectations about what constitutes proper behavior in academic spaces (i.e., how individuals occupy space) (pp. 6-8). Mya Poe (2013), Asao B. Inoue and Poe (2012), Genevieve García de Müeller and Iris D. Ruiz (2017), and Staci M. Perryman-Clark and Collin Lamont Craig (2019) have also examined the impacts of discourse through studying

the enactment of language instruction and assessment in writing programs and coursework.

Important to highlight is that race-evasive ideology is not necessarily a *conscious* mindset. While adopting a meritocratic stance—"You've made it to college, so you should be able to do these things"—ignores the systematic hurdles students have navigated to reach this point in their academic career, it is a common belief that permeates higher education. One part of race-evasiveness is believing that everyone entering college is at the same level and has had the same cultural resources, opportunities, and preparation. Ignoring or being unaware of systemic barriers that disproportionately impact BIPOC students constitutes race-evasion, just as ignoring or being unaware of barriers that disproportionately impact women is gender-evasive and those of first-generation and low-income students is class-evasive. These common and subtle forms of racism (and sexism, classism, etc.) form microaggressions that are, as Peggy C. Davis (1989) noted, "stunning, automatic acts of disregard that stem from unconscious attitudes of white superiority and constitute a verification of black [and female] inferiority" (p. 1576). Unchecked, microaggressions become part of the campus' racial and gendered climate and have negative impacts on academic spaces and underrepresented students (Solórzano et al., 2000).

Undergraduate research is often argued to be an important tool for retention and persistence initiatives for underrepresented students as well as for increasing disciplinary diversity. This thinking, though, necessitates that we imagine research as a space that is empowering and equal, that recognizes difference as power, and that is not *only* for the "exceptional" student who already sees a place for themselves in the field. When faculty members are working with underrepresented students in their disciplines, these considerations can become more salient—not because of any deficits in the student but because to ignore difference is to perpetuate inequity.

When students come to classrooms and laboratories, they bring their inquiry and enthusiasm; faculty mentors and educators bring research and expertise. By default, in these situations, a "third space" is created (Bhabha, 1994; Gutiérrez et al., 1999; Moje et al., 2004; Soja, 1996) that also includes "different instructional, home, and community knowledge bases and Discourses that bear on classroom [and laboratory] texts" (Moje et al., 2004, p. 41). It is important to think actively about these third spaces because there is a lot more going on there than people often realize. There is culture. There is ontology and epistemology—the ways people view the world differ from discipline to discipline and community to community. There is prior knowledge and history: history of the discipline, of the student's experience in academia, of the mentor's experiences as both a student and educator. As Moje et al. (2004) have argued, if the "social nature" of these different spaces are not acknowledged, "then the knowledges and Discourses generated in each seem to take on a life of their own, as if they are somehow natural constructions that exist outside human interaction and relationships" (p. 41).

These third spaces can function in multiple ways, but for the purposes of this chapter, we will consider them spaces with the potential to build bridges between communities (Gutiérrez et al., 1999), to cross disciplinary boundaries (Lemke, 1990; Moje et al., 2001), and to challenge dominant discourses (Barton, 2001; Moll & Gonzalez, 1994). When race-, gender-, and class-evasive ideologies persist, however, they form a disruption to this bridge-building and disciplinary understanding potential. Treating language as though it exists outside of communities is problematic for individuals from historically underrepresented groups because it does not recognize the socially constructed nature of discourse and reinforces WIP.

Disciplinary Literacy and the Construction of Excellence

When students are not aware of the ways in which systems of oppression impact how they engage with institutions of learning and disciplinary spaces, they often internalize challenges as being deficits within themselves. While I will explore what happens when instructors share such race- and gender-evasive ideologies later in this chapter, it is important to begin by looking at how in the early stages of undergraduate research systemic bias impacts the very mechanics of networking and gaining access and how that impact can affect disciplinary literacy.

Deborah Brandt (1998; 2015) has made clear and convincing arguments about the social aspects of literacy development, noting the roles sponsors play in regulating, sanctioning, permitting, and allowing access to the materials and spaces where such learning can take place. "Literacy," she argues, "like land, is a valued commodity in this economy, a key resource in gaining profit and edge" (1998, p. 169). For decades, there has been a recognition that STEM literacy is unequal across gender, racial, and economic categories, with a particular focus on access. When considering the "pipeline" students follow in STEM education, there are clear activities that often receive attention as being worthwhile in assisting retention and persistence of women and BIPOC students (despite outcomes being questionable regarding effectiveness). Such activities include increased programming around science and math in K-12 settings, networking and mentoring opportunities for high school and undergraduate students, and curricular support in math and science to aid students in strengthening needed skills. While such programs *do* play important roles in building access and opportunity, they ignore the systemic biases that are built into the epistemologies and practices of the STEM disciplines, and it is often expected or assumed that students who persist to the undergraduate research level have developed enough disciplinary literacy to be successful as junior members of the field. There are, as Cornelius Minor described in an interview with Sarah McKibben (2020), "pernicious ideologies" that persist in academia—ideologies that hold that when students reach a particular stage in their education, there are certain concepts they should know and certain behaviors they should display that reflect gratitude and deservedness of the

opportunities afforded them. These ideologies become particularly salient when working with underrepresented individuals in STEM fields.

Some faculty mentors in this study, for example, expected students to "show initiative" and have clear goals of working toward graduate school. Students who were unclear of their career and academic possibilities, who were not entering the door articulating strong aspirational intentions, were dissuaded from "taking a spot" in the program. The intention behind this thinking was that students who *know* what they want should be provided the opportunities they need—with the unintentional consequence that those unsure or not already seeing themselves as worthy were left behind. By creating something "special," the program was also creating something exclusionary, replicating existing meritocratic systems.

While undergraduate research has been widely lauded as a high-impact practice that is transformative for STEM students, programs that provide undergraduate research opportunities are resource-intensive programs, requiring significant institutional costs—everything from preparing faculty to work with undergraduate students, to preparing students for the work of a real-life laboratory, to creating physical spaces with access to machines and materials for conducting research. R1 institutions benefit from economies of scale in hosting such programs due to increased funding opportunities, lower teaching loads, and higher prestige; HSIs and MSIs are among the least prepared in terms of financial support and laboratory infrastructure to offer such experiences to students (National Center for Science and Engineering Statistics, 2015). While institutional designations such as HSI and MSI means that these institutions can apply for racialized federal funding through programs like Title III and Title V (through the Department of Education), it also means that other non-racialized funding resources are much harder to secure. Further, as Nicholas Vargas (2018) notes, institutions with HSI status have "increased fivefold over recent decades, leading to greater competition between them for these racially designated resources" (p. 1). Vargas further highlights how, even amongst institutions designated as Hispanic-serving, those with "larger white and smaller Black student bodies are more likely to receive competitive funds" with (oddly) the proportion of Latinx students having no noticeable impact (Abstract). Such discrepancies—which Vargas noted are historically rooted in racial composition—reinforce existing disparities, and predominantly upper-class students preferentially benefit (Vargas & Villa-Palomino, 2019).

