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ORIGINAL ARTICLE

Blackgirl face: racialized and gendered performativity in mathematical contexts

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Abstract
While race, class, and gender are often treated as well-defined and static identities within mathematics education research, we explore gender, race and class as performances through the case of a middle school Black girl, Cameryn. Scenes from video artifacts are deconstructed using a hermeneutic process to reveal how Cameryn positions herself as a seemingly disinterested, resistant mathematics student through a façade we call *blackgirl face*. Blackgirl face not only reflects the particularities of Black girlhood for Cameryn but provides a new conceptual lens for understanding mathematics learning as a performance, requiring and enabling children to simultaneously negotiate race, class, and gender.

Keywords Gender · Race · Black girls · Mathematics · Performativity · Phenomenology

1 Introduction

The study of identity in mathematics has been disciplinarily diverse and theoretically far-ranging endeavor in mathematics education (Darragh, 2016). Within a US context, much of the identity work has approached Black learners through narrative accounts of mathematics identity or participative accounts of mathematics identities-in-practice (Gholson & Wilkes, 2017). In this paper, we underscore identity as performative. Specifically, we highlight the themes of *performativity* and *pain* in mathematics to explore how Cameryn, a middle school working-class Black girl from an urban neighborhood positions herself as a seemingly disinterested, resistant mathematics learner through what has been characterized in the literature as *cool pose* (Majors & Bilson, 1992). Applied to Black boy students up to now, cool pose operates to allow these students "to cope and survive in an environment of social oppression" (Osborne, 1999, p. 558). It manifests as a "façade of emotionless, fearlessness, and aloofness to counter the inner pain caused by damaged pride, poor self-confidence, and fragile social competence" (p. 558). In this paper, Cameryn operates from her standpoint as a Black girl to perform her own versions of cool pose. We are not suggesting that Cameryn is attempting to perform as a Black boy. Rather, cool pose is encompassed in what we characterize as *blackgirl face*, defined here as a façade of aloofness and stoicism (which can appear masculine or feminine) to counter the social vulnerabilities created by intersectional forms of racialized, gendered, and class-based oppression. Our goal is to interrogate Cameryn's performances of blackgirl face in the context of mathematics learning, as well as understand how particular performances of mathematics learning are made possible and, moreover, probable in a given context.

The analysis presented here offers compelling evidence that mathematics learning involves a repertoire of performances—including cool pose and blackgirl face—requiring forms of relational labor to simultaneously negotiate race, class, and gender. The analysis also offers finer specifications to two questions that have served to umbrella many recent phenomenological analyses: (1) what does it mean to be Black in the context of mathematics learning and participation? and (2) what does it mean to be a learner and doer of mathematics in the context of being Black? Here, we take up the questions: (1) what does it mean to be a Black girl in the context of mathematics learning and participation? and (2) what does it mean to be a learner and doer of mathematics in the context of being a Black girl?

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In deciding to focus on the pain associated with her mathematics learning, we are mindful of presenting Cameryn in an ethical manner that does not exploit her pain, that preserves and respects her childhood, and that avoids characterizing her as idiosyncratic. We understand that "Black girls and women were often thought to be innately emotionally strong and unbreakable; therefore, they were robbed of the privilege to show a variety of human emotions (Beauboeuf-Lafontant, 2009; Harris-Perry, 2011)" (Evans-Winters, 2017, p. 419). In taking up pain as a theme, we are committed to multidimensional, intellectually honest portrayals of Black girls, surfacing their ordinary brilliance even when that ordinariness seems exceptional. We believe that their ordinary brilliance should not mask the reality of the pain that Black girls may also be experiencing. Importantly, we do not seek to over-privilege pain or valorize mathematics as a desirable figured world for Black learners, given the propensity of mathematics education to serve as an emotionally painful, anti-Black space for many Black learners, and the tendency for school officials to discipline the Black girl bodies as sites of Blackgirl performance (Evans-Winters, 2017; Wun, 2016).

2 Learning mathematics while black in the United States

A persistent weakness of pre-K-12 mathematics education research in the United States has been the lack of culturally- and contextually-sensitive accounts of mathematics learning, development, and participation among Black learners. The study of Black learners in mainstream[1] mathematics education has historically been the study of so-called racial achievement gaps, focused on documenting how Black learners differ from white and Asian-American learners on selected indices of mathematics competence. For at least 40 years, the dominant storylines associated with Black learners, collectively, are that they lag behind their peers in key mathematical skills, and remain entrenched in mathematical illiteracy that is detrimental not only to themselves but also a threat to the US nation-state (Klein & Rice, 2012). Against the backdrop of these storylines as well as the proliferation of equity and inclusion discourses, the primary means of engaging Black learners have been "diagnosis of deficits, intervention, remediation, and repair rather than taken-for-granted assumptions about their brilliance" (Martin, 2019; also see Gholson, Bullock, and Alexander 2012; Leonard and Martin 2013).

