Chapter 1. The Intersection of Language, Culture, and Power

We author "selves" whenever we speak or write—through the language choices we select, our intonation and rhythm, how we engage with genres, and how we read our audience. Roz Ivanič (1998) defines this process as the making of the "discoursal self"—the impression individuals create through discourse of who they are—noting, "Every time people write, they reaffirm or contest the patterns of privileging among subject positions which are sustained by the relations of power in the institution within which they are writing" (p. 33). This discoursal self is mediated by the "autobiographical self"—the writer's "sense of themselves" within these institutions and power relations (p. 33). As Sara Ahmed (2006) reminds us, however, our sense of self is also impacted by our "conditions of arrival" (p. 41). These conditions include the story of how we got here, the things we came in contact with, and the bits we picked up and that stuck to us along the way. She explains, "You bring your past encounters with you when you arrive" (p. 40). These encounters and experiences are laminated onto one another and, over time, become difficult (if not impossible) to separate from one another.

Like these encounters and experiences, the framework through which I examine the student experiences presented in this book is also laminated. I begin with five key premises that ground my understanding of students' sense of selves within institutional spaces:

1. As both Lev S. Vygotsky (1978) and Wenger (1998) have demonstrated, learning is a social activity. While people can learn in isolation, it is through interaction with others—observing the reception of our words and ideas and engaging in discourse—that we truly build mastery and understand areas for growth.

2. Mastery of content knowledge and discoursal skill are intertwined. As we understand concepts, so too do we begin to understand the terminology associated with those concepts. They become part of an individual's vocabulary and discourse options.

3. This learning of content knowledge and discoursal skill takes time but can be sped up or slowed down based on internal and external factors.

4. Becoming a member of a group—disciplinary or otherwise—is a process of negotiating our existing identity and determining whether the beliefs and values of the new group align or conflict with our existing identities and storylines. Language is intertwined with this group belonging.

5. How we are reflected back to ourselves via others plays a role in our felt experience and group belonging.

Laminated onto these premises are some additional key considerations. Keeping in mind the "stickiness" and heterogeneity Ahmed (2006) refers to, we need to remember some of the tenets of critical race theory offered by Gloria Ladson-Billings and William F. Tate (1995), as well as others (Bell, 1992; Crenshaw, 1991; Gillborn, 2006; Solorzano & Delgado Bernal, 2001; Solórzano & Yosso, 2002; Tate, 1997), so that we understand that the conditions of arrival for BIPOC STEM students are not the same as for their White counterparts:

- Race and racism are central fixtures of U.S. society. They are so endemic to our institutions that the way we do things *appears* neutral (Bonilla-Silva, 2018); race and racism are there, but in a way that we do not necessarily see them (Ahmed, 2006, p. 37).
- Race and racism intersect with other forms of oppression to the degree that it is nearly impossible to parse the negative impacts of one oppression from another, but these impacts compound when multiple vectors of oppression are present (Crenshaw, 1991).
- Meritocracy—the belief that anyone can pull themselves up from the bootstraps (Villanueva, 1993) and succeed through hard work and grit—is a pernicious, persistent myth because it ignores systemic barriers unequally distributed throughout U.S. society.
- Experiential knowledge (DeCuir-Gunby et al., 2019, p. 6) is central to understanding the lived experiences of historically marginalized people in STEM. We cannot know the felt experiences without *listening* to their stories (Collins, 2000). Ignoring such stories, or writing them off as outliers, causes harm.
- Unpacking epistemological understanding of race and racism must be part of the process of counteracting and dismantling oppression. Working across disciplinary spaces is part of understanding the "complexity and intricateness" of race and racism in practice (DeCuir-Gunby et al., 2019, p. 6).

Furthermore, while the conditions of arrival are not the same across racial categories, they also are also not the same across gender or class. Like racism, sexism and classism are endemic to U.S. systems. Myths of meritocracy also impact female and low-income students because they ignore the extra set of challenges that need to be surmounted to reach the baseline. Epistemological understandings of gender and poverty also need critical examination, particularly in disciplinary spaces. There is a monumental amount of work to be done to even approximate an equal playing field.

