

by Kristyn Lue and Blake O'Neal Turner

Perhaps one of the most common reasons a student's favorite subject might be math is because, unlike English or history, math has a right answer, and there is little debate whether the solution is correct (Crean 2017). True, there may be many different ways to solve a problem, but, ultimately, mathematics is a universal language that leads to an objective truth (Sarli 2017). For these students, math is a beloved subject because they find comfort in both its simplicity and its assurance that there *is* a universal, objective, *correct* answer.

Or at least this is a story that we tell about math.

Other students like math because it *just makes sense* to them. There is an innate ability to loving and being good at mathematics; some people's brains are *just wired that way*, while others' aren't—they may be an *art person* or an *English person*, just not a *math* person. They can still learn math—it would just take more time and more work and more effort, and that's okay— *some people just aren't wired that way*.

Or at least this is a story that we tell about math.

Math skills are an indicator of natural intelligence, of academic ability. The smartest kids are the ones who are the best at math, the *math people* (Martin 2000). Students for whom math *just makes sense* and *clicks* are positioned differently in the classroom by teachers and their peers (Cobb, Gresalfi, and Hodge 2009). And once a student is positioned as a math person, they are always a math person.

Or at least this is a story that we tell about math.

From an early age, children receive messaging and implicit stories about the nature of mathematics and their role in it, through interactions with their families, communities, teachers, and schools (Martin 2000; Cobb, Gresalfi, and Hodge 2009). Sometimes the stories we tell about mathematics are told succinctly. Sometimes, they take years to unfold. But what is consistent across all these stories is that they are framed in white racial imaginations (Martin, Price, and Moore 2019). The stories we tell about who can do math, who is inclined to do math, or even who is meant to do math, are racialized and gendered (Leonard 2009). As two women of Color who are mathematicians and math education scholars, we, ourselves, have struggled to recall these stories being communicated to us in such explicit words—but have lived out the consequences of our racial identities in mathematics spaces. Despite early academic achievement in mathematics, Blake, like many other Black students, was deemed an outsider of the mathematics community by her teachers and other gatekeepers. Kristyn, like many Asian American students, experienced a contingent insider status that was subject to specific norms and expected behaviors.

Through our autoethnographic explorations, we hope to illuminate the consequences that these normative narratives about mathematics have on students—particularly students of Color. The stories that we tell—to ourselves and to each other—carry remarkable power in defining who gets to be doers and teachers of mathematics—and who *doesn't*—in very racialized ways. Educators serve as both gatekeepers of the mathematics community and as storytellers who shape and perpetuate these norms. While many of us may have good intentions and want all students to succeed, we may also be unaware of the racialization process and power dynamics that "neutral" stories of mathematics carry. In this essay, we (Blake and Kristyn) reflect critically on our positionalities and journeys into becoming mathematics insiders, and the incidents that shaped this process. Although this work is hard and labor intensive, we contend that it is work that all educators should undertake. By making our stories explicit, and by using them as counternarratives to critique the myths of neutrality, objectivity, and universality in mathematics, we can begin to imagine the power that counternarratives can have in restructuring the field in equitable and justice-oriented ways.

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Using critical autoethnography, we leverage our experiences as students, educators, and researchers of Color to counter explicitly the status quo and dominant narratives in mathematics. To the extent that our lived experiences cannot be divorced from the realities and consequences of living in a raced, gendered, and classed society, we are also told that mathematics *can* be. Framed by Critical Race Theory (CRT), our autoethnographic explorations confront the ways race and its intersections create unjust—yet normalized—power dynamics enmeshed in our society through years of historical oppression and legacies of white supremacy. This is done through two basic foundational assumptions: 1) the permanence of racism in mathematics spaces and structures, and 2) mathematics as white property. As a lens of analysis, Critical Race Theory allows us to compose counternarratives that critique white liberalism, using an interdisciplinary approach that centralizes experiential knowledge to move toward social justice (Davis 2019, Solórzano and Yosso 2001).

