

Building and Breaching Boundaries: an Intersectional Coherent Group Approach to Advancing Women Faculty in Engineering

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Dr. Claire Horner-Devine is the co-founder and co-director of three, federally funded, national programs (BRAINS, WEBS, and LATTICE) designed to accelerate and improve the career advancement of early-career women and researchers from underrepresented groups in STEM. She is also the founder of Counterspace Consulting and creates professional development and leadership opportunities for STEM professionals, grounded in social science research and with equity, diversity and inclusion at their core. She has published this work in *Frontiers in Ecology and Evolutionary Biology*, *CBE – Life Sciences Education* and *Neuron*.

Dr. Horner-Devine received her B.A from Princeton University and her Ph.D. in Biological Sciences from Stanford University and has published her work in community ecology, microbial ecology and conservation biology in journals such as *Nature*, *Science*, *Proceedings of the National Academy of Sciences*, and *Ecology*. She worked as a faculty member in the School of Aquatic and Fishery Sciences at the University of Washington for almost a decade. She also served as Director of Leadership and Diversity in the College of the Environment at UW.

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Abstract

This paper draws on data from the NSF ADVANCE-funded LATTICE program (Launching Academics on the Tenure-Track: an Intentional Community in Engineering) to examine how an interdisciplinary and racially/ethnically diverse group of women worked across different social and professional identities to organize a workshop for early-career women faculty in Engineering and Computer Science. Through participatory action research, we elucidate the social dynamics and power relations involved in forming a coherent group identity, and the boundaries we build and breach to advance a social/intellectual movement aimed at broadening participation in engineering disciplines. We illuminate the strategies of organizers to provide guidelines for others who work across, with, and through various dimensions of difference in social, political, professional, and cultural identities.

Introduction

Increasing and expanding diversity in engineering and computer science has long been a challenge in the United States. Despite moderate growth in other science, technology, engineering, and mathematics (STEM) disciplines such as biology and medicine, engineering and computer science have been identified as disciplines with the smallest measures of growth in representation of historically marginalized populations.³ In the past forty years, there have been many efforts focused on increasing the representation of underrepresented minorities and white women in STEM fields to increase diversity and inclusion in scientific knowledge production. However, few studies investigate how change agents collaborate across differences in disciplines and identity to advance such efforts.

The purpose of this paper is to address this gap by examining a racially and ethnically diverse team of women from a variety of disciplines as they work together to advance faculty diversity in Engineering and Computer Science. We draw on data from the national LATTICE program (Launching Academics on the Tenure-Track: an Intentional Community in Engineering) funded by the National Science Foundation ADVANCE program, a collaborative effort between three public universities to advance early-career women in Electrical Engineering and Computer Science (EECS) and early-career underrepresented minority (URM) women in engineering pursuing tenure-track faculty careers. We aim to adapt, articulate, and disseminate existing professional development models to support the persistence and advancement of underrepresented groups in engineering faculty careers.

In this paper, we examine how gender intersects with race and discipline to create a socio-emotional culture and coherent group identity in the LATTICE organizing team that fosters solidarity among women working for the advancement of other women. We refer to these feelings of solidarity and collective identity as “coherence” within the group. As a coherent group, we recognize ourselves as a group of researchers working together to oppose scientific trends, practices, and cultures that unfairly privilege dominant groups. Here, we focus on our efforts to build trust, rapport and coherence in advance of our programmatic intervention: the two LATTICE symposia. (www.advance.washington.edu/lattice) Our findings are grouped into two distinct types of discourse: *Talking Across Differences* in moments of operational

planning and *Intentionally Breaching the Professional and the Personal*, whereby the ethnographers developed mechanisms to transgress this false binary into the very design of the ethnographic research.

LATTICE includes two professional development cohorts of women in academic engineering and computer science and an anthropological investigation of the values, practices, relationships and philosophies of the organizers. LATTICE refers both to the programmatic interventions aimed at advancing women leaders in academic engineering and also the team organizing them. The interventions have six characteristics that include: **(1)** establishing a national network and professional development cohorts; **(2)** providing career skills in the context of cross-career-stage perspective sharing; **(3)** offering ongoing program and cohort connection; **(4)** creating a space for conversations around the intersection of social identities, especially URM identities, and career experiences; **(5)** offering senior panelists professional development as well; and **(6)** fostering cross-cultural and cross-disciplinary mentoring relationships.

