Overrepresented Not-Marginalized: Unpacking the Racialization of Asians and Asian-Americans in Engineering Education

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Overrepresented ≠ Not-Marginalized: AsianCrit's Potential for Unpacking the Racialization of Asians and Asian-Americans in Engineering Education

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Abstract

While there has been significant attention toward exploring the experiences of historically minoritized students in engineering, such as Black, Latinx, indigenous, and other students of color, relatively little research has been devoted to Asians and Asian-Americans in engineering. Asian and Asian-American engineers comprise the majority of non-White engineers, representing 12.2% of science and engineering bachelor's degrees earned and over one-third of tenured or tenure-track engineering faculty in the United States in 2018 (NCSES, 2018; ASEE, 2018). As the largest non-White group, they have played a unique racialized role in engineering, at once being cast as the "model minority" yet often overlooked as a minoritized group or viewed as a "perpetual foreigner" within White-dominated engineering spaces. In addition, legacies of Asian and Asian-American racialization, defined as the social, political, historical, and cultural processes that produce racial categories and attach meaning and value to those categories, manifest in complex, nuanced ways in engineering contexts (Iftikar & Museus, 2018; Omi & Winant, 1986). In this theory paper, we briefly survey the extant literature of Asian and Asian-American experiences in engineering and STEM education and identify areas for furthering structural critique in engineering education through Asian Critical Theory (AsianCrit). AsianCrit can be used to unpack the unique systemic structural forces and narratives that position Asian and Asian-Americans within a racialized engineering culture and how those forces continually (re)make their racialization and minoritization in engineering education. We conclude with how AsianCrit may highlight the unique challenges that Asian and Asian-American students encounter and resist as they navigate engineering education as well as provide pathways toward intersectional critique, social justice, liberatory policy and praxis, and solidarity with other minoritized groups in engineering.

Keywords: Asian/Asian-American, AsianCrit, critical race theory, engineering culture

Introduction

In engineering and STEM education, Asian(Americans) remain an "awkward question" [1], as their significant overrepresentation in engineering student and professoriate bodies have persisted year-over-year compared to other non-dominant racial groups. This fact has caused legislators, educators, researchers, and practitioners to categorize Asian(American) students in STEM disciplines as privileged [2], [3]. While some researchers justify this non-marginalized classification by arguing that overrepresentation gives them greater ability to "negotiate and transcend" engineering culture [2], [4, p. 491], previous work on Asian(American) STEM students and practitioners have countered this narrative by showcasing the complexities of their racialization in STEM contexts [5]–[10]. Yet the overrepresentation-privilege association perniciously persists, leading to a significant dearth of research on Asian(American) engineering student experiences.

Our goal is to disrupt the narrative that overrepresentation equals privilege for Asian(Americans) in engineering. We argue that Asian(Americans) encounter and navigate complex minoritization

practices, positions, and power structures that exist within a White-dominated cis-heteropatriarchal engineering culture and institution. In this paper, we apply Asian Critical Theory (AsianCrit) to situate Asian(American) student experiences to unpack how race operates within engineering education to maintain oppressive power structures more broadly. Through the perspective of Critical Race Theory, AsianCrit offers intersectional approaches to the study of race in engineering, opening new modes of coalition-building and resistance in engineering education.

Before embarking on this paper, we must be clear: we do *not* seek to minimize the minoritization experiences of other marginalized racial groups, particularly Black, Brown, Indigenous, and other People of Color, by focusing the spotlight on Asian(Americans). Our goal is *not* to identify the "most oppressed" group or promote a linear racial hierarchy along which every race is placed. Our goal is to highlight the need to understand Asian-American racialization in engineering education not only to examine experiences beyond the Black-White binary, but also to better understand how race and racialization operate more broadly to reify normative structures and ruling relations of Whiteness and cis-heteropatriarchy in engineering [11]. As we will discuss, narratives of Asian achievement and success are often rooted in smartness, Whiteness and ableism, subjugating Asians and Asian-Americans to unique derivatives of common racialized narratives surrounding achievement [5], [7], [12]. By understanding through AsianCrit how these narratives also dehumanize Asian(Americans), we are better-positioned to chart paths toward building solidarity with other marginalized groups, challenging the dominant racial order, collectively dismantling racism and other forms of oppression, and uplifting all marginalized groups in engineering.