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Journal of Folklore and Education (2020: Vol. 7) The Stories We Tell: Disrupting the Myth of Neutrality in Math through Counternarratives by Kristyn Lue and Blake O'Neal Turner Counternarratives emerged from Critical Race Theory as a powerful methodology to honor the voices and experiences of Black, Indigenous, and People of Color (BIPOC) and push back on the dominant narratives that normalize whiteness and neutrality. Counternarratives center these contexts and intersections and name the faulty, discriminatory assumptions that our normative stories about mathematics rely on. As Delgado and Stefancic write, "once named, it can be combated…powerfully written stories and narratives may begin a process of correction in our system of beliefs and categories by calling attention to neglected evidence and reminding readers of our common humanity" (Delgado and Stefancic 2017, 51). That is, counternarratives, through the act of remembering and retelling, can serve as a collective voice of support and validation for our experiences. We hope, then, that our counternarratives might illuminate the mathematics experiences of a Black woman math educator and an Asian American woman math educator through a critical lens, push back on white narratives about the neutrality and objectivity of mathematics, and imagine a more liberatory future for mathematics education.

Stories hold power for the storyteller and for those who get to bear witness. However, storytelling—without the "counter"—has also been used to reify cultural norms and expectations through "master narratives" that define and represent groups in the broader society (Montecinos 1995). Such narratives are presented as "neutral" and "objective," based on "facts" to serve as a tool that "distorts and silences the experiences of people of color" (Solórzano and Yosso 2002, 29) and privileges whiteness as the norm. This neutrality is preserved through stories that are ahistorical and devoid of a critical analysis of socialization, power dynamics, and identities.

Having defined what is meant by counternarratives, we will now move on to discuss how we enacted this methodology. We first drew on and immersed ourselves in the literature of critical mathematics education scholars who have problematized dominant narratives about mathematics. From there, we began to structure interview questions that would help us unpack our experiences in mathematics. In the interview process, we served as both storyteller and audience for each other, engaging in what Delgado Bernal (1998) refers to as *cultural intuition*: "a complex process that is experiential, intuitive, historical, personal, collective, and dynamic" (567-68). Although we used the interview questions to begin the storytelling process, the audience actively bore witness by asking questions or offering insights, thus also allowing the storyteller's memories to carry the conversation. This process also allowed us to engage in collective meaning making during the interview stage.

After the interviews, we transcribed our conversations and began to engage in critical analysis. By looking for themes and using CRT as our lens, we began to transform our stories into counternarratives. Through each step—choosing this topic, creating interview questions, telling our stories, analyzing our data, and writing—we contextualized our stories, engaged in collaborative critique, and traced the ways our stories converged and diverged because of our racial identities. We challenged what we had been told in our earliest mathematical experiences, reflected on critical turning points, and began to envision the new narratives that will guide our work as scholars and educators.

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The Beginnings

From an early age, education was portrayed to us as the key to success and achievement; hard work would bring about educational success. And, so, the earliest stories about mathematics that we received from our families focused more on the importance of education broadly, rather than any specific subject such as mathematics.

Blake

For many families of Color, education is seen as a gateway for success and opportunities. As Blake explains:

I think as a Black family, that was one of the things that my dad... And he always would say that, being Black, you have to work twice as hard and so you have to be twice as good in school. When we think now about some of the messages that we get in math, that math is a gatekeeper and if you're not good in math, it prevents you from being a doctor or a scientist. I didn't have those same messages from home. It was just like, you need to get an education because that's the only way to be successful as a Black person.

For Blake, the stories that her family—and in particular her dad— told her revolved around the relationship between being Black and being educated. The American Dream (meritocracy, upward social mobility, and equal opportunity) was obtainable if only Blake was "twice as good," which meant that she needed to work twice as hard. But we know that in mathematics classrooms hard work does not equate to being granted insider status.

In middle school, Blake was an excellent student. She earned As and high standardized test scores in all subjects, including math. Yet she was told by her mathematics teacher, and then her principal, that she was not a "strong enough" math student to handle being placed into honors math. Blake recalls:

...my parents fought him on it. It was a white man and they said it was racist because there were no students of Color at all that he had recommended for the honors...the principal decided that [the teacher] would get to create a diagnostic and grade said diagnostic and then based on who did well on the diagnostic, they would go to honors. I missed his arbitrary cutoff point...by one question... I did not go to honors that next year. It positioned me to not see myself as a math person.