Here we focus on ethnographic data collected in the first stage of this five-year project—a year and a half of creating and sustaining a coherent group of interdisciplinary scholars to create and offer the LATTICE programmatic interventions. Using anthropological methods informed by critical methodologies, we elucidate the social dynamics and power relations involved in the formation of this coherent group and the boundaries we form and breach in order to advance a social/intellectual movement aimed at broadening participation in academic engineering. Social/intellectual movements are a “collective effort to pursue research programs or projects for thought in the face of resistance from others in the scientific and intellectual community... [they are] coherent programs for scientific and intellectual change or advance (p. 206).”¹⁰ In regards to this collective effort among multiple change agents, we ask: **How do the organizers remain attentive to and negotiate differences in social identities and disciplines to form a coherent group that advances the social/intellectual movement of institutional transformation in engineering?** We discuss findings related to how we work across difference and how we actively generate rapport and trust to enrich our commonalities, friendships and shared purposes.

LATTICE as a Coherent Group Contributing to a Social/Intellectual Movement

The LATTICE members are a coherent group, diverse researchers working collectively toward common intellectual and social goals, in opposition to dominant practices and ideologies. The term coherent group was one of many proposed to define our collaboration. All suggested terms were considered and discussed at length over the course of several group meetings. We defined the goals of the LATTICE coherent group in the following terms:

- Form a interdisciplinary group of scholars each with her own voice
- Build rapport across multidimensional differences, including social and professional
- Advance change in academia through a social and intellectual movement in STEM
- Support the success of female faculty in engineering, especially women of color

The LATTICE team consists of a group of eight female scholars from different disciplines, race/ethnicities, sexualities, career stages, workplaces, and socioeconomic and geopolitical backgrounds. Two members identify as African American women, and two members identify as Asian American (Taiwanese and Korean American) women. Four members of the team identify as White American women, one of which also identifies as Jewish American. Two members identify as queer and one is the only LATTICE member not cohabitating with a male partner. Five team members have children and four are pet owners.

Half of the LATTICE team members are engineers, and all of us are active in engineering education communities. The team consists of scholars from a variety of disciplines including industrial and systems engineering, electrical engineering, chemical engineering, ecology and evolutionary biology, sociology, anthropology, and education. In addition to the variety of disciplines, two distinct methodologies are represented in the groups' expertise: quantitative science grounded in positivist methodologies and qualitative scholarship informed by critical methodologies that interrogate both historical structures of domination and everyday practices of exclusion. We also represent the full spectrum of academic career stages from a doctoral student to senior leaders in academia as well as including academic faculty and university staff. The LATTICE team is a collaboration between three public institutions of higher education, two of which are research universities, and one comprehensive teaching institution.

Another important goal of LATTICE is to build upon our prior experiences in social/intellectual movements in STEM. LATTICE is aligned with the mission of the National Science Foundation ADVANCE program to build coalitions among existing transformational efforts and make these innovations highly adaptable. Toward that end, we are integrating three national interventions aimed at broadening participation at the faculty ranks of science and engineering fields in U.S. higher education. Four members had senior leadership roles in these programs, and others in the LATTICE coherent group participated in some of the programs' design, events and extenuating networks. The first program is the University of Washington's WEBS (Women Evolving the Biological Sciences), a professional development symposia for early-career women in ecology and evolution.¹⁶ Another program is BRAINS (Broadening the Representation of Academic Investigators in NeuroScience), a National Institute of Health-funded adaptation of WEBS to a new discipline (neurosciences) that includes symposia followed by Mentoring Circles for early career scientists belonging to groups underrepresented in neuroscience (racial/ethnic minorities and/or people with disabilities).²⁴ Another transformative program that forms the core of the LATTICE initiative is the NSF ADVANCE-funded Peer Mentoring Summits for Women Engineering Faculty of Color. This program was a series of three professional development summits that convened over 90 URM women faculty from a range of engineering disciplines to offer mentoring, encouragement and strategies for persisting and advancing in academia.¹² Thus, our LATTICE collaboration requires building coherence not only across disciplines and social identities, but also blending and adapting all three of these social/intellectual movements for advancing underrepresented groups in science and engineering.