Positionality and Language

As researchers, we recognize that our lived experiences inform the work that we do and the perspectives that we contribute to the research literature. This paper was sparked by a graduate course that the lead author took in Fall 2022 and additional dialogues with Asian and Asian-American Studies scholars. Jerry identifies as a gay East Asian-American cisgender man and engineering PhD student whose engineering education research centers on the intersections of engineering and social justice. In developing this work, Jerry, drew on his experiences as an engineering student and personal conversations with other Asian-American engineering students to further sharpen the theory. antonio engages this project as a Filipino American man, higher education scholar, and formally-educated and formerly-practicing engineer. antonio's perspectives are derived from those identities and experiences. Sheri engages this project as a white female academic whose is formally educated in mechanical engineering. Besides teaching engineering and design for nearly four decades, she has researched students' pathways through engineering and into the workplace for over 20 years with particular interest in diversifying engineering.

We also recognize that language plays a significant part in shaping the ways in which marginalized groups are constructed. The Asian diaspora is constructed of many different ethnicities with unique histories and experiences that shape their lived experiences within engineering, and the term "Asian-American" was constructed within the United States context to represent political solidarity across the many diverse cultural, national, and ethnic groups across the Asian continent who have made their way to the United States [13]. However, this term may promote essentialist pan-Asian understandings and reify the social construction of "Asian" as a

singular category. For the remainder of the paper, we follow Chen and Buell's term "Asian(American)" to refer to "people with Asian ancestry in the United States, regardless of citizenship status, who self-identify or are identified as Asian by census forms and what the Supreme Court in *United States v. Bhagat Singh Thind* (1923) called 'in accordance with the understanding of the common man'" [6, pp. 609–610].

Background

Asian(Americans) have occupied a particularly fraught and constantly evolving position in U.S. racial hierarchies. We define *racialization* as the continuous, active, sociocultural, historical, and political processes that produce racial categories and attach meaning to them [14]. As the only racial group to be explicitly legally excluded from immigration through the Chinese Exclusion Acts and incarcerated *en masse* by World War II Japanese internment, they are racialized in a multitude of ways, from the model minority to the perpetual exotic foreigner to the yellow peril [15], [16]. Furthermore, the histories of U.S.-Asian relations and U.S. geopolitical involvement in the Asian continent have created a diverse set of histories, experiences, and pathways for Asian people to migrate into the United States, generating vastly different experiences of the U.S. racial hierarchy among different ethnic groups. While these histories are out of the scope of this paper, we encourage readers to explore them to gain better understandings of various cultural backgrounds. Some references are listed here: [15], [17]–[23]. In this section, we give a brief historical overview of Asian(Americans) in STEM and engineering. Then, we discuss the current racial landscape for Asian(American) engineering students and how their racialization intersects with engineering culture.

Asian(Americans) in STEM: A Brief History

Asian(American) immigrants first entered the United States *en masse* in the mid-1800s to early-1900s in a newly industrializing America. These immigrants, primarily Chinese and Japanese, provided a source of unskilled labor that White elites (defined as White people in positions of social, political, economic, or institutional power) preferred over Black and Indigenous slaves because they were often seen as apolitical, unresisting, and more intelligent [15]. However, as the country industrialized and labor markets shifted through World War II, perceptions of Asian(American) immigrants shifted to the "yellow peril", with many White Americans fearing that Asian(Americans) would soon threaten White-controlled livelihoods and national security [6], [15].

During the Cold War, U.S. interests in developing a strong, highly-skilled science and engineering workforce led to significant shifts in national education reform [24]. With education programs shifting to support rising international military and technological threats, the US also turned to Asian(Americans), particularly immigrants, as an 'ideal workforce' that was seen as "docile, cheap, and hard-working" [6, p. 612]. The 1965 Hart-Celler Immigration and Nationality Act opened the legal door for highly skilled workers to gain a science and engineering education within the US through the H-1B (worker) and F-1 (student) visa programs, enabling a large influx of Asian migrants to establish themselves in American society via entering the US STEM labor force [6]. While previous waves of Asian migration were male-dominated and workers had low socioeconomic status in their home country, contemporary Asian immigrants under H-1B and F-1 visas are highly diverse in gender, socioeconomic status, and geographic location [17]. Today, immigrants from India (74.1%) and China (12.4%) make

up over 85% of H-1B visas as of FY2021, and 86.4% of H-1B visa holders work in STEM fields [25].