While Blake's teacher purported to recommend students for honors math through objective standards, Blake's prior high mathematical achievement, as well as the fact no students of Color at her school were recommended for honors math by her white teacher, contradict the teacher's claims of objectivity. His initial assessment that Blake would not be able to "handle" honors math were challenged by Blake's parents, who knew how brilliant their daughter was. Their protests, however, were then met by the principal instituting another alleged objective and neutral cutoff: the diagnostic. Yet the diagnostic was still created and administered by Blake's math teacher, who used this as further "proof" that she was not capable of succeeding in honors math.

Blake's story is reminiscent of many students' experiences with standardized testing, but particularly students of Color. Testing, although purporting to be objective and neutral, is used to reproduce racialized hierarchies in mathematics. Testing is just one structure that functions to maintain whiteness in mathematics education and restrict minoritized students from accessing resources and opportunities (Battey and Leyva 2016).

Blake's "incapability" was not intrinsic to her as a mathematics student, although this is how her teacher framed it: Blake was simply not good enough to be an advanced math student. As noted, there are students who are naturally "good" at math, and there are students who don't make the cut. Despite Blake's high performance in math, the teacher categorized her as the latter. Blake's experience is unsurprising, given that Black and Brown children are often not placed or recommended for higher-level mathematics courses by their teachers and counselors, even if they excel in the subject, as Blake did (McGee and Martin 2011). Structural racism and implicit bias, manifesting in how students are positioned as students and doers of mathematics, affects how students see themselves as intelligent and doers of mathematics, a common experience for Black students (Martin 2009). The trauma of this incident shadowed the remainder of Blake's high school career. The way she was positioned through her teacher's narrative, and his inability to reconcile her Blackness and her brilliance, had profound consequences. She continued to excel academically, taking Advanced Placement and honors courses in English, history, science, but she never pursued high-level mathematics courses. Moreover, while writing our autobiographies and during our interviews, Blake remembered very little of her high school mathematics experiences. The effects of this critical racial mathematics incident also caused Blake to shy away from taking mathematics courses in college. Her early experiences in math bruised her confidence and cracked her foundation as a mathematics student in ways that felt permanent and persistent. Blake struggled to connect with mathematics, stating, "I had a lot of fear. I went into class just anxious everyday... I had already positioned myself to not be good at math." It did not help that the stories Blake was told about the nature of mathematics in later years was that it was a theoretical subject often divorced from real-world applications. This story is not unique to Blake's experiences: Many students express learning mathematics in a vacuum, separate from context and application.

Kristyn

As an East Asian American woman, Kristyn was positioned early as a contingent insider in mathematical and educational communities. She recalls:

My parents always really emphasized the importance of education, and they had high expectations for us to go to college, because that's why their parents had come to the United States. For them, it was really like, "If you want books, if you want workbooks, if you want math games, whatever you want. If it's educational, we will buy it for you."

Education was seen as a vehicle to the American Dream for which her family had made generational sacrifices. Kristyn's grandparents had sacrificed their native languages and cultural traditions for their children's education. Kristyn's parents in turn sacrificed financially for this American Dream. Similar to Blake's family, Kristyn's parents believed that everyone could succeed—if they devoted the requisite time and financial resources. Her family believed familial sacrifice was necessary in a white American society.

This notion of sacrifice, however, often ran contrary to what Kristyn was implicitly told by teachers and peers about what it meant to be "good at mathematics." She was taught that you were either a "math person" or "not a math person," that success in mathematics was dependent on innate ability. And, as an East Asian student, Kristyn's teachers and peers often associated her as being a successful math student and "smart"—in other words, the "model minority." Although Kristyn was a year "ahead" in math, she struggled when she reached geometry in 8th grade. She didn't grasp the concepts as quickly as others around her, and she was not receiving As in the course. She interpreted these struggles to mean that she was no longer good at math. This feeling persisted in her precalculus course in 10th grade, when she struggled more than she ever had in a math class.