It is also important to note that one person in this eight-person coherent group has long-standing relationships with all of the team members. Because this person has both personal and professional ties with all on team, and many of her relationships span a decade or two, we

consider her the social hub of the group. She defines her role in LATTICE as older sibling: “the shepherd of the group, [which] feels a little different than the organizer.”

While LATTICE explicitly set out to breach traditional boundaries set up by institutions of power, we do not mean to dismiss the importance of shared norms and values. These threads of our identities and experiences, in their rich and complex varieties and overlapping relationship to one another, form a lattice of support for our change agency work and for us. Ethnographic data analyzed across categories of race, gender, and academic disciplines helps elucidate how our interdisciplinary work transforms us, both personally and professionally. The LATTICE coherent group engages in both endogenous and exogenous boundary work to create and generate a successful program that plays a leadership role in the social/intellectual movement to end labor segregation in academic engineering.

Theoretical Framework

Two theoretical frameworks structure this paper: *sociological scholarship* on the emotional dynamics of scientific collaboration^{30, 10, 22} and *Boundary Work*.^{17, 8, 31} Parker and Hackett (2012) define coherent groups in science as “small, self-aware, mutually interaction groups of thinkers who have identified a social problem, analyzed its sources, and devised a solution” (p.22).³⁰ Coherent groups are the intellectual arm of social movements, yet there is little scholarship on how they operate to produce new scientific knowledge and cultural change in scientific institutions.³⁰ This paper addresses this gap in knowledge. Further, we also add to this body of scholarship by providing an intersectional analysis of collaboration across not just scientific disciplines but also across social identities such as race/ethnicity, gender, and sexuality.

Furthermore, scholars from a range of social sciences highlight the important role of emotions in scientific knowledge production.^{2, 34, 30, 34} Integrating science and emotions trouble a foundational tenet of western science— objectivity— and other traditional practices, methodologies and representations in scientific knowledge production. They also help to blur personal and professional boundaries in service of group coherence. Emotions are critical in creating bonds in coherent groups, fortifying the external boundaries around a group and mollifying internal frictions to facilitate collective action—all critical especially to coherent groups who oppose the status quo in science.³⁰

Boundary work explores what happens when socially constructed and imposed boundaries collide and how individuals resist, negotiate, and foster tensions across those boundaries.^{17, 31} In engineering, the “boundary” metaphor has been used to examine the gendered boundaries of the engineering discipline.³¹ In this paper, we engage boundary work to examine how breaching boundaries facilitates coherence within our team. We identify the processes and associated behaviors through which we make boundaries between members salient yet porous to build a coherent community across various dimensions of difference. We refer to this process of acknowledging, resisting, and transgressing boundaries across social and disciplinary identities as “breaching.”

We chose the term ‘breaching’ because it implies a transgression, an infringement of rules, and an invasion of sorts where a barrier is broken through. However, it also provides a hopeful image, as in a whale rising and breaking through the surface of water. When the LATTICE members ‘breached’ boundaries, it involved transgressing traditionally policed boundaries in academia (the personal/professional, boundaries between disciplines) and in many ways, an invasion into new and unfamiliar territory. However, this breaching also offered more clarity of vision and perspective into new and different worlds, and further, allowed each member to be seen by members of these new worlds, as the whale can be seen by birds and people. And just like the whale, while we cannot occupy each other’s worlds for long periods of time, and while we have no claim to those worlds or perspectives, for moments we could clearly see each other, and gain better understanding.