The uniqueness of a program such as PRISM existing at an urban, public HSI/MSI was not lost on the students or faculty. An aura of specialness surrounded the program and those who were admitted. Access to the program, for all of the student participants in this study, was considered an honor. While being part of something unique and special was used to bolster students' sense of worth, it also had an unintentional consequence of creating an atmosphere of expecting "transactional gratitude." In an interview with McKibben (2020), Minor described transactional gratitude as follows: "In most academic spaces, there is a

silent pact that teachers make with students: *I will agree to teach you well if you demonstrate to me that you are thankful for it. And if you do not demonstrate to me that you are thankful for it, I will withhold quality teaching from you*" (para. 10). On its surface, when faculty members are giving up research time to mentor newcomers, this expectation seems reasonable. Unlike in a classroom, students are not required to participate in undergraduate research and, as such, if they do not seem interested or willing to do the work (i.e., demonstrate thankfulness), then mentoring is not a worthwhile use of a faculty member's time. Problems with this ideology occur when our expectations of what constitutes engagement or thankfulness is normed on traditional STEM students.

One of the ways in which thankfulness presents is in the reading and writing work students do on their own time. Students who came to meetings with mentors having conducted some research into the work of the laboratory were interpreted as students who "put in the work" and showed initiative. Engagement with scholarly research translated as interest and preparedness. A discussion of how this plays out with students is offered later in this chapter, but it is important to note here that this ideology of being grateful for an opportunity like PRISM had immediate impacts on how students were positioned within the laboratory. Were they going to require a lot of "hand-holding," or could they be assigned low-stakes tasks right at the start? Did they need guidance on how to find and read peer-reviewed scholarship, or could they be given a topic for a literature review and be left to their own devices to work on it?

Connected to this positioning of academic-preparedness-as-thankfulness are considerations of race and gender. In their research on the experiences of Black women with the "white gaze" in the workplace, Verónica Caridad Rabelo and her colleagues (2021) diagram the ways in which "display rules" (ways of occupying and performing in spaces) are normed on Whiteness, focusing specifically on the ways in which Black women are consistently misread in professional spaces. For example, assertiveness in Black women is read as aggression (as in the Angry Black Woman trope), beauty standards and professionalism are based on Eurocentric aesthetics, and a lack of regular smiling is read as being threatening. While the students in this study did not consciously encounter these specific challenges in their PRISM laboratory experiences, some *were* regularly misread in ways that were similarly harmful.

Anne, for example, was a shy, young Black woman who was taught not to inconvenience her elders. She saw her mentor as a busy researcher who should not be disturbed unless necessary (someone who "had more important things to do"). As such, Anne would try to work out her research problems independently or wait until she had reasonable access to her mentor, Dr. Meijer. Dr. Meijer, however, read Anne as a student who required significant direction and supervision. At one point early in the study, Dr. Meijer commented that Anne did not seem to know what she was doing or why—a message that Anne received and internalized as evidence of not being ready for undergraduate research. This disconnect

impacted everything in Anne's research experience—from their conversations about the scholarship Anne was reading to her physical access to the laboratory and materials needed for her project. As a result, Anne and Dr. Meijer pulled further apart rather than building a mentor-mentee bond.

As Marieke van den Brink and Yvonne Benschop (2012) outlined in their examination of gender and academic excellence, "excellence" is constructed on the spot through the recruitment and selection of individuals to be part of competitive programs and opportunities. This selection often relies on faculty and students having prior relationships (e.g., the student having taken a course with the faculty member), the student being known as a high-performing individual, or the student being friends with another peer who is already a member of the faculty mentor's laboratory (and who can serve as a reference). Selection is also impacted by a student's interest in pursuing graduate school, the amount of time they can devote to research, and their academic performance. At the time of this study, PRISM students were required to have successfully passed Organic Chemistry II, which served as a gatekeeping course (this requirement has since been changed to introductory courses), as well as have a grade point average of at least 2.5. Most mentors interviewed for this study reported having prior relationships with their mentees, primarily through coursework. At least half of the mentors reported self-selecting (inviting) students who did well in their courses to apply to the program.

This construction of excellence—who is *seen* as being an excellent student and potentially excellent undergraduate researcher—was based largely on academic performance and the performance of gratitude. There was no evidence that this selection process was impacted by physical appearance (gender, race, or class). Yet, that does not mean that the meritocratic thinking did not prevent mentors and program administrators from participating in "the production and reproduction of possible inequalities" (van den Brink & Benschop, 2012, p. 513). While I will investigate performativity as it relates to race, gender, and science in Chapter 4, it is worth noting here that it is in these relationships and in the interpersonal exchanges between mentor and student that messages about self-worth, belonging, and aptitude are conveyed.

As students enter undergraduate research, their mentor (and the program) becomes a literacy sponsor. As Brandt (1998) explained, when students move into new academic and disciplinary spaces, they are forced

> to consider not merely how one social group's literacy practices may differ from another's, but how everybody's literacy practices are operating in differential economies, which supply different access routes, different degrees of sponsoring power, and different scales of monetary worth to the practices in use. (p. 172)

In order to succeed in undergraduate research, students need to recognize that certain ways of communicating are expected of them. Part of the value of stu-

dents participating in undergraduate research is that it provides a space for them to adopt and practice the reading, writing, and ways of knowing that are enacted in disciplinary spaces. Through access to a mentor, they gain access to knowledge of the disciplinary community: the forms of knowledge valued, the processes of inquiry, the rhetorical moves privileged, and the physical space and materials to engage in research activities. In this way, mentors become powerful literacy sponsors with regard to their discipline—i.e., they recognize that role as belonging to them. Strong relationships between mentor and mentee, where understanding is demonstrated regarding meeting students where they are (as opposed to where they "should" be), builds commitment and obligation to the URE and, as will become evident in the rest of this book, affects "what, why, and how [students] read" (Brandt, 1998, p. 198). A lack of commitment or obligation can lead to detachment and attrition.

How Mentors Learned to Read and Write as Scientists

In the early phases of this research study, I interviewed ten faculty mentors[6] in PRISM about the reading and writing practices of scientists. In addition to discussing the ways in which they learned to communicate in their respective fields, our conversations explored how that translated into their teaching practices. This section explores the ways in which these orientations to scientific discourse aligned with, or counteracted, White meritocratic discourse in science disciplines and, by extension, these mentors' pedagogical thinking regarding discourse instruction.

Of the ten mentors interviewed, all of them reported never having any form of formal pedagogical instruction during their graduate and postdoctoral career—none of them ever had a course related to teaching or a course related to scientific writing instruction. Eight out of ten of the faculty members reported that they learned to read and write as scientists in what they referred to as "the traditional manner."[7] They were told to write something—an abstract, a proposal, a paper summarizing results, etc.—and were given no instruction on what that was supposed to look like. They went off and did the writing, then received critical feedback after submitting to an advisor. Usually, that feedback was in the form of: "You're doing it wrong. Do it again." Or, in some cases, they received a lot of red marks on the page "correcting" their writing. Through trial and error, over time, they learned how to communicate in a way that was ac-

6. Demographically, 40 percent of these mentors identify as male, 60 percent as female; 50 percent identify themselves as White, with the remaining 50 percent identifying as Black, Asian, and Latinx.