At the same time, in both 8th and 11th grade, Kristyn received awards in mathematics. Teachers categorized her as this model minority, a student innately good at mathematics and therefore an *insider* to the mathematics community. This did not align with Kristyn's notion of how she saw herself, however, and she felt like an imposter who had somehow fooled her math teachers. The struggles she faced to "fit in" among her peers further compounded this internal struggle. Being ahead a year in math meant that Kristyn took courses with older students, many of whom did not like math and were already friends with each other. They positioned Kristyn as "one of those smart Asian students" who did not need help in math and probably liked the subject—in other words, someone very different from themselves. She often felt like an outsider and isolated from everyone else, even when she shared some of her classmates' struggles in math. Kristyn recalls her experience in precalculus:

I didn't want to speak up or really make waves, or engage with the content because that wasn't the "cool" thing to do. I didn't want to be singled out more than I was. I did not do well in that class, I really struggled with the material and the content... I convinced myself that I wasn't good at math.

For Kristyn, community and mathematics were closely linked. A community that positioned her as a contingent insider based on her race made her feel unseen in the ways she saw herself, which she found traumatizing. She began to dread going to math class, fearing the day when she would be "found out" as an outsider. Math began to give her a deep anxiety, and she began to burn out and dissociate, waiting for when she would no longer be required by the school system to take more math courses.

And here might be where the stories should end. Numerous stories about young children of Color start—and end—in these ways. For young Black students, stories about their mathematical achievement focus on ways they are "underachieving" or are traumatized by racist teachers and administrators. Young Asian American students are positioned as the "overrepresented model minorities" or good students who do not need help, regardless of the nuances of their academic performance. As a result, they may struggle to reconcile these views of themselves but keep their heads down and continue to work as hard as expected. Studies about disparities in STEM and math identity development highlight these early formative experiences and how parents and teachers shape who we are as mathematicians and as students.

But for us, it didn't—and doesn't—end there.

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Turning Points

For a long time, the ways we saw ourselves as mathematics students seemed static and permanent, and we both divorced ourselves from the field. Yet as we progressed through our educational journeys, we both reached unexpected turning points that began the process of reshaping our views of ourselves as mathematicians and as "math people."

Kristyn

Kristyn's turning point was in AP statistics when her teacher explicitly named her as a mathematician, citing how she saw Kristyn as a peer mentor to classmates. This was contrary to what Kristyn had previously been told constituted a mathematician, which helped her to begin the process of redefining what being a mathematician meant. She recalls:

...she wrote me this Christmas card...She's like, "Yeah, Kristyn is a really excellent mathematician." She had nominated me for this award [in] math, because she's like, "Well, you're really good at explaining your thought process. You're really good at piecing things together, and thinking critically, and you help other people."

This experience helped Kristyn contend with the idea that being good in mathematics was about effort, critical thinking, and edifying others, which began to combat the imposter syndrome she felt powerfully. She decided to take more math courses in college beyond the requirements, which further expanded her views on mathematics and her potential place in it. Reflecting on her college mathematics experiences, Kristyn states:

My calc teacher would get excited talking about graphs, and how you could zoom in on these graphs. Different ways of thinking about it, I think made a really big difference for me. Them being able to tell stories about how, I had a teacher for multivariable calculus who talked about these different applications of partial derivatives, and we'd talk about that, or we would talk about shapes, and things like that in ways that were different than purely lecturing on like, "Here's the formula you need to learn." They were excited about the different ways that this math could be used, and the beauty of it, and they really saw some beauty in it. I liked hearing about the cultural stories about math. I liked that kind of stuff.

Math is traditionally taught as a conglomerate of standard algorithms, rules, and definitions. But Kristyn was exposed to both the beauty of mathematics and its rich cultural histories. These histories were not confined to the western cultures and famous mathematicians she had learned about in high school, for whom theorems were named (such as Pythagoras). Her professors, who employed ethnomathematics (Powell and Frankenstein 1997) and culturally responsive pedagogy (Ladson-Billings 2009), expanded her worldview and conceptions of mathematics. The new stories Kristyn was told about math were of joy, wonder, and exploration. She recalls, "The biggest stories come from the classrooms and the teachers and sort of where that power is housed and who are the storytellers."