Critical Methodology and Anthropological Methods

Ethnography, a primary tool of anthropologists, is a common method used to understand culture from the perspective of insiders of that culture. Ethnographic methods include participant observation, field memos, autoethnography, interviews, and focus groups interviews.^{35, 36} The methodology of this paper is rooted in critical ethnography, which “begins with an ethical responsibility to address processes of unfairness or injustice within a particular lived domain”.²¹

Decolonizing Anthropology: For the scholar-activist doing qualitative work with the aim of ameliorating oppressive conditions, identity can act as a point of departure for theorizing. People with social identities that are underrepresented in institutions of power experience these institutions differently. Not only are they often presumed less competent than their majority peers, they have different relationships and insights into how power operates interpersonally and institutionally. If identity is a point of departure, what is the intended destination? For the anthropologist doing applied work, one way to use our data is to help facilitate a collective process of discovery that involves multiple perspectives on power, laying the groundwork for articulating a vision of an “anthropology of liberation.” Anthropologist Faye Harrison coined the term “anthropology of liberation,” to describe the nexus where knowledge and praxis intertwine.¹⁵ This approach can illuminate and document not only the texture of underrepresented groups lived experiences but also the power exercised by dominant groups in the reproduction of the status quo. These goals are central to the method of decolonizing anthropology, which requires historically excluded people have an active voice in ethnography. For far too long, underrepresented minority women have been silenced, appearing in texts as “an absent presence” talked about, spoken for, but denied a voice.²⁶ An *active presence* however of underrepresented groups, resists dominance and aptly describes a significant intention of both the LATTICE programmatic *and* research goals. Thus, the goal we are striving toward is for all LATTICE coherent group members to have an *active presence* in this research, the opportunity to co-produce products and outputs if so desired.^{11, 26}

Participatory Action Research: Toward this end, we use participatory action research (PAR), a type of critical methodology that involves participants in the design and implementation of the research. PAR is particularly appropriate in this study because it enables researchers to collaborate and reach consensus with those they study.^{27, 28} PAR uses a method called

“member checking,” as a way to not only to excavate assumptions about our values, norms, politics and philosophies, but also to enable research participants to contest or consent to the way they are represented in a given research project. How people are represented is how they are treated, and anthropology has been wrestling with this power dynamic since the “interpretive turn” in the field.^{7,9} This rupturing moment in anthropology emerged out of broader social movements for justice led by activists from the civil rights, feminist, queer, indigenous and anti-military movements in the second half of the 20th century in the United States. The “interpretive turn” in anthropology is also a reckoning with the discipline’s ties to colonialism and the ongoing, global imposition of hegemonic western value systems.

PAR, like other critical methodologies, opens up a new terrain, a new culture of scientific knowledge production to be navigated. For example, the people being researched are the eight LATTICE team members, who are also creating the new knowledge about shaping cultures of collaborations among change agents in academic engineering to amplify efforts toward institutional transformation. Breaching the demarcation between who is being studied and who is studying is tricky, especially since it challenges the historical and cultural power dynamics in western empirical science in which dominate groups typically study the less powerful. In traditional anthropological studies, or what Forsythe calls “the old story” of anthropology, the researchers and the research participants do not share similar worlds and the latter rarely reads the formers’ ethnography about them.⁹ The LATTICE project follows the “new story” of anthropology in that it is applied, critical of dominant structures of power—both institutional and interpersonal. In this “new story,” the distance between researcher and researched is breached. In this “close-to-home study” of change agents in a social/intellectual movement within engineering, the two ethnographers are studying *very* close to home, studying their colleagues, themselves, and the myriad of relationships among the team.²⁸ This methodological strategy requires new tools and methods and more time and effort than the “old story” of traditional anthropology.⁹

Other traditional ethnographic methods must be adapted when using PAR methods. Akin to other science and technology-focused ethnographies, we rely on a multisited approach.^{13, 14} Our proposed project is multisited and will involve “interacting with informants across a number of dispersed sites, not just in local communities, and sometimes in virtual form (p. 115).”¹³, The ethnographers are attuned to possible qualitative differences—in both tone and content—between data collected in person and data collected virtually. In doing we, we participate in “polymorphous engagement,” meaning we interact “across a number of dispersed sites, not just in local communities, and sometimes in virtual form (p. 116).”¹³

Data Collection: This paper is informed by data from the first 18-months of the five-year project, including: nine individual interviews and three group interviews with the team members, three interviews with participants and panelists at the May 2017 LATTICE workshop, and collected detailed field notes on over 40 observations of online meetings, and 45 hours of in-person observations. The data presented in this paper is a subset of the large data set described above. We center our experiences building a coherent group of diverse scholar activists with prior experience in nation-wide social/intellectual movements to broaden participation in

academic science and engineering. Our findings in this paper are based on ethnographic research activities aiming at intentionally breaching personal and professional identities and data that emerged in team meetings as the group planned the two symposia: LATTICE I, for early-career female faculty in EECS and LATTICE II, for early-career URM female faculty in engineering.