7. The use of the terms "traditional" and "nontraditional" refer specifically to how *scientists* learn the discipline and disciplinary discourse—this is the way these faculty members talked about writing. It is not reflective of traditions in writing studies.

ceptable to the scientific community. It is important to note that this was not a positive experience for many of these faculty mentors. The emotional trial this traditional learning process took on some of these scholars was traumatic. One mentor described the writing experience during her doctoral studies (which is where all of her science writing training came from) as a process of "ripping all of the confidence out of you."

Within the group who had traditional training in scientific writing, a portion had moments that disrupted the traditional approach—positively and negatively. The mentor who described herself as having all of the confidence ripped out of her as a writer had a member of her dissertation committee step in during the 11th hour to provide intense writing instruction. She said he sat beside her and they went through the text, line-by-line, to edit her thesis so that it would pass, and she credited him with providing most of her training in scientific writing. Others in this category noted a moment when a peer or a faculty member took time to break down the components of a specific writing project or provide genre instruction, such as the format of a scientific paper, for example. But other than these exceptions, in general, these faculty mentors had a traditional learning experience with regard to scientific writing. The remaining two faculty mentors—notably the mentors for Ruben, Natalia, and Amrita—had received what they referred to as "nontraditional" training in scientific communication. This included explicit instruction by a mentor on how to read scientific articles and extract information as well as on writing in various scientific genres and even included course supplements that focused specifically on disciplinary writing.

The two faculty who had a nontraditional writing education expressed positive relationships with the writing process and stressed the value of writing to scientific work, both in cognitive terms and communicative. For example, one faculty mentor spoke about the relationship of task-oriented writing (lists, etc.) to the final report or paper's organization, emphasizing the need to convey the *story* of the research. Another spoke about the implications of writing skill on a scientific career, equating the ability to write well with competence as a scientist.

When comparing the mentors' learning experiences with teaching, I noticed an interesting shift. Fifty percent of all faculty interviewed were using nontraditional teaching approaches for science writing instruction, such as guided readings, explicit teaching of genre and jargon, scaffolded assignments, and making sure to present scientific discourse as its own language. Of the ten faculty mentors interviewed, all declared that they were taught to write by trial-and-error. Only two faculty mentors noted having supplementary disciplinary writing instruction during their degree. Both types of mentors noted using nontraditional teaching approaches related to disciplinary discourse. Of the eight faculty with no guided writing instruction during their education, six self-identified as using nontraditional approaches.

Given that none of these faculty mentors took courses in pedagogy or writing instruction during their graduate and postdoctoral work, this was a noteworthy

observation. Of the faculty members who learned to write as scientists in a traditional manner, without any nontraditional elements or disruptions, over half of them taught using some form of (what *they* called) nontraditional pedagogy. Assigning multiple drafts and providing some explicit genre and language instruction was a common approach. Of the faculty members who had a traditional education with some nontraditional elements and disruption, all of them taught using a nontraditional approach. Some of these faculty members explained that it was because they did not want to do to their students what was done to them; the trauma these faculty members experienced as students affected their pedagogy. All mentors who chose to teach differently than the way they were taught also happened to have participated in a college-sponsored series of writing across the curriculum (WAC) workshops.

Only four of the faculty members who had been taught with a traditional approach continued to teach with a traditional approach. Interviews with these faculty members reflected David Coil et al.'s (2010) findings that faculty do not devote much time to teaching disciplinary writing skills both because of the time required to teach disciplinary content and also because of their own underpreparedness in terms of how to handle writing instruction. Part of this underpreparedness has to do with "expert blindness." As Mitchell J. Nathan and his coauthors (n.d.) explained this concept, "the development of domain expertise leaves people largely unaware of the workings of their own expert behavior and the processes and learning experiences that led to its development" (pp. 5-6). In short, these faculty mentors either forgot what it was like to learn to read and write in their discipline, or they adopted a tough-love approach—"I was able to do it, so my students should be able to do it, too." Many of these faculty members also adopted an attitude that "good writing" is generic, transfers across contexts, and therefore is the purview of English departments.

It is important to pause here to note that these faculty mentors, in addition to having no pedagogy-focused coursework in their doctoral or postdoctoral training, also did not have training with regard to the ways in which race and gender discrepancies develop in STEM education. A notable few were involved in building PRISM from the beginning and were deeply aware of the effects of discrepancies, but their understanding of the causes of these discrepancies aligned with most targeted retention and persistence initiatives, which aimed to help students "catch up" through remediation and opportunities for research engagement. Being unaware of or ignoring the systemic nature of racism and sexism in STEM education created a program-wide race-evasive ideology that was unconsciously reinforced by many of the faculty in the program (regardless of their own race and gender identities). This ideology is noteworthy because the institution is a HSI and MSI with a high number of first-generation, multilingual, and low-socioeconomic status students. Those students whose mentors taught with the traditional approach reported that they were struggling with the discourse and feeling alienated from the discipline.

Cultural Expectations and Discourse

With the exception of one student (Natalia), all of the student participants in the study were new to the genres, language, jargon, and processes scientists use in their everyday work. Despite having taken core classes and the associated labs in their disciplines, five of the six students entered their undergraduate research experiences with little to no understanding of what was expected of them. For example, when Anne entered her mentor Dr. Meijer's lab, she had never read any scientific articles or books, short of textbooks. Her scientific writing experience, likewise, consisted of having only written laboratory reports for her organic chemistry course. When describing her approach to scientific writing in this context, she explained: "I write basically how I did it....But, like, what I've learned at John Jay is that basically just say *why*. Just ask 'why?' Everything you do—say *why*. . . That is basically how you make a discussion." Her understanding of scientific writing at this stage was more aligned with academic assessment (i.e., laboratory notebooks for coursework) than with authentic disciplinary practice. Anne's understanding of genre conventions was also somewhat distorted. She understood that there was a reason, for example, that scientific papers and reports follow an Introduction, Methods, Results, and Discussion structure, but understanding what that reason was and executing that structure was challenging:

> The thing that really gets to me, though, is separating parts. It doesn't happen too much in chemistry, but in physics lab reports I tend to merge, so my Introduction tends to have a little analysis inside. And the analysis tends to have a little discussion inside. . . . So stuff are going where stuff are not supposed to be. I don't know why.

Because she was never taught to look for the rhetorical moves that occur in the different sections of a report and the subtle, but important, differences in stance, uses of evidence, presentation of data, and more in those sections, she was understandably confused and overwhelmed by this genre. Thus, Anne was at a disadvantage when entering Dr. Meijer's high-demand laboratory with little prior knowledge of or first-hand experience with the reading and writing practices of scientists (though, she at least had an awareness of this disadvantage).