Through blending the history of mathematics and cultural anthropology, Kristyn's professors implicitly communicated that mathematics was not confined to the notions of whiteness and thus perhaps outside the notion that one is innately "good" or "bad" at mathematics. She began to see mathematics through the stories and histories her professors presented, and as a collaborative journey and process.

Blake

These sentiments rang true for Blake as well, who also eventually got her mathematics teaching credential, despite early traumas with mathematics. Blake attended a Historically Black University (HBCU) for her undergraduate degree. There her teachers nurtured her development academically and personally, a trend not uncommon at HBCUs but in stark contrast to her K-12 experiences. Blake was encouraged to pursue graduate school by her professors, advisors, and peers, who not only acknowledged—but also centered and supported—her brilliance. After graduating with her bachelor's degree, Blake enrolled in a master's program at the same HBCU, intending to pursue her teaching credential in history.

However, Blake's professors encouraged her to reexamine her mathematical brilliance and see herself as they saw her. They began recommending her to tutor young students in math, including their own children. One faculty mentor then approached Blake and suggested she apply for the Robert E. Noyce Teaching Fellowship and teach mathematics instead of history. The prestigious Noyce Fellowship's aim is to increase the number of minoritized STEM teachers in urban schools. The support and encouragement of faculty mentors and professors gave Blake the courage to apply for the fellowship and to reimagine herself as a mathematician and as a teacher of mathematics, which she could not have imagined a decade prior. She recalls:

It was definitely meaningful for parents to be recommending me and for some of my professors to be recommending me, because I think it helped me to see that they were seeing something in me that I necessarily wasn't seeing in myself.

Being seen as a doer of mathematics and also a teacher of mathematics ignited a passion to tell and to be a character in the other positive stories for minoritized students.

These turning points allowed us to begin rewriting and reconceptualizing what we believed mathematics was and what it meant for us to be doers, learners, and teachers of mathematics. Our experiences challenged and dispelled many early and formative stories that had shaped our views of mathematics from a young age and encouraged us to become math educators who may create turning points for others like us. As we have embarked on our journeys of becoming critical math education scholars, we believe that if we can first identify what these narratives are and how they have shaped our views of mathematics, we can then change them in profound and powerful ways.

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Looking Ahead

We look forward with the hope that we can reshape the stories and notions of mathematics and who gets to be doers and learners and teachers of mathematics for all students, from the beginning. Yet we know that it is not enough to change the individual stories of each mathematics learner by giving them their own turning points. We have to reshape these stories more broadly. Although we have both experienced transformative turning points that started the process of rewriting our stories, we recognize that our turning points came down to chance. The shifts in our stories were the result of multiple people who believed in us and encouraged us explicitly, who saw something in ourselves that we no longer were able to see. We recognize that not every child, nor every student, has this opportunity, and we continue to wrestle with the questions: Why us? Why not all? And how do we give all children a winning hand from the beginning?

If change is going to occur, teachers and other educational stakeholders must be willing to confront and change their own biases and misconceptions. We recognize that this is difficult work; the critical examination of deeply held biases and their origins—as well as how they manifest in classrooms—will also be deeply uncomfortable. One way to start this process is by engaging with the work of critical mathematics scholars. Scholars who have been helpful for us in challenging our assumptions and traditions have been Danny Martin, Ebony McGee, Ubiratan D'Ambrosio, Dan Battey, Luis Leyva, Robert Berry, Maisie Gholson, Julius Davis, Na'ilah Suad Nasir, Rochelle Guiterrez, Jemimah Young, Niral Shah, and Jaqueline Leonard—just to name a few. These scholars have been instrumental in helping us to dismantle our beliefs that the world consists of "math people" and "not math people." As teachers engage in this critical introspection and growth, a community of accountability is key.