We collected data in a variety of ways: semi-structured interviews, group interviews, detailed meeting minutes, first and second authors' participant observation field notes at bi-weekly group meetings, member-checking responses from non-ethnographer team members and extensive dialogue and debriefing about the data set between the ethnographers for more than two years. A hallmark of anthropological research strategy is participant observation, which involves both participation in and observation of the activities of the people under study. We paid careful attention to the social dynamics and relationships among team members as they work across racial/ethnic identities and disciplines to better understand how best to work across differences to create effective cultural interventions. Two of the eight LATTICE members are leading the ethnography and using member-checking techniques as a way of ensuring internal validity by including all group members' voices and perspectives.^{25, 27} This fieldwork was undertaken in person and virtually; the ethnographers are both researchers and research participants.

Data Analysis: Data were analyzed using open coding. The first and second authors analyzed and noted emerging themes and developed a code book to systematize these themes. The interviews, field notes and meeting minutes were then closed coded using Dedoose coding software. Within Dedoose, the data was extracted by each code and analyzed alongside each other allowing recurring themes and patterns to be collectively analyzed.

Trouble with Anonymity: Tracing recurring moments of resistance and negotiation that arose from differences in our personal and professional lives played an important role in the formation of the LATTICE coherent group. We will discuss these intimacies and tensions. However, given the "small N"³² of the LATTICE coherent group, we will confront difficulties regarding anonymity, a challenge we will use to experiment and advance the terms and bound of qualitative inquiry, especially research with highly underrepresented groups or highly visible ones.^{1, 32} The issue of confidentiality in writing this paper has been paramount. In this early stage of disseminating LATTICE work, quotes are attributed to their speaker using salient aspects of their identities. Stories that required direct attribution were not included in this text because the team is still building consensus on where and when to breach confidentiality in service of honoring a coherent group member's voice and experiences. We recognize that using "strategies to improve anonymity, such as glossing over details" run the risk of overgeneralizing and decontextualizing our findings.¹ We will experiment with other ways to provide anonymity to LATTICE group members and come to consensus which data can breach traditional protocols of anonymity.

Building and Breaching Boundaries

I. Talking Across Difference

A critical part of facilitating coherence in our group was establishing a socio-emotional culture to communicate across various dimensions of difference.³⁰ The members of our team used two

main strategies to breach the boundaries between our various social, political, professional, and cultural identities: (1) members explained their perspectives to their fellow group members, and (2) members validated each other's perspectives. For the purposes of this paper, we will focus on how members' communicated and collaborated across different racial and disciplinary identities.

Explaining Perspectives: Due to the extremely diverse nature of our group, there was a great deal of work involved in building coherence across and through the various dimensions of difference in our group members' perspectives and worldviews. Furthermore, as much of our work was done virtually and many of us did not know each other outside of the LATTICE context, building meaningful relationships across all the members of the group proved to be challenging. However, a priority in our group, as in any degree of relationship building, was for everyone to understand each other's perspectives, and also to be (and feel) understood.

One explicit example of how members engaged with this strategy was designated lecture-style meetings where each member was allowed to run the meeting and design a presentation explaining their work, their professional pathways, theoretical lenses, or any other topic of their choice that they felt they needed the rest of the team to understand. Group members were able to use the lectures to explain philosophical differences in our disciplines, to describe how our work in past symposia might impact the design of ours, or to tell a story about all the life experiences that motivate us to broaden participation of underrepresented populations in engineering. These lectures played a key role in members' abilities to breach personal and professional boundaries by structuring in opportunities for members to explain their perspectives in our work together.