The overrepresentation of Asian(Americans) in STEM fields have rendered them both hypervisible and invisible in discourses of STEM equity. On the one hand, Asian(Americans) are hypervisibilized in STEM equity discourses as the "model minority" – the stereotype that all Asian(Americans) are academically successful, particularly in STEM disciplines [5], [7]. This stereotype has led to some educators and researchers participating in discourses that reify Asian(American) "achievement" through means such as signs that racial inequity does not exist within the neoliberal capitalist U.S. STEM education system [6], [16] or as the "good students" that Black and Brown students should aspire to [6], [9], [21], [26]. On the other hand, this sweeping overgeneralization that Asian(Americans) are doing "just fine" invisibilizes the vast intraracial achievement gaps based on ethnicity, class, immigrant status, and other characteristics [27]–[30] and marks Asian(Americans) as irrelevant – if not social "spoilers" – in discussions about equity [9], [16], [27]. As a result, Asian(Americans), particularly non-East (e.g. Chinese, Japanese, Korean) and non-South (e.g. Indian, Pakistani, Bangladeshi) Asian(Americans), who are not academically successful in STEM disciplines are often overlooked and underserved [7], [9], [29].

The multiple and often contradictory racializations of Asian(Americans) in STEM education as model minorities, idealized labor, quiet, hardworking, naturally talented in STEM yet also as perpetual foreigners, yellow peril, and immigrant threats showcase the complex and continuously evolving positioning of Asian(Americans) within broader narratives of equity in STEM and engineering. In presenting AsianCrit, we hope to give a starting point for engineering education researchers and practitioners to challenge and explore these complex racializations and how they function in parallel with other racialized narratives such as anti-Blackness in engineering to create caricatures of who is (allowed to be) successful in engineering.

Theories of Engineering Culture and Race

Various theoretical frameworks have been developed about and applied to engineering culture. A full survey of all the theories that have been applied to engineering culture is out of the scope of this work; by identifying one theory and showcasing its utility in theorizing about race and racialization of Asian(Americans), we hope to spark additional conversations about and explorations of how theories of engineering culture intersect with critical race theories.

One predominant framework used in engineering education to describe engineering culture is the culture of disengagement, first posed by Cech in 2014 [31]. The culture of disengagement describes the cultural processes by which engineering students' interest in public welfare issues decrease as they persist in engineering programs [31]. For this paper, we focus on the three pillars of the culture of disengagement: depoliticization, meritocracy, and techno-social dualism. Cech defines these terms as follows:

> [The culture of disengagement] has three pillars: the ideology of depoliticization, which frames any "non-technical concerns" such as public welfare as irrelevant to "real" engineering work; the technical/social dualism, which devalues "social" competencies such as those related to public welfare; and the meritocratic ideology, which frame existing social structures as fair and just [31, p. 45].

Previous work has explored how each pillar of the culture of disengagement manifests in engineering education, particularly in creating cultures of silence, continued marginalization, and microaggressions around issues facing marginalized engineering students [32]. While we do not limit our theory to these pillars, they are useful as a starting point for theorization.

In addition, within the past decade, significant attention has turned toward embracing critical theories in understanding marginalized students' pathways through and experiences of engineering culture. Researchers have used a variety of theories, such as feminist standpoint theories [11], Critical Race Theory [33], queer theory [34], intersectionality [35], and others, to center the voices and lived experiences of marginalized students within engineering education literature. As critical equity-centered approaches have become more mainstream in the literature, researchers have begun to challenge the interlocking systems of power, privilege, and oppression that act on marginalized engineering students [11], [33], [36]–[38]. These theories have often worked in tandem with theories of engineering culture to call out the ways in which oppressions materialize in engineering education, including racism, sexism, ableism, capitalism, and neoliberalism [11], [39]. We position our work in conversation with this literature base, in particular drawing on AsianCrit, an extension of Critical Race Theory, and the culture of disengagement [40].