Throughout this book, I unpack how race and racism, gender and patriarchy, and class and classism are systematized into the epistemologies, discourses, and practices of STEM disciplines, and I relate the felt experiences of individuals as they negotiated these discoursal spaces. Student experiences show how, as a new discourse is acquired, existing identities can be called into question and allegiances can be challenged, even as the new discourse opens students up to new opportunities and communities. Further, the interplay of these factors work to either drive

students from a space or attract them toward it—push and pull factors, respectively. Within the context of disciplinary and educational spaces, researchers can think of these push and pull factors as the factors that draw students toward a discipline and/or educational institution and as the factors that may cause them to feel pushed out or unwelcome. Within these disciplinary and educational spaces, push and pull factors should be viewed as often-subtle influences that convey to students their place—their position—within the space. These include, but are not limited to, the institutionalization of particular belief systems, teaching practices, and societal expectations that allow for structural patterns of inequity to persist within the US (Guess, 2006). Denying the presence of racism, sexism, and classism within these different spheres contributes to the perpetuation of hostility and discrimination (Gusa, 2010); explicitly addressing them in a way that creates spaces to subvert them can assist in the creation of welcoming, inclusive environments (Ong et al., 2018).

Developing discoursal skill as a member of a community should never be about assimilating into another's discourse; instead, it should be about negotiation and embodiment with agency—adopting some or all of it as one's own, which includes agency to critique and modify it. It should emphasize understanding one's self in light of the new discourse. Because language has

> the potential to conceal as well as disclose, any struggle over language at the same time entails a struggle over worlds fought on the deepest levels of the self—that part of the self that most intimately connects with other selves and with history. (Spellmeyer, 1998, p. 258)

To take on a new discourse as one's own requires recognizing that the discourse has the ability to describe an aspect of one's self that other discourses cannot adequately represent.

In the case studies presented in this text, I examine how various push factors influenced individual students as they attempted to learn the practices and discourse of science. Importantly, I also discuss the pull factors—practices and approaches that counteracted these negative messages—that helped students both see a place for themselves within the discipline as well as see the discourse of science as one that belonged to them. As Diane Lynn Gusa (2010) notes, when people "neglect to identify the ways in which White ideological homogenizing practices sustain the structure of domination and oppression, they allow institutional policies and practices to be seen as unproblematic or inevitable and thereby perpetuate hostile racial climates" (p. 465). When we know better, we are obligated to do better. This text will contribute to educators' and administrators' ability to do better.

Discourse and Identity

Bryan Brown and colleagues (2005) have argued that, given the "notion that all forms of discourse come to symbolize cultural membership and identity," those

interested in science education particularly should be conscious of the compli-
cations that students face in "the literate practices of science" (p. 790). Knowl-
edge, scientific or otherwise, is constructed by the individual in conjunction with
others and can have powerful effects on student identity. As such, Brown and
his coauthors suggest that educators should understand identity as a "resource
as well as an artifact of classroom interaction. As students position themselves
via discourse, they allow themselves to access specific knowledge and conceptual
understanding that might otherwise be out of their reach" (p. 790). Discourse,
in this sense, is more than a series of linguistic features and rhetorical moves. It
serves as a gateway to other ways of knowing, seeing, and thinking that are so-
cially constructed by the individuals circulating within specific discursive spaces.

At the same time, the individual's selection of which language to take up and
how to take it up either reinforces or critiques the status quo. As Ivanič (1998)
notes, using a specific discourse "is an act of identity in which people align them-
selves with socio-culturally shaped possibilities for self-hood, playing their part
in reproducing or challenging dominant practices and discourses, and the values,
beliefs and interests which they embody" (p. 32). The nature of these variations
makes discourse inherently political; it is deeply embedded in struggles for pow-
er, is rooted in social structures, and is ideologically shaped (Fairclough, 1992, p.
17). How people see themselves, the world, and their places in the world impacts
the ways they take up and engage in professional discourses.