Semantic Consensus Building: In breaching the boundaries between our disciplinary identities, members did a great deal of what we have called "semantic consensus building." It became clear that the type and tone of language used to discuss issues of marginalization was very distinct between the social sciences, field sciences and lab sciences. Throughout our meetings, there were many conversations in which we identified and analyzed the meaning of a term in order to build a body of vocabulary as 'common ground' to stand on as a group.

For example, one conversation involved a discussion on how the group's work would be positioned and framed. Specifically, do we align our work of expanding diversity with an agenda to maximize talent and innovation in the engineering community, or do we align our work with a social justice agenda of interrupting the reproduction of injustices by expanding and redistributing access to power and opportunity in American society? During this conversation, it became clear that the group needed to agree on three layers of boundaries: (1) "What are the boundaries around what qualifies as 'social justice work'?"; (2) "What are the boundaries around who we impact? (the discipline of engineering or wider society?)" ; and (3) "Where are the boundaries around how we situate our work as a group?"

What is important about semantic consensus building is that it does not necessitate ideological consensus. It was critical in our group to decide how the first boundary layer was defined (i.e. What is social justice?), but not the second or third. One potential reason for this is that the second and third boundaries are steeped in information regarding an individual member's personal motivations for engaging in the group's work, and philosophical or ideological

interpretations of how our work is connected to (or not) other political, social/intellectual movements.

The process of semantic consensus building was a critical step to breaching boundaries and facilitating coherence within the group. For example, this particular conversation was a result of noting a disciplinary difference in how ‘diversity work’ was framed and discussed. STEM literature often leaned towards the ‘maximizing talent’ narrative,²⁹ while the social scientists of the group were more familiar with social justice frameworks. However, one member noted that this boundary was not useful or necessary, and extremely ‘breachable.’ She stated: “In terms of social justice versus maximizing talent, I don’t think they are mutually exclusive, and the focus will change based on the audience. It has to translate and account for economics- it’s not one box or another, but how they are together.”

In this quote, the participant identified that while we do not need to agree on whether we want to prioritize one agenda over the other, it is important to recognize that both exist, and we can breach differences in disciplinary cultures by being strategic in our choices to emphasize one or the other depending on the values and stances of our audience.

Storytelling: Another strategy used by our team members was storytelling. Storytelling was used as a strategy to address or bring up dissenting opinions and concerns by group members. As Mattingly (2007) points out, stories often play a critical role in professional decision making.²³ In our group, these stories played an important role in maintaining coherence in our group by allowing the space for group members to disagree and be critical of each other while also working to prevent, manage, and address any tensions, concerns, or negative emotions that may arise in the group. Storytelling allowed group members to contextualize their concerns within their own personal lived experiences and worldviews. In other words, participants were able to build a boundary around their opinions and perspectives in order to communicate and provide insight to those who did not share that boundary.

For example, team members often used storytelling to bring up concerns they had on how programmatic decisions might impact the experiences of the participants who identify as part of an underrepresented racial or ethnic group in engineering. These concerns were brought up by using their own personal and lived experiences in other workshops where they might have felt offended or unsafe to fully participate or engage with a particular activity. Storytelling was an essential strategy of identifying issues from other experiences to ensure that the current one would be different and better.

Another function of storytelling was to advocate for groups that were not represented on our team. One team member, for example, used storytelling to advocate for people who identified in between the identity categories appointed by our symposium such as non-binary gender identities or mixed-race women. In this way, storytelling was not only used for personal advocacy, but to also act as allies and advocate for the perspectives that were underrepresented on or absent from our team.

Validating Perspectives: In order for either of these two strategies to be successful, it was important for the other group members to consistently validate the perspectives that were

explained by individual group members. In both types of conversations, interactions always involve building on information presented and not on questioning the information itself.

While criticism and skepticism are important components of collaborative efforts, in the processes of semantic consensus building and storytelling validation is more productive as information is always presented as bounded within personal experience, perspectives, and emotions. In the process of semantic consensus building, for example, participants bounded their definitions and understandings of words within their own worldviews (e.g. “in my field, it means X) in order to build a shared understanding of a term. Validation served as a way to show the respect for each other’s disciplines, abilities, and expertise that was a critical component to establishing and maintaining coherence across differences in our group.