Critical Race Theory (CRT), and more specifically AsianCrit, have sought to illuminate the ways race have been integrated into all aspects of modern life. Critical Race Theory is generally outlined with five to seven interlocking key tenets [41] (Fig. 1):

1. Ordinariness of racism - Racism is the usual way society operates and serves important purposes for the dominant group
2. Material determinism and interest convergence – Racism manifests in material ways through law, policies, and structures, and racial progress is only made when it advances the interests of White elites
3. Social construction thesis – Race is a product of social thought and relations
4. Differential racialization – Dominant societies racialize different racial minority groups differently at different times in response to shifting needs
5. Intersectionality & anti-essentialism – No person has a single, easily stated, unitary identity, and all people have lived experiences at the unique intersection of their identities.
6. Voice-of-color thesis – Because of histories of oppression, people of color have unique voices and narratives that those in power (White elites) cannot know

At its core, CRT argues that race is both *sociocultural* and *material*; that is, race is a social construction that has real political, institutional, and structural materializations. In addition, CRT is both *empirical* and *activist*: in eliciting the materialization of racialization through sociopolitical and institutional structures, it actively participates in the dismantling of such structures. CRT also views race and racism as enacted by *Whiteness*, defined as the processes, practices, and policies by which hegemonic, dominant White elites seek to maintain privilege and power within their ranks and thereby dehumanize non-Whites as second-class citizens [42], [43]. However, a limitation of CRT was its focus on Black Americans' experiences: subsequent scholars have developed additional CRT-based frameworks such as TribalCrit and LatCrit to highlight the unique conditions and attendant racialization processes specific to that group. In 2014, Iftikar and Museus proposed AsianCrit, adding, tailoring, and extending several CRT

tenets to respond to the complex ways Asian(Americans) were often positioned alongside with yet not quite of the same status as Whites [40]. We discuss each tenet of AsianCrit in detail in the next section.

Asian(Americans) in Engineering Education

According to the American Society of Engineering Education, Asian(American) engineering students make up 16.1% of non-White undergraduate engineering students, just under three times the proportion of Asian(Americans) in the national (U.S.) population [44], [45]. In addition, Asian(Americans) make up almost 30% of the engineering professoriate, up from 24% in 2010 [44]. However, in our literature search for this paper, we found fewer than ten studies focusing specifically on Asian(American) student experiences in engineering. While other studies have reported results for Asian(American) students within the context of understanding broader racial patterns, the significant lack of academic attention, particularly compared to that toward Black and Hispanic/Latinx engineering students, showcases an urgent need to forefront Asian(American) engineering student experiences in engineering education scholarship.

Previous work on Asian(American) engineering students have primarily focused on how Asian(American) students navigate identity formation and stereotype threat in the classroom. In their mixed-methods study, Trytten, Lowe, and Walden found no quantitative support for the model minority stereotype for Asian(American) engineering students but highlighted the significant detrimental psychological effects of the stereotype on Asian(American) students [7]. Disaggregating by various ethnic groups, Ing and Victorino found that classroom engagement was higher for East Indian/Pakistani subgroups compared to Chinese, Filipino, and Thai subgroups [46]. However, they note that due to low effect sizes, their conclusions may be limited [46]. During the COVID-19 pandemic and the rise of anti-Asian sentiment in the United States, Ausman, Akera, Cheville, Appelhans, and Shuey found that pan-Asian discourse significantly influenced Asian identity and the politicization of Asian(American) engineering students [47]. These studies begin to tie broader racializations of Asian(Americans) into engineering culture, providing a baseline for theorizing about the multitude of narratives that characterize power, privilege, and oppression in Asian(American) engineering student lives. However, additional work must consider the intersecting theoretical foundations that undergird Asian(American) engineering student experiences.

AsianCrit: Tenets and Possibilities

We argue that engineering sociocultural processes deeply intertwine with structural oppressions to create unique racialized experiences for Asian(American) engineering students. AsianCrit, a form of Critical Race Theory, allows us to unpack these racialized experiences within engineering. In this section, we define each tenet of AsianCrit and describe how engineering sociocultural processes intersect with it. While the sectioning of each tenet discretizes the theory on the page, each tenet intersects in complex ways with other tenets, creating a nuanced web of connections between the theory and engineering culture (Fig. 2).