While one way to restructure the field might be to cultivate a workforce of teachers like our transformative ones, we also know that this will not be enough. Our stories are about a system and structure both within and beyond the mathematics classroom. We see this as evident in the ways that we still both struggle with identifying fully as mathematicians, even though we hold degrees in mathematics, serve as mathematics educators, and center our research on mathematics and mathematics learning. Our early experiences and traumas still exist within us in powerful ways. For us, our stories have been reshaped, but the context of mathematics has remained the same, because the narrative of what it means to be good at math, and what mathematics is, has not changed. We continue to exist in this context, which built and continues to build the foundations for what math is, and what it means to be "good at" math, and, ultimately, who gets to be an insider—who gets to be a "math person."

Our aim, through continual introspection, reflexivity, and critical scholarship on how we navigate as doers, learners, and teachers of mathematics, is to write and tell counternarratives about mathematics and, in doing so, to change these foundational contexts. Mathematics is a social and cultural practice, and our identities as mathematics learners cannot be separated from context and our other identities, both inside and outside the mathematics classroom. In other words, context matters (Chazan, Herbst, and Clark 2016; Martin 2000). This context drives how we, as a Black woman and as an Asian American woman, were positioned as math learners—as an outsider and as a contingent insider of mathematics, respectively. Racialization played a strong role in this positioning, and this is true of all students—not just students of Color. Although the racialization process looks different for white students, they are positioned in mathematics classrooms in a raced way that is structurally tied to the positioning of students of Color (Battey and Leyva 2016). Thus, white teachers must also engage in critical self-examination as a part of this collaborative reflexivity and of re-storying (Milner 2007). We hope that our stories provide examples for beginning this process.

These are the new stories we want to tell about math.

Neither of our math trajectories has been seamless and we have both experienced feelings of discomfort and anxiety in mathematics courses. As emerging critical mathematics scholars, our stories don't end here. We continue to reflect critically upon the stories we have been told and hope to change the types of future stories and what mathematics learning can be. As Blake says:

I like math because I like rules and structures, but I also recognize that you can love math because you don't like rules and structures. Because there are a million different ways to solve any problem. You don't necessarily have to use an algorithm. You can draw pictures, you can do a graph, you can cut up stuff. And there's a ton of different ways to solve a problem. And I'm realizing now that I liked that part of math.... I like the algorithms of math and I want people to love math the way that I love math, but that also means loving math the way that you see it. If that makes sense.... I see it for the rules and the algorithms, but some people... I think of mathematicians who love it because of the creativity in it and the ways... an engineer who uses math and the different ways you can apply it. And I want students and people to love it for that.... And it's the rules and algorithms part of it that, because we show such a small part of it, kids rarely get to see. I think kids and adults rarely get to see the beauty of what math is.

And it is the beauty of math, and the beauty and brilliance of us all as learners, that will be the stories that we will continue to tell.

These are the stories we will now tell about math.

Kristyn Lue is from the West Coast, where she attended UC Berkeley and obtained her undergraduate degree in Applied Mathematics and her teaching credential from the CalTeach program. She received her MA in Higher Education at the University of Maryland before joining the Center for Math Education as a doctoral student in 2018. She has worked in various educational settings and roles—including teaching, advising, and program development—while studying fulltime. Her research interests focus on racial equity and justice in math education. She is particularly concerned with dismantling the ways in which systemic and structural issues in mathematics education affect student identity development and disrupting the subsequent social inequities that can result from these structures.

Blake O'Neal Turner is a mathematics educator. She earned a BS in Psychology and an MA in Teaching Secondary Mathematics and Special Education from Xavier University of Louisiana. She also holds an MEd from the University of Illinois-Chicago in Measurement, Evaluation, Statistics, and Assessment. She is a doctoral student at the University of Maryland in Minority and Urban Education with a concentration in Mathematics Education. She is particularly interested in social justice and liberatory pedagogies within mathematics education. As a critical Black mathematics scholar and educator, she aims to problematize anti-Black rhetoric, teaching, policies, and pedagogy within the field to create a Black liberatory mathematics. Her areas of research focus on how mathematics education operates as an anti-Black and white institutional space and challenges dominant perspectives and constructions of minoritized students in mathematics research and classrooms.

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