Similarly, in the process of storytelling, participants would use stories to say, “As a person from X identity, I experience this. Participants from this identity might also experience this.” In this case, it would not be useful or wise for a person who did not share such insight into a particular experience to say, “You did not experience what you felt you experienced.” They could, however, elaborate on how their experiences might differ or be similar to add nuance or expand on such knowledge.

For example, in one instance while discussing the schedule of the symposium, one group member told a story about a symposium where a strong sense of community was present due to a shared racial identity among the participants. She used the story to point out the power of using shared lived experiences to foster a supportive and cohesive culture, and wanted to push the rest of the team to build this in explicitly into the schedule.

To validate her perspective, a fellow group member said,

“I completely agree with everything you’re saying...There is something that’s different because you’re part of the central team in a way that other people haven’t been in the past, but I think everything you’re saying aligns really well with our vision of what the symposium looks like and what happens and makes it great. There are more thoughtful things that need to be done based on your ideas and things you’re bringing up.”

In this way, the story that was told, while still bounded by her individual experiences with people who shared her particular racial identity was easily translated into a productive conversation about the workshop’s curriculum by validating her expertise stemming from her leadership experiences, while also acknowledging how the “central team” benefits from her contributions.

II. Intentional Breaching of the Personal and Professional

In both our group collaboration and the design of our programmatic intervention, the LATTICE coherent group resists normative bounded categories. For example, from the early moments of this project’s conception, we intentionally and explicitly aimed to breach the cultural norms dividing scientists and engineers’ professional and personal identities. We do this transgressive work in both our coherent group and in the LATTICE symposia, using techniques from LATTICE team members’ prior experiences as leaders and change agents in engineering. Our

method is also informed by critical race feminism articulated by “Black women who argued within the broader feminist movement: ‘the personal is the political’ (Taylor 2016).”³⁷ In halls of academic science and engineering, the boundary between the personal and professional is often rigid. In the context of the LATTICE group, we recognized how the policing of this boundary creates hostile environments for non-white and non-male identities in academic ‘work’ spaces. Thus, we reject this false binary and its attendant cultural values. To do so, we engaged in three activities— 1) team meetings; 2) Identity Examination; and 3) a LATTICE coherent group retreat in June 2016—with the goal of breaching the professional and the personal to systematically elucidate the best ways to work across difference to increase the retention and advancement of women in academic careers.

1) Identity Examination: There is a critical need to better understand alliances between female URM and non-URM scholars in academia and how these alliances can work to create institutional transformations in the academy.⁵ From the beginning, the LATTICE coherent group was determined to grapple with how race/ethnicity and gender intersect to form “interlocking oppressions”.⁴ This required that we better understand each other’s personal identifications and identity politics. The ethnographers devised a process that sought to share and validate the particular experiences of each team members’ as they related to our identities. Inspired by a lesson plan from Teaching Tolerance, in this activity, group members were asked to write down five different aspects of their identities (e.g. race, ethnicity, sexuality, political affiliations, family roles) and then explain to the team why they chose those five social identities. We aimed in this exercise to help displace white privilege from the center of LATTICE practices and outputs, as well as other privileges like heteronormativity, class status, and career stages.

Another purpose of this activity was to understand which identities are most important to group members, how these identities intersect with our work in designing professional interventions for women. Additionally, this Identity Examination activity helped LATTICE team members illuminate and reflect on the aspects of our identity that motivate our work and our engagement in this social/intellectual movement in academic engineering. Further, our professional activities shape and are shaped by our lived experiences. Sharing our lived experiences helped us understand one another’s emotional and political standpoints that serve as a wellspring of creativity and motivation in the theorizing and application of the new knowledge we are co-creating.

2) Team Meetings: The LATTICE coherent group meets for biweekly video conference calls. In this paper, we discuss data from the first 18 months leading up to the 2017 LATTICE I symposium. At the suggestion of team’s “older sibling,” we established the custom of “worlds checks”²² where each group member gave brief ‘check-ins’ on what was going on in their ‘world’. For example, some common topics of worlds checks were members’ struggles with family, finances, or health, or exciting news such as buying a home, planning a major celebration, or vacation stories. The worlds checks were essential to the establishment of ‘coherence’ in the group, as group members could provide brief glimpses into their worlds and perspectives. Worlds checks were also essential in creating opportunities for group members to feel vulnerable, self-disclose intimate information, and foster feelings of trust and respect. The team agreed that conversations from world checks are inadmissible in the research data set.