Asianization

Asianization is the process by which Whiteness racializes certain bodies as “Asian” [40]. Associated with this label are a variety of stereotypes, narratives, and perceptions that have been written onto Asian(Americans), such as the model minority, perpetual foreigners, yellow peril,

sexual deviants, and bamboo ceiling [30], [40]. These constructions materialize in institutional policies and programs that write Asian(Americans) either out of engineering education discourse entirely or into engineering education as a privileged ingroup.

In engineering disciplines, pervasive narratives that Asian(Americans) are uniquely good at mathematics, science, and engineering highlight Asianization. These narratives are one manifestation of the model minority myth, commonly defined as the myth that Asian(Americans) are universally successful and do not face racial challenges [48], [49]. Extensive literature exists on the construction, materialization, hyper-visibilization and invisibilization, and harms of the model minority myth in education and broader culture. However, in engineering, the model minority myth is enhanced due to engineering's meritocratic cultural ideology and the highly technical and mathematical nature of the discipline. These phenomena produce entry points for dehumanizing narratives such as abnormal intelligence and mathematical ability [5], leading to hypervisibility, tokenizing, and spotlighting for Asian(American) engineering students [7]. In addition, in the broader US political landscape, Asian(Americans) have often been viewed as apolitical and not a part of American civic life, a phenomenon termed by Kim as "civic ostracism" [15]. The fact that Asian(Americans) are racialized as apolitical and abnormally technically capable aligns well with the values of depoliticization, techno-social dualism, and meritocracy in engineering spaces to reinforce confirmatory narratives of universal Asian(American) success and smartness in engineering education despite substantial evidence to the contrary [7].

The overrepresented-privileged association is one version of the model minority myth, as it rests on two assumptions: first, that overrepresentation is a form of success in equity and inclusion, and second, that overrepresentation directly confers privilege onto overrepresented bodies. These assumptions stem from socio-scientific perspectives on equity that value increasing representation rather than social justice. Solely valuing representation represents a frequentist approach to equity that ignores the broader goal of dismantling oppressions and serves as a neoliberal form of dehumanization. In the social sciences, frequentist approaches have been criticized for obscuring the often-racialized and highly social processes by which supposedly neutral, objective numbers are generated, particularly to reproduce deficit narratives of marginalized groups in education [50]. The overrepresentation-privilege association relies on frequentist approaches that may appeal to engineering, as quantifying and operationalizing equity through representation enables technical statistical methods to uncover trends in achievement, depoliticizing and reducing the highly complex social racializations that produce the numerical trends to seemingly objective metrics. Furthermore, this operationalization of equity strips the numbers from their human ramifications and vice versa, creating a dehumanizing narrative that ignores the lived experiences of marginalized people [36], [51]. As such, overrepresentation combined with pro-Asian sentiment obscures the multitude of ways Asianization occurs to negatively impact both Asian(American) engineering students and other historically marginalized groups [52]. By tacitly ascribing privilege to overrepresented bodies, particularly Asian(Americans), researchers perpetuate divisions within marginalized communities and inhibit solidarity and coalition-building to promote social justice [52].

Being racialized as both model minorities and spoilers in equity discussions positions Asian(Americans) in a unique location in the "field of racial positions" that Whiteness creates for non-White bodies. Through the process of Asianization, Asian(Americans) are subjected to so-called pro-Asian sentiment that also marks them as abnormally different and therefore

dehumanizing in the larger racial hierarchy of the United States, which is enhanced through meritocratic and techno-social values in engineering [5], [52]. As a result, East and South Asian(Americans) are often read as more "natural" engineers, often at the expense of other underrepresented Asian ethnic groups, and of Black and Brown students/engineers. Engineering educators and researchers must attend to these racialized dynamics in crafting equity-based programs, policies, and research to ensure that Asian(Americans) can fully participate in engineering.

Transnational Contexts

Transnational contexts highlight how Asian(Americans) are subjected to broader global geopolitical forces and relationships at multiple levels. At least two key areas of inquiry emerge under this tenet: first, how Asian(Americans) are racialized in the broader US political landscape impacts how Asian(American) engineering students are racialized, and second, Asian(American) immigrants comprise a significant number of H-1B and F-1 student visas.