In her conceptualizing of queer phenomenology, Ahmed (2006) has articu-
lated how individuals orient themselves to certain possibilities and ways of know-
ing: "bodies," as well as identities, "take shape through tending toward objects that
are reachable, that are available within the bodily horizon" (p. 2). Which objects,
which opportunities, and which discourses are within people's spheres as they
grow and mature? Which of these are not within any line of sight? The objects,
people, opportunities, and discourses people come in contact with affect them in
significant ways and orient them toward some things and away from others.

In the context of this research, what this means is that, as students entered
PRISM, they were choosing to orient themselves toward STEM as a career, but
their orientation markers—their points of entry and of understanding what this
choice actually meant, what it looked and sounded like in practice—were quite
different from one another and based on their prior exposures (through school,
television, family, etc.). Those orientations to the discipline are discussed in the
next chapter, but it is important to note here that as students entered the program,
they were not very aware of the possibilities for self-hood within this new disci-
plinary sphere. Their orientation toward research and disciplinary discourse was
rooted largely in laboratory work and readings related to coursework, with few
exceptions. This orientation had its first immediate effect on mentor selection,
but importantly it also impacted how students identified where they fit—how
they were *positioned*—within larger hierarchical social structures of the program
and discipline.

Wendy Holloway (1984) introduced the concept of "positioning" into the realm of social psychology and gender studies, using it as a means to conceptualize gender differences and subjectivity in discourse, arguing that

> discourses make available positions for subjects to take up. These positions are in relation to other people. Like the subject and object of a sentence. . . , women and men are placed in relation to each other through the meanings which a particular discourse makes available. (p. 236)

This conceptual framework allowed Holloway to make claims as to why women speak less frequently in mixed-gender groups than they do in gender-homogenous groups—her explanation being that in heterogeneous groups, women are positioned as having fewer rights than the male group members. Such positioning, Holloway argues, is something done to women and takes away a woman's ability to act. It is a social situation that is more *felt* than explicitly stated. Through life experiences, all individuals learn what they can get away with saying and doing in particular circumstances and what they cannot (often accompanied by a fear of reprisal or very real concerns for one's safety).

Positioning theory, as Holloway's (1984) concept has come to be known in the decades since, has become a foundation block of discursive psychology and has proven to be a useful tool for examining identity in practice. It is, as Harré (2004) explains, "the study of the way rights and duties are taken up and laid down, ascribed and appropriated, refused and defended in the fine grain of the encounters of daily lives" (p. 4). With each speech act (whether spoken or written), people locate themselves as well as others within larger communities and contexts and "ascribe rights and claim them for ourselves and place duties on others" (Moghaddam & Harré, 2010, pp. 2–3).

It is worth noting that the terms "rights" and "duties" are quite loaded. In positioning theory, becoming a group insider is not as simple as performing appropriately. At its heart is the examination of the rights and duties people believe they have within a given context, as well as those rights and duties others ascribe to them. What people do (and say/write) within a given situation is dictated both by what they are physically and cognitively able to do, as well as what they believe they are permitted or forbidden to do based on historically and culturally situated storylines (Bonilla-Silva, 2018, p. 97). Storylines are developed in response to the experiences and encounters individuals have had along their journeys to this moment, but they are also informed by the ways individuals are oriented. "How do we begin to know," Ahmed (2006) asks,

> or to feel where we are, or even where we are going, by lining ourselves up with the features of the grounds we inhabit, the sky that surrounds us, or the imaginary lines that cut through our maps? How do we know which way to turn to reach our destination? (p. 6)

As individuals navigate new spaces, learning the lay of the land as they go, they are developing new reference points and inferring the social contracts at play in the space. In turning toward one possibility, they are turning their back on another, and that orientation is impacted by the things that have stuck to them along the way. Such things include an individual's personal history (what they have done or been perceived as in the past, including group histories like race, gender, class, and educational experience) as well as their individual attributes (i.e., mental, character, moral). For example, the storylines that women are too sensitive and not critical enough to do science or that individuals of Asian descent are naturally adept at mathematics have direct implications for how these individuals are perceived—and perceive themselves—in STEM educational settings. Such beliefs (which include stereotypes) can directly or indirectly position someone favorably or unfavorably within a given context.