Similarly, prior to writing her first proposal, Amrita noted that she was "not actually too sure what needs to go in there" and that she had a "general idea of how it's supposed to go, but [she didn't] really know how to write a proposal." Asking if she had an approach in mind for the writing process, Amrita responded: "I'll take quotes for what I need to and then organize [an outline] based on the quotes. And that's it. And major ideas that I need to talk about." In terms of anticipated revision, she was expecting possibly one large revision but nothing more substantial. These comments reflected that Amrita was neither clear on

the discourse conventions of science disciplines (e.g., that direct quotations are not typical) nor on the rigor required to clarify one's ideas in such a discourse. Though the program did make available a template for the proposal, in this initial discussion, Amrita did not comment on planning to use it as a resource for her writing. She intimated that she was simply going to start putting ideas on paper (as she might for an English essay assignment) and then talk to her mentor, Dr. Bianchi, about what she should do next. Like Anne, at the start of her URE, Amrita was doing little more than experimenting with the discourse.

Similar experiences were documented with three of the other participants; Natalia was the one exception. Her experiences at an inner-city high school that focused specifically on STEM education through health and human services disciplines prepared her well for the reading and writing practices of undergraduate research. Her high school's approach to curricula and pedagogy embraced project-based, experiential and interdisciplinary learning, with a focus on providing "students with opportunities to learn about and understand how our independent global community functions and interacts" (Anonymous High School, 2017). At the same time, it made explicit the expectation that students would enter higher education after graduating and supported this expectation "by maintaining challenging academic standards and integrating education into professional settings so that [the students] acquire scientific knowledge, ethics, integrity and compassion" (Anonymous High School, 2017). In some of her early science courses at John Jay, Natalia noticed that students were "still learning how to break down a peer-reviewed journal article," which was something she had learned to do in high school. She was already quite comfortable with navigating articles to "see if it relates to your [research] topic" and finding what she needed in the various sections. This prior experience also helped with her writing-intensive science courses that involved writing pre-laboratory and post-laboratory notes, formal reports, and article summaries.

I begin by describing these experiences to establish a reality that I have written about elsewhere (Falconer, in press). These students had, effectively, passed the instructor expectation threshold in reading and writing for coursework (Sommers and Saltz, 2004), meaning they had met or exceeded the baseline needed to successfully engage with the genres, reading practices, and writing practices common to classroom instruction: short lab reports, identifying correct answers on a multiple choice test, composing effective open-answer exam responses, etc. They had arrived, so to speak. But as research has shown (e.g., Middendorf and Pace, 2004; Wilder, 2012), specific disciplinary ways of thinking and communicating are part of the hidden curriculum—often assumed by college instructors and not made explicit to students. As such, students moving from coursework to undergraduate research encounter a new, unexpected threshold despite disciplinary continuity. Highlighting the instructor expectations for PRISM students as they entered their respective UREs helps illustrate one aspect of this threshold and how WIP plays a role or is subverted.

For example, Amrita and Natalia's mentor, Dr. Bianchi, viewed the reading and writing practices of scientists as a language and practice unlike any other. At the time of this study, Dr. Bianchi was an early career faculty member at the college. In our first conversation, I was struck by how cognizant she was of the rhetorical challenges newcomers to science face, particularly women, multilingual students, and students of color. She spoke of how the language of science is quite particular and of how the discourse of her subfield, specifically, is very much in flux. Like Dr. Meijer (Anne and Madalyn's mentor), her perception of poor writing and reading skills on the part of students at the college frustrated her, but Dr. Bianchi chose to take up the challenge by meeting students where they were and incorporating writing instruction into her coursework. She participated in college-sponsored WAC seminars, designed writing-intensive courses, and took a scaffolded approach to teaching disciplinary rhetorical practices within her laboratory. Dr. Bianchi was emphatic that writing is "absolutely integral" to the work of science, saying, "If you can't write, you're useless as far as I'm concerned. And if you can't write well, then you don't succeed. I mean, to me it's pretty clear-cut. It sets apart the successful scientists from the non-successful ones." Both students saw in Dr. Bianchi an individual who would actively mentor them, who was interested in getting to know them as people, and who was not only patient but also a strong scientist. Dr. Bianchi's approach to mentoring also took into account both students' skills and interests, leaving room for Amrita and Natalia to grow at their own pace.

Though Amrita was not aware of it, at the beginning of her URE, Dr. Bianchi had already started her on many of the prewriting tasks required for the successful writing of proposals. In particular, Dr. Bianchi assigned Amrita to read a series of scholarly materials related to the work being done in the laboratory—mostly journal articles, but interestingly also Dr. Bianchi's doctoral thesis. In addition to the thesis, some of the articles had been written by Dr. Bianchi herself. This was largely because her discipline is a "baby field," as Dr. Bianchi described it, and there simply was not much scholarship to reference. Dr. Bianchi's research was breaking new disciplinary ground. But as I learned later, she expected (and explicitly directed) that her thesis be used as a model *as well as* a content resource by Amrita. In one-on-one meetings, Amrita had the opportunity to ask questions about the content and scientific processes as well as bring up any elements she did not understand. The primary challenge in this reading, Amrita noted, had to do with language: "I didn't really know the language that they used and I wasn't too sure how they were doing things." Adding to this complication was the fact that the terminology used (including some *she* would need to use) is still evolving and under great debate.

In addition to the research articles and thesis, Dr. Bianchi required Amrita to review disciplinary textbooks, which included a significant number of images, particularly photographs. Because Amrita was going to be observing animal growth, it was critical that she understood the various stages of development and

what these actually *looked* like. Dr. Bianchi followed this reading up by personally taking Amrita into the lab and showing her specimens. As Dr. Bianchi noted, the practice of reading coupled with discussion of those readings and first-hand exposure to the process itself (e.g., looking at the stages of development in the lab) helps students

> to pick out the important things and [gets] them to critically evaluate work that's out there. So, kind of mold them and get them to pick out things like: "What makes a good experiment versus what makes a not good experiment?" And, "You know in the Discussion section—do you think that maybe they should have considered this?" And "Going through the experimental design, where do you think some more errors could have been?" So all of that kind of comes up in discussing the paper, and [the students] usually evolve and are able to pick up things like that on their own after a couple months.

In the early stages of research, Dr. Bianchi put a heavy emphasis on reading rather than writing, though she did take time to instruct students on how to create and complete data sheets and keep a "side notebook" to document everything they noticed in the lab. Though she did not describe it in these terms, it was clear that Dr. Bianchi saw the data sheets as a "fuzzy genre" (Medway, 2002) and made sure her students saw it as such, as well:

> What I've learned is you have a data sheet and you really don't know if it works properly or not until you are halfway through the experiment and you realize that it doesn't. So, at least you have your notebook that you're writing down the additional information. So if you have to run the experiment again, you update your data sheet and make it more functional.

To that end, Dr. Bianchi provided students with a binder in which she expected them to put a paper copy of each article they read related to the project, the data sheets, and then additional notes and observations. She also kept a stack of sticky notes handy for drawing Venn diagrams, life cycles, and points to remember that could easily be attached to a page in the binder. These practices directly mirrored her own document collection and writing practices. These papers, data sheets, and notes all formed the basis for the students' research proposals because students were often well into research before funding proposals were submitted. Dr. Bianchi did not guide the initial writing of Amrita's proposal except to note that she should use Dr. Bianchi's thesis as a model for form (not length). As such, Amrita was left to synthesize the information she had learned as a mentee and translate it into a document.