Asian(Americans) often find themselves caught within the crosswinds of political change. With histories of US involvement in Asia, US-China relationships, and anti-Asian hate, Asian(American) students must navigate a complex racial hierarchy in which their position is constantly in flux. Previous work has shown that Asian(American) engineering students navigate this dilemma by applying the engineering culture of disengagement, with some students describing the perceived apolitical nature of engineering as a boon [47]. By focusing on technical topics, some Asian(American) engineering students see engineering as an insulating force between broader sociopolitical processes and their own personal lives [47]. Future work must unpack the racialized dynamics and processes by which Asian(Americans) negotiate the US political landscape.

As mentioned above, the Hart-Celler Act enabled a significant influx of highly skilled Asian immigrants, particularly from China and India, into US engineering education programs. Immigrant experiences have remained largely unexplored, particularly in engineering and STEM education. However, research on undocumented Asian(American) immigrants has shown that unique forces of criminalization, fears of deportation, and nondisclosure create lasting traumas and resistance strategies to protect their presence in the US [53]. These forces may impact Asian(American) immigrant students, particularly graduate students, as their visas are often tied to their ability to succeed in a doubly meritocratic institution of engineering and academia. Future work must explore these intersections and their impact on Asian(American) engineering students' experiences.

(Re)constructive History

(Re)constructive history focuses on redressing the issue that Asian(Americans) are often invisibilized in US history [40]. By writing Asian(Americans) back into historical narratives of the US, Asian(Americans) resist attempts to erase their histories, identities, and cultures and recenter their own experiences in historical discourse about their own identities. (Re)constructive history also seeks to re-historicize the processes that create the current state of engineering education. In thinking about Asian(American) engineering student experiences, we must consider historical immigration policies, the Hart-Celler Act, refugee resettlement programs, and other ways the US has leveraged Asian(Americans) as an idealized STEM/engineering labor force, as discussed above.

Due to their consistent invisibilization, Asian(Americans) are not necessarily acknowledged or credited for their scientific and intellectual contributions to technological advancements within the United States [6]. Chen and Buell note that Asian(Americans) likely account for much of the scientific and intellectual advancements leading to and during the Technological Revolution over the past century. In particular, Chen and Buell discuss how Asian(American) immigrant women formed the backbone of the semiconductor industry by working in Silicon Valley-based factories, and Asian(American) men fulfilled roles as engineers, designers, researchers, and scientists to push the frontiers of semiconductor devices [6]. However, their contributions have often been overwritten by broader narratives of scientific progress of the United States as a whole – when new technical innovations are announced, (predominantly White) business leaders and government officials hail their achievements as part of the greater US technological enterprise rather than centering those who developed the innovations. This example of (re)constructive history illustrates how neoliberal and capitalist systems leverage techno-social dualism to separate the technical innovations from their social histories and, in doing so, support attempts to invisibilize the people behind the engineering.

Strategic (Anti)essentialism

Strategic (anti)essentialism recognizes the ways that Whiteness understands Asian(American) as a monolithic group in the US as well as the ways that Asian(Americans) have actively resisted pan-Asian narratives and sought to build coalitions between ethnic groups. As Espiritu writes, strategic essentialism is how Whiteness controls access to resources while ignoring the complexities of racial and ethnic dynamics [30], and strategic anti-essentialism is how Asian(Americans) resist those processes. Each ethnic group under the Asian(American) umbrella has its unique history and pathway to the US, often intertwining with transnational geopolitical forces. For example, Lee and Zhou describe the distinct histories of Chinese Americans and Vietnamese Americans, particularly how the former are highly skilled and socioeconomically diverse whereas the latter often came to the US as refugees due to US imperialism in Southeast Asia [17]. Scholars have also examined the experiences of Hmong, Cambodian, and Lao students, particularly as they have had unique experiences of statelessness and displacement before coming to the US [22], [28], [54]. These ethnohistorical differences have led to differential access to education resources, leading scholars to observe an "intraracial achievement gap" among the various Asian ethnic groups [29]. Previous literature on various Southeast Asian(American) groups illuminates that non-East or South Asian students are often exposed to "failed minority" stereotypes – because they are Asian, they are expected to be successful, but because they are not East or South Asian, their academic achievement is policed more heavily than East or South Asian students [12], [55]. However, strategic essentialism also plays a role in coalition-building and resistance: the term "Asian-American" arose from the need for political solidarity across Asian ethnic identities in the United States and continues to play a role in political action groups fighting for social justice [13]. These tensions between essentialism, anti-essentialism, and coalition-building highlight the nuances of the strategic (anti)essentialism tenet in AsianCrit.