"Positions," Rom Harré and Fathali Moghaddam (2003) argue, "exist as patterns of beliefs in the members of a relatively coherent speech community," which are reified in discourse conventions, performativity, and epistemology (p. 4). For example, within discussions of biological processes, we frequently see terms like "maleness" used to refer to organisms that provide something in a reproductive process (e.g., a fertility factor in bacteria), while those organisms without said factor are referred to as "female." Though seemingly innocuous, designations like this reinforce the idea of females being helpless and lacking and the idea that males are the provider and supporter in critical processes—even when discussing organisms, such as bacteria, that do not possess sexual organs. When discussing race, science textbooks often explore the topic from a seemingly impartial viewpoint that nevertheless embraces a particular belief system about the relationship between genetics and race. As Ann Morning (2008) illustrates in her systematic review of science textbooks from 1952 through 2002, contemporary textbooks often approach race through taxonomic and genetic lenses under the guise of inherited medical disorders. As she put it, the "overall impact of genetics has been to bolster, rather than challenge [essentialist views on race]," leaving an impression that, in addition to phenotypic differences across racial categories, that there are also differences connected to competencies (i.e., intellect)—a clear connection to the eugenics movements of the 19th and early 20th centuries (p. 125).

However, positioning goes much deeper than simply adhering to discourse conventions. Bronwyn Davies and Rom Harré (1990) took up Henri Tajfel and John Turner's (1979) model of social identity theory, arguing that how we see and interpret ourselves, the world, and our place in the world involves a series of interconnected processes. We must first understand that categories exist that include some individuals while excluding others (for example, gender, race, and socioeconomic class). We must also participate in discursive practices through which these categories are not only reinforced but also ascribed meaning (e.g., White is good, girls are sensitive). Then, we must position ourselves in relation to these categories and meanings, which "involves imaginatively positioning

oneself as if one belongs in one category and not in the other" (Davies & Harré, 1990, p. 49). This imaginative positioning involves being oriented in specific ways—recognizing oneself as having the attributes and characteristics of a group and subsequently committing to the group and "the development of a moral system organized around the belonging" (p. 49). This moral system is deeply tied to the ways of being in the group—what it means to perform as a member of the group (for example, scientists have a moral obligation to be objective and conduct methodologically sound research). The degree to which individuals adhere to—assimilate into—this moral system is intricately linked to their perception by others (their positioning by others) as group insiders.

James Paul Gee (2000) notes that an individual is recognized as a "certain 'kind of person'" whenever they act or interact with others, and that the "kind of person" they are recognized as is mediated by the interaction's context and participants (p. 99). This "certain 'kind of person' in a given context" is what Gee means—and in this text, what I mean—by "identity" (p. 99). Since there are a multitude of interactions individuals can participate in, "all people have multiple identities," multiple selves, based on how they perform—or position themselves—in a given interaction or space (p. 99). As Harré and Moghaddam (2003) have explained, "people can adopt, strive to locate themselves in, be pushed into, be displaced from or be refused access . . . [to groups] in a highly mobile and dynamic way" (p. 6). This last facet becomes salient when considering work with marginalized groups in science where a lack of representation for women and BIPOC plays an important role in the socially constructed categorization of "scientist." It is through these lenses that we can begin to understand the systemic ways various vectors of oppression can operate in society and groups.

Positionality and Intersecting Vectors of Oppressions

A critical first step of orienting toward a disciplinary space and identity relies on recognizing that such possibilities exist for oneself to begin with. It is only when we see that these possibilities are within our social spheres that we can move toward them with an eye toward belonging. But, as explained in the previous section, how we position ourselves within the hierarchies is impacted by the rights and duties we see as being internally and externally ascribed to us: what are we allowed to do and not allowed to do within this space?