Amrita submitted this draft to Dr. Bianchi, who commented *heavily* in the margins as well as line edited the text. When asked how she felt when she

opened the digital file, full of blue text edits and comment boxes, Amrita responded:

> So, I did not expect that. Like, I would not expect that heavy of edits. And especially the first submission that I submitted for the abstract was like—basically every word was edited, pretty much every single sentence. So, I didn't expect that at all. But it was great. It was great to be able to compare what I did to what she rewrote and how she rewrote it. My content was there. It was my delivery of it, that was what she tweaked a lot of.

Though many students would understandably be intimidated and, possibly, disheartened by the amount of edits on that first draft, Amrita's strong sense of self and self-positioning as a learner helped her to look past any rejection and to the substantial learning opportunity available. This was bolstered by Dr. Bianchi's positioning of the discourse itself. Dr. Bianchi used this as a teaching opportunity; her comments and edits were rich with information about the subset of the scientific discourse community involved and the genre of the research proposal in general. For example, in the abstract of the proposal, Dr. Bianchi provided such comments as, "In [our field] we are shifting our terminology to reflect that we don't estimate PMI directly, all we can do is estimate the minimum time of colonization," and, "You want to also introduce a statement about the importance of biomarkers here." In this way, she was framing the discourse for Amrita in a way that pointed out rhetorical conventions of the field rather than positioning these as errors on the student's part. In modelling the discourse and providing an explanation for the changes, Dr. Bianchi was providing insights into how the discourse in the field was evolving; what that meant in terms of scientific practice; and importantly, how these realities should be conveyed through language. Throughout the first edited draft appeared similar comments, sometimes explicit instruction into practices such as using species names ("The first time you mention a species in a paper you need to include the full name and who named it"), sometimes clarifications on techniques or tools ("You are going to use containers, not jars"), and sometimes on needed additions to the text ("State here how the specimens are placed on filter paper. . . ").

During the revision of this first proposal, Amrita was tasked with doing additional, independent reviews of the scholarly literature to flesh out various aspects of the proposal. Though this was at times challenging, she felt the recursive process of writing and reading was helping her to become an expert on her own. And the work certainly paid off. When she submitted the second revision of her proposal, much of the new text Amrita added to flesh out the introduction was unedited by Dr. Bianchi (excepting comments on the need to cite certain claims). In this second version, Dr. Bianchi's focus shifted from large-scale organizational requests to requests for greater specificity and additional examples in the literature review and for the inclusion on definitions where necessary. The feedback

had moved from larger genre concerns to more narrow disciplinary conventions. By the fourth draft, the edits Dr. Bianchi requested were limited to small line edits on two different pages, focusing on preferred semantics that improved sentence flow but that did not change meaning. The final (fifth) version Amrita submitted to Dr. Bianchi was approved without edits.

After she successfully received her first research stipend, with a strong positive response from the program coordinator, I asked Amrita how she felt about the scientific "voice" and if it was something she felt comfortable with or if it was awkward. Her response was one of laughter, followed by seriousness:

> Um, I think it's not necessarily either one of those. I think it's just like foreign. It's like, it's not—I feel like after I've gotten used to it, after I understand it, it will make more sense. It's starting to make sense after these writings that I've done. But, like, I'd never read any [scientific articles] or like written anything with that [before now], so it's just like, you know, I didn't know what to expect. I didn't know how to write it, that's all. I feel like once I get used to it, once I do more of them, it's not going to be as big of a deal.

By positioning scientific discourse as a foreign language that had to be learned, systematically, rather than as an extension of typical academic writing in English, Dr. Bianchi helped Amrita successfully sidestep a situation in which she might consider herself as deficient or underprepared. Similarly, Dr. Bianchi's mirroring of Amrita's abilities to succeed through the types of comments and instruction she offered, positioned Amrita as a burgeoning scientist that simply needed explicit instruction in the discourse of her sub-discipline rather than someone who was incompetent or unable to handle the work.

At the start of her undergraduate research experience, Natalia described Dr. Bianchi as "so willing to tell me about the projects and what's going on." At the same time, Dr. Bianchi made sure to let Natalia know that she was not expecting her to understand everything she was "throwing" at her, reassuring Natalia that she would send her everything she would need to get ready for research and training. Natalia described the situation as follows:

> When I was hearing her tell me all of these projects, inside of me I just thought, "How am I going to do this?" Because I don't know all of this that is going on. Like, I've done a bit of research, but it hasn't been enough for me to understand all of these projects in detail. But when she told me, "I'm going to give you all the information you need," I was a lot more calm and like, "Okay, I can do this. I can do this."

As with Amrita, Dr. Bianchi's first step with Natalia was to send her scans of a textbook and copies of research articles that were relevant to the research being

conducted in the laboratory. She instructed Natalia to "just try to comprehend as much as [she could] about what would be in her research, because. . . those are the basics that [she] would need." Dr. Bianchi explained that once Natalia had a chance to read through the materials, they would sit down together and talk through the research, then decide on next steps for the proposal. Though there was only a month from this initial meeting until the time the proposal was due to the PRISM office, Natalia was confident: "I feel like once the positive environment is set with a mentor even if the deadline's coming up, the contact with the mentor will help get that proposal done."

At this early stage, Natalia was not sure how she was going to approach the proposal writing process because she was not sure which project she would be working on. But she was confident that once they had formally decided on a topic for research, "the writing part will be easier." Though she had prior experience with a scientific research proposal, this would be the first proposal Natalia would write for PRISM. She had reviewed PRISM's guidelines, noting that "they looked pretty intense." At the same time, she saw in the guidelines a useful template. She explained that her process would involve creating an outline using the requirements as a guide, drafting the sections throughout, and then revising the proposal as a whole so that it would become more cohesive—"that way there is a flow in my writing."

Natalia and Dr. Bianchi met again not long after this initial meeting and discussed the research papers and potential projects. They decided on the project Natalia would be part of, which allowed her the space to get started on the proposal. Before starting to write, Natalia met with PRISM's program coordinator to talk about the writing expectations. She described that meeting thus:

> I don't want to seem like I'm laid back about my scientific writing. . . .So, he said, "Oh, you know, don't worry about it. Write as if you're writing to me or if you were writing to a couple of friends who don't know what's going on, so you have to be. . . you have to explain it." . . . He told me, "As long as you're able to communicate to me what the experiment you're doing [is] and how it's important to your community, then I'm pretty sure you're going to do a good job with it." [. . . .] I took his words into consideration and I thought, "Ok, let me just write it like as if I was writing to a friend rather than, I guess, the scientific community," because that's what [he] was talking to me about doing. So I did that, but I wasn't—I wasn't satisfied with what I did. So I tried to incorporate a lot more scientific terms and like the, specifically the names of the [organisms] that we're specifically looking at. Then I changed it a lot.