Engineering education research has, in large part, essentialized the Asian(American) category as a monolithic group and failed to recognize the tensions within the pan-Asian narrative. Across both quantitative and qualitative traditions, this form of Asianization allows overrepresented ethnic groups to dominate the narrative of Asian(Americans). Future research must consider

intersections of race and ethnicity, such as through the different versions of the model minority stereotype for different Asian ethnic groups in engineering.

Intersectionality

Intersectionality is a theory, analytical tool, and heuristic that argues that Whiteness, racism, and other systems of oppression intersect to create unique marginalizations and lived experiences for multiply marginalized peoples. While a full discussion of intersectionality is outside the scope of this work, intersectionality is grounded in radical activist histories of Black women and seeks to center multiply marginalized people in solidarity and liberation efforts [41], [56]–[60]. In engineering education research, the most explored intersections of identities are racism and sexism [11]. However, many different forms of exploitation intersect within engineering, such as racial capitalism, racial neoliberalism, racism and immigrant carcerality, and others [6].

One particular intersection that impacts Asian(Americans) engineering students is the intersection of racism and ableism through the narrative of smartness. Ableism is defined as the "system of assigning value to people's bodies and minds based on societally constructed ideas of normalcy, productivity, desirability, intelligence, excellence, and fitness…. You do not have to be disabled to experience ableism" [61]. Ableism manifests in narratives of smartness and intellectual superiority in engineering by identifying which minds and bodies are privileged and uplifted in engineering: minds and bodies that "maximize outcomes while minimizing effort" and demonstrate technical superiority are privileged due to meritocratic ideologies [31], [62, p. 575]. Through the model minority stereotype, smartness is used to racialize Asian(Americans) as abnormally intelligent, ruthlessly efficient, antisocial, and incapable of working with others [5]. When combined with overrepresentation-privilege associations, engineering becomes racialized as a uniquely "Asian" discipline that expects Asian(Americans) to excel to the detriment of other racial groups [10], [52].

Another intersection is racism and sexism, particularly toward Asian(American) women. Previous work has reported on the masculinization of engineering culture, particularly the ways in which masculinity is performed through technical work and competition [63], [64], and it is well-known that women in engineering report chilly climates and have lower educational outcomes compared to men. Asian(American) women inhabit the intersection of gender norms and racial norms, encountering disconnects between "traditional [Asian] cultural values" that may discourage women from entering technical fields, model minority stereotypes, and norms of femininity and patriarchy [9], [65]. As a result, they may encounter stricter cultural expectations in traditionally White, masculine engineering spaces. Intersectionality challenges researchers to examine Asian(American) women's experiences in engineering to unpack the ways racism and sexism intertwine in engineering to muddy systemic analyses of power relations.

Story, Theory, and Praxis

The tenet of story, theory, and praxis, derived from the voice-of-color thesis of CRT, is founded on the belief that counterstories can be used to disrupt dominant hegemonic narratives and politically empower marginalized groups. Counterstories are defined as stories centering marginalized people that challenge dominant stories by highlighting lived experiences, contradictions, and material harms that dominant stories cause. Counterstories serve as epistemic starting points for new theorizations about structural operations of racialization [41], [66].

In conducting the literature review for this paper, the authors found fewer than ten journal articles focusing explicitly on the experiences of Asian(Americans) in engineering. We theorize that this silence is due to systems that reinforce the overrepresentation-privilege narrative. Thus, engineering education researchers have devoted little exploration to Asian(Americans) because they have assumed that everything is "just fine" despite persistent racialization practices. And showcasing how the materiality of systemic racializations in research agendas drive equity research, funding agencies such as the National Science Foundation focus almost exclusively on "underrepresented" racial groups. Engineering education researchers must recognize that Asian(American) engineering student experiences are complex and complicate dominant systems of racialized privilege if they are to work toward equity and social justice. Additional work must begin to elicit Asian(American) engineering student narratives and highlight resistance practices within the racial group.