Because of these rights and duties, positioning is not the sole domain of one's own perceptions. It is not incumbent on individuals alone to decide that they can claim a space and belong within a discipline. The "you can be anything if you believe in yourself" perspective ignores that there are very real vectors of oppression working to reinforce and reinscribe particular social structures and hierarchies. As Rebecca Walton and colleagues (2019) have argued effectively, power within a space is directly correlated with positionality and privilege. How we are oriented and the space we see ourselves as being able occupy are directly

implicated by who we are in relation to others, what our identities mean, historically, within a given space at a specific moment in time, individual conceptualization about what it means to occupy particular roles, and how our identities interact with normative conceptions of a specific role. Because of this, we cannot talk about disciplinarity, identity, and social categorizations like race, gender, and class, without explicitly addressing intersectionality.

This often-misused term does *not* refer to the multiple identities an individual may possess (e.g., "my intersectional identities"); rather, it explicitly refers to the vectors of oppression an individual experiences as a *result* of their multiple identities. In the United States, BIPOC individuals experience oppressions related to race that White individuals do not, and women experience oppressions that men do not. Female BIPOC individuals experience *compounding* and sometimes distinct oppressions of both race and gender.

In her seminal work on intersectionality, legal scholar Kimberlé Crenshaw (1989) offers a frame through which to see these multiple vectors of oppression operating on individuals. As she explains early in the piece, when considering the law,

> in race discrimination cases, discrimination tends to be viewed in terms of sex- or class-privileged Blacks; in sex discrimination cases, the focus is on race- and class-privileged women. This focus on the most privileged group members marginalizes those who are multiply-burdened and obscures claims that cannot be understood as resulting from discrete sources of discrimination. (p. 140)

In STEM equity research, the ignoring of intersectionality plays out regularly: the overwhelming majority of research on gender has focused on the experiences of White women, and the overwhelming majority of research on race/ethnicity has focused on males. Disturbingly little research has been conducted with individuals who not only have the double oppression of being both female and a racial/ethnic minority but also the third oppression of their chosen discipline—science (Cobb, 1976; Ong et al., 2011). The examination of intersectional identities of BIPOC women within science disciplines is necessary if we as a nation are truly interested in increasing the number of women and minorities not simply studying but also *working* in STEM disciplines. It is also critical in this research to ask whether the focus on men of color and White women in STEM has had the unintentional consequence of once again "othering" minority women by reinforcing a stereotype that BIPOC women do not exist in STEM disciplines and/or are not interested in pursuing STEM careers.[4] Without critically examining the

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4.   By way of example, while reviewing data collected by agencies such as the National Science Foundation, I observed that data are collected by race and gender but are not parsed by both (we know how many men and women are studying and working in STEM,

conditions of schooling for minority women, we may be unintentionally excluding and also obscuring areas ripe for reform.

A Case for Counterspaces

In the preceding sections, I have laid out the interdisciplinary approach I take in this book toward thinking about the experiences of my research participants and their discoursal skill development as they engaged in undergraduate research in STEM. By considering how humans orient themselves to new spaces, how they are positioned as individuals *within* those spaces, and how their identities inform how they see themselves in these spaces (as well as how others see them), researchers can then begin to unpack the ways in which these forces impact discursive practices.

For the students in this study White institutional presence (WIP; discussed in detail in the next chapter) played a role in their engagement with scientific discourse and the scientific community despite the college being recognized as a Hispanic- and Minority-serving institution and despite targeted efforts to improve retention and persistence. WIP is embedded within STEM disciplines and education broadly. Understanding the profession, leadership roles, and networking behaviors presented one level of barrier to students attempting to engage with the authentic work of undergraduate research. A lack of career models, stereotyping, narratives of grit, and ascription of intelligence presented another level. Combined with language associations, concerns about tokenism, and insecurity regarding self-sufficiency, these barriers impacted students' early engagement with both scientific discourse and the community.

As will become evident in the telling of these students' stories, there is a need for marginalized individuals in STEM disciplines (and other restricted disciplines) to have a space to breathe, push back, and form responses to outside oppressions (Collins, 2000; hooks, 1990; Smith, 2000). In 1991, Henri Lefebvre wrote that space

> shows itself to be *politically instrumental* in that it facilitates the control of society, while at the same time being a *means of production* by virtue of the way it is developed…; underpins the reproduction of production relations and property relations (i.e., ownership of land, of space; hierarchical ordering of locations; organization of networks as a function of capitalism; class structures; practical requirements); is equivalent, practically speaking, to a set of institutional and ideological superstructures that are not presented for what they are…; and contains possibilities—of works and reappropriation—existing to begin within

but we do not know *exactly* how many of those women are women of color). This omission alone makes women of color in science invisible.