Though Natalia had gotten clear direction from the program coordinator about the audience and tone for the proposal, it was in direct opposition to what

she had already absorbed as appropriate scientific discourse. As noted earlier, Dr. Bianchi had provided all of the students in her laboratory with a copy of her doctoral thesis to act as both a content reference and a writing model. In approaching this first proposal, however, Natalia wanted to start more autonomously:

> I thought, "Okay, let me do a draft on my own without taking a look at hers. . . at her thesis." So I wrote down, you know, the basics of me being in the lab and keying out the [organisms] or the species that we—that [Dr. Bianchi]—had collected. But then I thought, "Okay, this needs to have a lot more information that I wouldn't be able to get if I *didn't* look at her thesis.

Looking at the thesis meant that Natalia noticed the specificity of the language Dr. Bianchi used and that there were significant differences in how Natalia was describing equipment and objectives and how Dr. Bianchi described them. Natalia observed, "It's one word, so [you] wouldn't think that it would be much of a difference. But it does."

As she worked through the proposal writing process, Natalia drew on her metacognitive skills about science writing, continuously checking what she was being told by the program coordinator and the proposal guidelines against what she knew from experience and then comparing these to the models of writing Dr. Bianchi had provided. Yet, despite drawing on this rich writing-knowledge bank, Natalia was still unsure about whether she was composing for the appropriate audience. Though she sent the first version to Dr. Bianchi for review, she did so with the explicit caveat that she was aware that this was not "100 percent scientific" and was pretty "bare." Dr. Bianchi agreed with Natalia and assisted her in revising the proposal to include even more specifics about the specimens themselves, the purpose of the research, and the methods and materials used. Dr. Bianchi's guidance to Natalia, however, did not focus on discourse conventions as it had with Amrita early on—instead Dr. Bianchi encouraged Natalia to do what she already knew how to do: "She was like, 'Oh, why don't you try to be a little more specific. . . and she put some suggestions on the draft" (such as [equipment] names and distinctions about procedures). In this way, Dr. Bianchi validated the background and knowledge Natalia brought to the lab from her high school experience.

Approaching the revisions, Natalia attempted to embody Dr. Bianchi's voice: "I thought, 'Ok, this is something [Dr. Bianchi] would say.'" Part of this approach drew on her time speaking with and listening to Dr. Bianchi, and part of it drew on the thesis Dr. Bianchi provided as a resource and model. When Natalia completed revisions, Dr. Bianchi reviewed the draft and responded, "That one's pretty good. Let's leave it at that."

By creating a laboratory environment in which students were recognized for the skills and experience they brought to the space but supported in new efforts, Dr. Bianchi served as an effective and valuable literacy sponsor while fostering a culture of growth and belonging. Students recognized that reading and writing

(like the research process itself) is a recursive process that is not done alone. Dr. Bianchi's explicitly acknowledging these concepts meant that students were clear on the expectations for their performance; they had to work hard, but they were not in it alone. This meant that, regardless of their cultural capital or lack thereof upon entering the space, all students were set up to thrive.

This was a very different environment from other laboratory spaces in the program, however. For example, Anne and Madalyn's mentor, Dr. Meijer, was clear in interviews that she privileged self-directed learners and that she had no interest in mentoring students who were not looking to be scholars. "One of the first things I say when they meet with me," she explained, "is that if they are not thinking about publishing, they should not join my lab." She was also very clear about the type of students she wanted: "I tell them that they need to come to me with solutions, not problems." She directed interested students to a page on her lab website that gave potential mentees both practical advice (e.g., to delay trying to join the lab if they were over-committed with coursework or other activities), as well as warning students about her approach to mentoring ("A sharp and quick mind cannot take the place of hard work," and "If your adviser had the answer she would have published it already.") Whether conscious of this or not, Dr. Meijer was seeking students who had already positioned themselves as belonging within science as scientific researchers, students who had already recognized that they had valuable contributions to make and expected others to see them as professionals. Dr. Meijer was not interested in mentoring students who could not problem solve; she did not want to accept students who would email or text basic questions throughout the day or who required too much handholding. As Anne explained in an early interview, "She knows you're in this lab, you're big enough, you're *supposed* to know...to pace yourself and produce results." Dr. Meijer wanted future scholars who would step up to the challenge of research. In many ways, she was asking students to *be* scientists upon arrival without necessarily enabling those identities in the early stages of the URE. This approach, she conceded, had a lot to do with her own experiences in academia. Her experiences at the undergraduate level, she recounted, were particularly competitive, harsh, and at times humiliating. Students were expected to self-teach, and much of the examinations for coursework were public and oral (with high stakes). One either performed or they failed. And if they failed, they were publicly directed to other majors.

At the same time, Dr. Meijer was an incredibly open and welcoming individual whom both mentees in this study adored at the start of the study. In an early interview about mentoring practices, she described an intentionally designed, scaffolded approach to introduce students to the lab. In recounting her approach, Dr. Meijer described teaching new lab members how to effectively use the internet and databases to find scholarly material, including the use of Boolean searches. She claimed to teach students how to build literature reviews and assess sources. She demanded that they write their project protocol (the Methods and Materials section) before any other parts of the proposal and that they visit John Jay's writ-

ing center not once, but twice, to ensure clarity and coherence, even asking many to purchase themselves a copy of Strunk and White's *The Elements of Style* for reference. All of these components illustrated an awareness of how to enculturate new student researchers to the lab, even if there was little evidence during my study to show that these activities actually took place. (They may have occurred in prior years, however, or been enacted disparately.)

In short, Dr. Meijer was (in theory and intention) investing in the content knowledge of her mentees as well as in the practical, mechanical aspects of scientific writing. But she was also unintentionally reinforcing WIP in science and in academia broadly. Her expectations about self-efficacy and self-directed learning, students' understanding of the profession of science, and students' ability to answer questions for themselves through inquiry assumed a particular level of education and autonomy that many students from underrepresented backgrounds and underfunded communities do not possess. Culturally, such expectations assume that students will be comfortable with what they might see as challenging authority or imposing on others: making independent decisions without the explicit direction of a superior, persistently following up with a mentor on unanswered questions, etc. Because her expectations were not aligned with Anne's cultural capital at the start of the URE, a fertile ground was created for the two not understanding one another and for "reading" one another's abilities and intentions inaccurately.

Anne's response to this situation was to see herself as unprepared, unskilled, and unclear about how to move forward in research. Anne never received the rhetorical introduction to research that Dr. Meijer had described—she was not taught what a literature review was nor how to compose one, how to read or review a scientific article, or the various forms of writing she might encounter in the laboratory space. Anne remarked that she had a memory of one optional group instruction on using referencing software, but it was scheduled for a time when she was unable to attend. One-on-one instruction or make-up sessions never took place, and it was never clear to her why such a workshop would be of benefit to her work and scholarship. Similarly, Anne was left to herself to identify a potential research project at the start of the URE. For the first few weeks, she observed and assisted laboratory peers in their research, not understanding that she was supposed to be coming up with both a research question and a proposal to submit to PRISM for funding. She realized this needed to be done less than 48 hours before the deadline for submitting a proposal.