Social Justice

Social justice represents AsianCrit's commitment to ending all forms of oppression and cross-racial, cross-identity solidarity and coalition-building toward liberation. This tenet also highlights—and rejects—the ways Asian(Americans) have been marshalled to perpetuate oppression.

With recent high-profile cases marshalling Asian(American) voices to restrict affirmative action, Asian(American) success has been thrust into the political spotlight as "spoilers" of equity programs [1]. Recent White-led conservative movements have used Asian(Americans) as scapegoats to argue for restricting affirmative action, pointing to their success as evidence that racial equality exists for all races [16]. Thus, in these broader narratives of equity and access, Asian(Americans) become the "spoiler" race that Whiteness uses to pit historically marginalized groups against each other. This "spoiler" position, combined with the sheer overrepresentation of Asian(Americans) in engineering, reproduces the dominant narrative that Asian(Americans) are in a position of privilege, more readily identify with engineering, and therefore do not need resources in engineering education [10]. As a result, Asian(Americans) become awkwardly positioned to contribute their voices to equity narratives in engineering, particularly in calling for more resources devoted to their unique experiences.

Important to recognize is that the "spoiler" narrative is constructed in relation to the racialization of other bodies, in particular, anti-Blackness. As Chen and Buell note, Asian immigrant labor has been used to maintain a highly skilled labor force without making substantial changes to STEM education curricula to promote Black and Brown scientists and engineers [6]. In addition, in broader equity discourses like affirmative action, White elites have positioned Asian(American) success narratives to shift the narrative from structural oppressions to deficit-based individual/cultural intellectual capabilities of Black and Brown students [16]. As Kim writes, "Whiteness has pushed Asians down, but anti-Blackness has provided the floor beneath which they cannot fall" [16, p. 226]. Particularly in STEM and engineering, where Asian(Americans)' so-called positive racialization creates pro-Asian sentiment, the "spoiler" narrative masks how both stereotype lift and stereotype threat impose significant psychosocial costs on Asian(American) and Black STEM students [10], [52]. These Asianized narratives limit and antagonize broader movements toward equity and social justice because they drive wedges into solidarity movements with other marginalized racial groups, therefore maintaining the power of Whiteness [30].

Implications and Limitations

There are many cultural processes that exist in engineering that intertwine with Asian(American) student experiences, but we illustrate how AsianCrit furthers theorizing about race at the intersection of both critical race theories and engineering culture. This overlapping of engineering cultural processes onto critical race theories creates a starting point for researchers and practitioners alike to begin (re)considering the positioning of Asian(American) engineering students as a "dominant" and "overrepresented" group. It gives engineering educators and researchers new modes of thought in considering how programs, policies, and practices may be (re)designed to embrace the complex needs and experiences of Asian(American) engineering students.

While AsianCrit presents a starting point for engineering education researchers, there remains points of misalignment between AsianCrit and the racialization processes in engineering culture. Some tenets are less applicable to engineering spaces. Other elements and intersections of engineering cultural processes are not captured in AsianCrit, such as how Asian(Americans) are often positioned alongside Whiteness to construct anti-Black success narratives in engineering [16]. AsianCrit explores the multidimensionality of this phenomenon by segmenting it along its tenets, which, while valuable, does not capture the complexity of this racialization narrative. In addition, the roles of meritocracy and engineering culture do not necessarily feature prominently in our discussion of AsianCrit. Our future work will further expand on AsianCrit to develop a novel approach for theorizing at the intersection of racialization processes in engineering.

Conclusion

Asian(Americans) remain overlooked and understudied in engineering education. We attribute this gap in research to intersecting narratives of the model minority stereotype, overrepresentation, and privilege in engineering that has suppressed research with Asian(Americans) in engineering. We elucidate the ways engineering cultural phenomena uniquely interlock with Asian(American) racializations in broader US cultures and histories. We hope that AsianCrit will motivate future work with Asian(American) engineering students while creating grounds for praxis, activism, and coalition-building to liberate all marginalized people from systems of oppression, racism, and power.

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