Much like the *Every Other Thursday* group, another all-female coherent group of scientists,⁶ team members share both challenges and rewards in both our personal and professional lives. Responses often include congratulations, support, mentorship, care packages, laughter and validation.

3) *LATTICE Team Retreat Organizers Only (June 2016, Seattle)*: Through our use of video technology, LATTICE members from all three sites can meet regularly and have the opportunity to observe and respond to each others' facial expressions and body language. While the video conferencing enriches our coherence, the team decided an in-person retreat would allow us to deepen our personal bonds and work together. During this team retreat, all eight members participated in LATTICE I Symposium logistics planning, including a site tour of the location for the symposium, and ethnographic research activities, including individual and group interviews. The planning activities gave us ample opportunity to talk informally and experience Seattle as a place and culture—an experience new to some, familiar to others and deeply nostalgic for another. The research also had positive outcomes in regards to building trust and rapport and a greater understanding of each others' strengths, values, politics, prior experiences in social/intellectual movements and intrinsic motivations. For example, the group interview began with the question: In regards to the intersecting lattice of our identities, how can we have hard conversations in order to facilitate an inclusive, lasting community? The question sparked a conversation that addressed a range of critical topics, including 1) whether the design of our two symposia asks women engineers in EECS to choose between their race and discipline; 2) our lived experiences at past diversity in STEM forums; 3) balancing anonymity and the *active presence* of all members in the ethnographic research. We also discussed Seattle Gay Pride and our various comfort-levels with this annual celebration and the meaning of the event within this particular city. The retreat culminated with a ferry ride in the Puget Sound where we shared heartfelt emotions regarding our collaboration and our time shared together in Seattle.

Future Directions

After the May 2017 LATTICE I symposium for early-career women in EECS, the LATTICE coherent group is now in its Phase II stage of research. Augmenting the ongoing data collection activities that dominated Phase I, we are now also in the process of data analysis and dissemination. Therefore, we are now working to build consensus in Phase II on activities regarding several critical elements of the LATTICE team's coherence, including: authorship, data sharing, informed consent, anonymity and baseline references to the critical influences in all aspects of our program—WEBS, BRAINS, and Peer Mentoring Summits for Women Engineering Faculty of Color. As discussed above, we are also concerned with working together to create a comfortable, safe environment for women of color engineers at the LATTICE II symposium, where the issues of gender and race are not viewed as mutually exclusive,¹⁹ women of color are heard and validated, and the women whose race/ethnicities are overrepresented in the academy refuse to leverage their undeserved advantage and privilege. Representation of scholars from the lesbian, gay, bisexual and transgender community (LGBT) was lacking at LATTICE I and more planning is needed to address this at the LATTICE II symposium. Finally, another challenge ahead is to be true to the critical, decolonizing methodologies undergirding the LATTICE ethnographic research so that all coherent group members are co-producers of this emerging, innovative knowledge.

Scholarly Significance

Diversity has been an increasingly poignant topic of engineering education research. Being able to engage with and respect diverse people, cultures, customs, and perspectives has often been positioned as a fundamental dream, possibility, and goal of engineering educators, but the vision's manifestation remains nascent. This paper makes a methodological contribution to research on diversity in science and engineering by identifying coherent practices and strategies that foster interdisciplinary collaboration that work across, with, and through various dimensions of difference in social, political, scientific, and cultural identities. In addition to identifying findings that are consistent and compatible with existing research that emphasizes the importance of processes in impacting individuals' internal motivations and identification with a given group,³⁸ we further identify three actionable strategies that not only impact individual engagement, but also the group's coherence across multiple dimensions of difference. A work in progress, our *semantic consensus building*, *storytelling*, *consistent validation*, and *intentional blurring of the personal and professional*, our group builds and breaches boundaries of difference between our personal and professional identities to create a coherent group working for the social/intellectual movement to diversify science and engineering fields.

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