In order to help Anne make this deadline and acquire funding, Dr. Meijer strongly guided her toward a project to propose, rather than having her generate a topic independently. Dr. Meijer also provided Anne with a paper on similar work to reference and to guide her understanding, though because of the 11th-hour situation, Anne had not had an opportunity to read it before writing her proposal (thus missing critical information). Anne described the project to me hesitantly:

> I [will be trying to] retrieve viral particles—DNA and RNA phages—from bones that have been. . . that have been left. . . you could just say left out in the wilderness. Been left on. . . I don't know, what's the word I'm looking for? Untouched? So that's basically what I'm working on. And I'm going to be using pigs. Domesticated pigs to see if. . . I would have to look up internal viruses that are known to domesticated pigs, and then retrieve the bones to see if those viruses are present or are still present in the bones after, like, a period of let's say two months? Or, I don't know, sometime after. After all the decay and all of that has occurred.

Though she was enthusiastic, it was clear from her description that even after *writing* the proposal Anne was not sure what her project was about or how it would be implemented. Did she need to look up viruses first? Infect the pigs? Or were the pigs infected prior to arriving at the lab? How was the testing going to be conducted? These were questions she was not able to answer clearly in that discussion of her research, and she frequently confused the names of procedures and instruments. It appeared at that early stage of the URE that Anne's performance of "scientist" in discourse was unconvincing. She was also, as Dr. Meijer intimated in an interview, a perfect example of the "average student" encountered in her faculty role: lacking skill in communicating, in both oral and written forms; lacking a strong vocabulary in science; and having poor mathematical abilities. Fortunately, Dr. Meijer attributed these challenges to poor public schooling in the US and did not see them as deficits originating in the students themselves—though she did suggest that it was the students' responsibility to remediate these discrepancies, which ultimately, I believe, influenced Dr. Meijer's interpretation of Anne's work in the laboratory.

The proposal writing *process* was similarly disjointed. Anne struggled to get and keep a meeting time with her mentor due to Dr. Meijer's demanding schedule. Unfortunately, Anne also waited to work on the proposal until speaking with Dr. Meijer in person because she was, essentially, waiting to be told what to do. She did not feel she had the authority to write and propose ideas for research in someone else's lab without having discussed the possibilities first. Her reference points in orienting to the URE (as discussed in Chapter 2) were skewed, and she was struggling to understand the social contracts at play in the space. This resulted in the drafting of the entire proposal from scratch at the last minute:

> I did write a draft. I didn't get to write it as best as I could because I wrote it the night before the [due] date. Not because—Like I said, she was busy. I had that meeting with her the 22nd and I was like, "Do you want me to submit a proposal, because I know the deadline, it's so late?" And she's like, "Go ahead!" So

> basically the night of the 23rd I had to write. I was up 'til like four o'clock in the morning writing a proposal. Then I sent it to her in the morning, she reviewed it, sent me my corrections, sent it back to me, and then I submitted it that night. . . . I could have done it better. . . .I didn't read the paper that she gave me because I was against time. And I had to sleep. So I, like, I glazed over it. But when she sent me the reviewed version, I decided to take a look at [the paper], like revising my parts. And then I realized what I did for my results and what they had for their results was completely different from what they *actually* had! And I was like, "Oh my goodness!" So had to rewrite that whole part [before submitting it].

The feedback she received from the program coordinator on the submitted draft was helpful, though slightly disheartening. "Most of my errors were because of my lack of knowledge," she explained; "I really didn't know what I was doing. I knew what the end result should be, but I didn't know how I was going to get there." Though she was ultimately funded for this research project, Anne left the experience feeling inadequate. She interpreted her mentor's lack of attention as related to her, rather than Dr. Meijer simply being too busy. As Anne began her first research project, she was left with doubts about whether she belonged. When it came time to write a proposal for the next semester's funding cycle, she reported feeling "depressed and overwhelmed."

Madalyn (a White woman in her early thirties), who was also a member of Dr. Meijer's laboratory, had a very different level of cultural capital. Hers more closely aligned with her mentor's in that she actively sought out projects and answers for herself, conferred with Dr. Meijer only when necessary (but "hunting" her down when queries went unanswered), and taught herself software and techniques that would improve her performance in research. What Madalyn knew, but Anne was unaware of, was that "rules are negotiable" (Keels, 2019) and that, though the laboratory was technically Dr. Meijer's, as a member of the research community, she had leeway in terms of her process of inquiry. Autonomy was not only encouraged, it was expected. Anne also did not understand that Dr. Meijer would not view persistence as a problem; what Anne determined would be annoying (e.g., waiting outside Dr. Meijer's classroom to speak with her) was viewed by Dr. Meijer as dedication and showed a commitment to undergraduate research.

Though Madalyn had never taken a course with Dr. Meijer, never "had any contact with her" at all, she had met another student during the research training workshop who was already working in Dr. Meijer's laboratory. Madalyn was entranced by the kinds of research taking place there and, after "looking her up" to learn more about her work, wasted no time in reaching out:

> I was like, "I want to do that!" And I basically—you know she's very busy, so I had to chase her down. I was very persistent and

> she's like, "It's pretty crowded in the lab." And I was like, "Well, I'll find something to do." She's very welcoming. . . . She just hasn't told anybody "no." I think she thinks that people will filter themselves out. Like, if they're not genuinely interested, they're just going to stop showing up. So, it kind of takes care of itself. . . . I just felt like I had to work with her.

Whereas Anne perceived Dr. Meijer's allusiveness as evidence that she did not belong in the laboratory, Madalyn saw it as a challenge—going so far as to wait outside Dr. Meijer's classroom for a chance to speak to her about research opportunities. Madalyn was not intimidated by Dr. Meijer at all, and this was my first glimpse into her ability to compartmentalize. Over the course of my research, I was consistently impressed with Madalyn's ability to focus on the objective at hand and block out the social factors that might have dissuaded other students. "I think," she explained, "once I get an idea in my head, if I don't do it, then I'm annoyed at myself. I guess it's just the attitude, 'What have I got to lose?'"

Madalyn wasted no time in bringing herself up to speed on the work happening in the laboratory. As soon as Dr. Meijer gave her permission to join the laboratory, Madalyn began reading—first a grant proposal Dr. Meijer was preparing to submit, then independently-sourced material. "We do a *lot* of research in the literature about the experiments that we want to do," she explained, "and the procedures we want to follow, and trying to get ideas. So, that's where I am right now." Using John Jay's library, Madalyn began searching the databases to learn more about the types of work taking place in Dr. Meijer's laboratory. "You can look things up by journal," she explained,

> but if I'm looking for a particular subject, I can type that in and it'll call up every scientific [article] that has a phrase that you're looking for. So, usually, I end up looking in the *Journal of Forensic Science*, *Analytical Chemistry*, *Biochemistry*, archeological scientific journals. . . . It can be a rabbit hole. One thing leads to another, and all these papers reference each other, so you end up going to references, and then the references have references. . . .

Though this was the first time she had conducted scientific research, Madalyn was able to effectively draw on the skills she had learned in her earlier educational experiences to successfully navigate the databases and find content relevant to the work of the laboratory. Importantly, she had very quickly developed an understanding of the specific academic journals that would be of use to her.