> the artistic sphere but responding above all to the demands of
> a body "transported" outside of itself in space, a body which by
> putting up resistance inaugurates the project of a different space
> (either the space of a counter-culture, or a counter-space in the
> sense of an initially utopian alternative to actually existing in
> "real" space). (p. 349)

In other words, space is not apolitical—spaces "are made for some kinds of bodies more than others" (Ahmed, 2006, p. 51). Spaces position individuals through hierarchies, systematize bias in ways that are invisible, and reify particular ways of being and knowing (which I illustrate at the beginning of the next chapter). Critically, they also hold the potential for disruption through counterspaces. Counterspaces are a place to actualize resistance to the status quo. They provide a space to create a reality that does not reinscribe traditional rights and duties and allows for the *turning toward* potential futures described by Ahmed (2006) without necessarily turning *against* culture or history.

Though Lefebvre (1991) did not fully define the concept of counterspaces, nor did he offer insight into their construction or maintenance, others have taken up this concept and filled these gaps. For example, Daniel Solórzano and his colleagues (2000) describe such spaces in education as "sites where deficit notions of people of color can be challenged and where a positive collegiate racial climate can be established and maintained" (p. 70). Counterspaces are intentional spaces where individuals with a shared identity can be free to work, talk, study, etc., without the physical or emotional pressures of specific oppressions and without the presence of potential oppressors. For example, a group for women in engineering or a Black caucus within a national organization can serve as counterspaces. Such spaces can be created through organizations and affinity groups (e.g., fraternities and sororities) as well as between faculty and students who share particular characteristics (such as race, gender, disability, or sexual orientation).

Andrew D. Case and Carla D. Hunter (2012) further argue that counterspaces can and should be thought of as specific, intentional settings—spaces where individuals can develop positive self-concepts that challenge "deficit-oriented dominant cultural narratives and representations concerning these individuals" (p. 261). These settings play critical roles in enabling marginalized individuals to push against dominant narratives of exclusion or inadequacy through what the authors refer to as "adaptive responding" (p. 259). "Adaptive responding," they explain, "is the multidimensional psychosocial process occurring at the individual and setting level, which facilitates, in marginalized individuals, the capacity to circumvent, resist, counteract and/or mitigate the psychological experience of oppression" (p. 259). The mechanisms for which this process is actualized are, as noted above, multidimensional and include such things as self-protection, which may include using basic coping skills, avoidance, or confrontation, as well as the enhancement of self-concept. This latter mechanism may be enacted through

narrative identity work (e.g., resisting traditional storylines related to race, gender, or discipline), acts of resistance (challenging traditional norms, etc.), and direct relational transactions (the relationships between individuals that foster agency and self-efficacy).

Much of the research on counterspaces has focused on predominantly White institutions (PWIs) where race is salient (Keels, 2019; Ong et al., 2018). In this book, I explore how counterspaces work within the confines of Hispanic- and Minority-serving institutions (HSIs and MSIs) where the dominant groups are not White (though the disciplinary and academic discourses are). Using Case and Hunter's (2012) framework, I explore how narrative identity work, acts of resistance, and direct relational transactions were enacted within PRISM as an institutional structure as well as explore interpersonal interactions that took place as part of the undergraduate research experience. While I go into specific detail in Chapters 5 and 6 about how these mechanisms are actualized in PRISM, throughout all of the chapters I discuss the ways in which student participants adopted or resisted traditional storylines of scientific identity, challenged norms, and built empowering relationships. Importantly, I also discuss the ways in which the program and individual mentors facilitated the development of a counterspace—even if it did not seem accessible to all students in PRISM. These findings lead to guidelines instructors, mentors, and programs can adopt to build inclusive spaces for BIPOC, women, and other minoritized individuals within STEM.