Prior to this experience, like most of her peers, Madalyn had never read a scientific paper, and found her first attempts overwhelming. "When I first read a scientific paper," she explained, "I was like, 'I don't understand what any of this means! This language is totally foreign to me. It's so dense and so complicated.' But the more I read, it's getting so much better to understand what's going on."

Though (like Anne) Madalyn did not have any direct instruction on reading scientific materials, during the first half of that semester, the genre conventions of the scientific article became apparent through repeated exposure, which made navigating the pieces more manageable. "It's like a standard format that everyone has to follow," she explained. "You treat it like a sandwich. You read the beginning [the Introduction] and then the end [the Results and Discussion], and then the middle [the Methods]. That makes it nice and easy for me to understand." This strategy allowed Madalyn to "extract the important points" in an efficient manner. As she read, she kept a notebook with entries related to each article, making connections to other pieces of literature. It was clear that, in a short period of time, Madalyn had adapted her prior knowledge of academic research practices to develop a sophisticated approach for reviewing the scientific literature. She never questioned whether she was allowed to propose new lines of inquiry, nor did she worry that she was pushing the established boundaries within the lab. Rather, in many ways, her autonomy and strong sense of belonging created a sense of ownership and entitlement to the space.

Despite this progress, Madalyn held off writing her research proposal until she had a fully formed idea and, as a result, missed the cutoff for funding for the spring semester. Instead, she began writing a proposal to be considered for summer funding, using her time in the spring to work through the ideas and conduct a more thorough review of the literature. Surprisingly, this additional time to think through the project, and her observation of how much time it took for an animal carcass to decompose, resulted in a major directional shift:

> I was involved in two different projects [for Dr. Meijer], and I decided to focus on one that was more practical for me to accomplish things with. There was one that involved computer science, developing software, machine learning software. And then the other one was looking at bone trauma on cremated remains—which is a really interesting field, but there was really no way to [conduct] enough experiments for me to feel like I was doing something. . . . I like to be active. . . . I decided to change direction and focus on the machine learning software, which is—I'm NOT a computer science student. I have very little knowledge about it. . . . But the long-term goal of the project is to construct software that will recognize features that you photographed on something, like human bones.

Though there was already a graduate student working on this project, Dr. Meijer and Madalyn agreed that this was an appropriate project for her to assist on. And, despite her emphatic resistance at the start of the URE to any identity as a computer scientist, Madalyn was able to see a connection between the work the laboratory conducted, the role of photography in evidence gathering (which

referenced her art background), and her confidence in her ability to learn new technology and skills.

The difference in how Anne and Madalyn each experienced the same laboratory was noteworthy and is reflective of how many underrepresented students internalize challenges as a deficit in them rather than as a failure of those in charge to articulate the rules and expectations of the space. On one hand, we can view these interactions as part of the "weeding out" process that Madalyn noted. On the other, we can view it as the enactment of WIP in STEM education: assimilate or leave, show gratefulness for this opportunity or receive less attention. At the URE level, this is problematic, because some students are only beginning to understand the practices and habits of mind of their respective fields and because that assimilation process could also be weeding out innovative and potentially strong researchers.

The orientations students hold within an academic space also have profound impacts on whether they feel comfortable composing in and for that space and on the authority that they demonstrate in their writing. Anne's work (both in oral description and written drafts) illustrated an insecurity with the ideas and practices of the research, embodied by hedges, incorrect terminology, and lack of detail. She was uncomfortable almost to the point of paralysis. Madalyn, on the other hand, was able to claim a niche for herself and take risks, knowing that her mentor would correct any misunderstandings or incorrect terminology use. UREs place incredible literacy demands on students, which can be mitigated through mentorship as well as through clear articulations of expectations for performance and explicit instruction on disciplinary discourse conventions (see Chapter 4). As faculty mentors and educators, we need to question whether our policies and expectations are having the unintentional consequences of losing valuable talent and minds.

Considerations and Applications

Despite inclinations to view educational and disciplinary spaces as arhetorical and apolitical, it is critical to recognize that pedagogical practices in teaching disciplinary norms and discourses are infused with preconceived ideas of what it means to be an "excellent" student and worthy of educators' time and energy—ideas that can have roots in racial, gender, and class inequities. Ignoring (or being ignorant of) race- and gender-evasive ideologies can have significant impacts on students' self-concepts and sense of belonging in the discipline.

When considering disciplinary writing instruction, it is critical to remember that discourse is part of culture and a *reflection* of culture (Gee, 2001). It is something that needs to be taught explicitly. As Ahmed (2006) has noted, the arrival of students in the classroom

> is dependent on contact with others, and even *access* to the "occupation of writing," which itself is shaped by political econ-

> omies as well as personal biographies. . . . Having arrived, [a student] might do a different kind of work given that [they] may not put these other attachments "behind" [them]. (p. 62)

There is a merging of worlds and experiences that take place in that classroom space. While disciplinary instructors are the best suited to teach disciplinary writing *in situ,* they also need to be trained in how to *teach* that writing in light of the multiple worlds students bring with them to the classroom.

Despite challenges noted by other scholars regarding disciplinary faculty members' abilities to teach the discourses of their communities (National Research Council, 2000; Smit, 2004), Dr. Bianchi's own experience learning to read and write as a scientist led to her strong awareness of the needs of students coming to the discourse as newcomers (she drew on her own personal biography). As such, she developed an explicit, scaffolded approach to teaching the genres, rhetorical conventions, and critical reading strategies necessary to successfully engage with others as a scientist.

To counteract the "writing is the domain of English" perception, it is important for writing programs to work toward educating non-writing specialists about how their respective disciplines' epistemological and ideological views are reified in text and speech so that, together, these can be made transparent to newcomers. This involves disciplinary instructors becoming, if not experts, proficient in the rhetorical conventions and genres of their disciplines. Deeper scholarship into working across epistemological and ontological divides is needed, as is the preparation of junior scholars (particularly those likely to serve as supervisors) in the underpinnings of the disciplinary discourses. That way, when they are in a position of power (as a laboratory supervisor or new professor), they can adopt strategies to make disciplinary discourses accessible to as many students as possible. (A deeper discussion of these considerations is taken up in Chapter 5.)

Because mentors occupy a unique role as literacy sponsors, their being mindful of the ways in which pernicious ideologies of gratefulness, thankfulness, and preparedness are culturally shaped is critical. What may be read as a student being disinterested or underprepared might be a disconnect between two culturally shaped ways of communicating or performing. Students' performance might also be informed by how they are oriented toward the mentor and the field (e.g., being intimidated by a mentor or others within the lab, being unsure of where one fits within the space or what contributions they can make). As we educators move toward further diversifying educational and disciplinary spaces, it becomes even more salient that we stop and check ourselves and our assumptions as well as that we make sure we do not impose on students the same hardships and traumas we may have experienced ourselves.

In the next chapter, I discuss the ways in which our expectations around performativity (both physical and linguistic) can impact student success within disciplinary spaces. Through an examination of speech acts in practice, I

explore how assumptions and disciplinary norms can constitute microaggressions that ultimately work toward pushing underrepresented individuals out of disciplinary spaces.