Only in the last 15–20 years or so has there been a turn toward studying the "phenomenal realities of Black children qua Black children" (McLoyd, 1991). A shift toward a phenomenology of mathematics learning is in direct response to several limitations in previous research approaches: (1) impoverished theorizations of Black children's mathematical knowledge and competencies in classroom contexts, (2) undervaluing and underassessments of Black children's adaptive competencies in non-school, everyday contexts (see Nasir, 2000; Taylor, 2013 for exceptions), and (3) a lack of models of mathematical development among Black children at any age levels (Gholson & Martin, 2014; Martin, 2000, 2012). In contrast, a phenomenology of Black learners' mathematical experiences entails not only a psychology of learning focused on internal processes and the self, but also a sociology of learning that examines learners in their figured worlds (Holland, Lachicotte, Skinner, & Cain, 2001). More specifically, the turn toward phenomenological accounts of Black learners' mathematical experiences opens up conceptual and methodological spaces for non-deficit perspectives focusing on socialization, identity, power, resilience, and agency in the overlapping figured worlds of race and gender. Researchers have drawn on diverse perspectives such as ecological systems theory (e.g., Bronfenbrenner, 2009), race-critical frameworks (e.g., Dumas and ross, 2016), racial identity development theory (e.g., Sellers, Smith, Shelton, Rowley, & Chavous, 1998), culture-practice theories (e.g., Wenger, 1998), and critical race feminism (e.g., Crenshaw, 1989) to inform their analyses.

A number of scholars have demonstrated, for example, that *mathematics socialization* and *mathematics identity* formation are important aspects of mathematics learning, development, and participation for Black learners (e.g., Berry, 2008). Mathematics socialization refers to the experiences that individuals and groups have within and across sociohistorical, community, school, and intrapersonal contexts, and that facilitate or inhibit meaningful participation in mathematics. Mathematics identity encompasses the narratives and stories that individuals develop about their ability to participate and perform effectively in mathematical contexts (Martin, 2007). These narratives and identities represent a negotiated self, a negotiation between our own assertions and the external ascriptions of others. Mathematics identities can also be expressed as *performances* that align with or diverge from situational norms of what it means to be a doer of mathematics. Mathematics identities are co-constructed with racial, gender, and class identities.

Scholars engaged in phenomenological analyses of Black learners and mathematics have also pointed out that processes of mathematics socialization unfold to produce failure

[1] *mainstream* mathematics education research and policy refers to that which has relied on traditional theories and models of teaching and learning (e.g., information processing, constructivism, situated cognition) and research approaches (race-comparative analyses or the minimization of race through its absent presence) developed primarily by white researchers and policy-makers to normalize the mathematical behavior of white children.

and success among Black learners in ways that maintain, rather than disrupt, hierarchies of mathematics ability and opportunity. Even when they are successful on traditional measures of success, Black learners must negotiate racial-mathematical stereotypes, anti-Black racial ideologies, and forms of mathematics education that have been characterized as violent, painful, and dehumanizing (Martin, 2019; Martin, Price, & Moore, 2019).

3 Black lived experience and performance

Phenomenological accounts of Black learners' experiences in mathematics education contexts have primarily been conducted through interview-based methods. This means that the Black experience is typically narrated through post hoc accounts that may inadvertently project a coherence and orderliness that belie the interactional complexity of children's learning in real time. Given these phenomenological accounts are often biographical in nature, they generally span several years and, only in some instances, target very particular episodes that occurred over several minutes. Such narrative accounts are important to establish the racialized nature of learning in mathematics classroom. However, the narration of mathematics learning *as* racialized does not necessarily helps us understand the interpersonal dynamics—the role of the body and dialogue—in the making of racialized learning experiences. We assert that the performance of Black mathematics learners "can be a privileged object of phenomenological investigation, as well as a means of developing phenomenological practice" (Bleeker, Sherman, & Nedelkopoulou, 2015, p. 1).

The study of Black performance in particular provides a site for understanding the meanings of *Blackness* in lived reality and the modes of resistance to withstand structural, symbolic, and physical oppression (Johnson, 2006). We endeavor to contribute to this tradition by exploring the racialized and gendered performance of a Black girl in her algebra class and align ourselves with other scholars in mathematics education who have used performance, performativity, and performative acts as their basis for analysis (Chronaki, 2011; Darragh, 2015). For example, Chronaki uses performativity to examine the school-based arithmetic in buying-selling word problems and to deconstruct a classroom event in which a student teaches the class arithmetic. Darragh takes a different approach using performance as a metaphor to analyze interviews of students transitioning from primary to secondary school.

Performance and performativity have emerged as useful constructs in mathematics education research when seeking to incorporate the sociopolitical contexts of mathematics learning and knowledge in social interaction (Gutierrez, 2013). Such a stance toward the performative serves to displace essentialized notions of what it means to be Black, a girl, a mathematics doer, and working-class (i.e., what we are) with performative acts (i.e., what we do) (de Freitas & Sinclair, 2014). Butler (1988) makes the point that our performances are continuous, "the body is a historical situation, as Beauvoir has claimed, and its manner of doing, dramatizing, and reproducing a historical situation" (p. 521). That is, our bodily performances are never our own making but situated in a history that constrains the possibilities of corporeal acts. For us, it follows that gender and race are "in no way stable identity or locus of agency from which various acts proceed; rather they are identities tenuously constituted in time—identities instituted through the stylization of the bodily gestures, movements, and enactments of various kinds constitute the illusion of an abiding gendered [or racialized] self" (p. 519). Chronaki (2011) succinctly defines performativity as "an embodied culturally scripted character of identity where its main focus is to expose hegemonic conceptions of identity as fictions generated by power through repeated reproductions of norms" (p. 209). Within this paradigm, performance and performativity—the repetition of stylized acts or repeated reproductions of norms—is the way we become a mathematics learner (Darragh, 2015). Darragh (2015) describes that in mathematics learning context "our performances may include putting a hand up to answer a question during a mathematics lesson, persisting to solve a problem, arguing or justifying a given solution. We may perform by working silently and individually or by giving up on a problem after a single attempt" (pp. 85–86). Importantly, just as performance can serve as a site reproduction of what it means to be a mathematics learner, then it follows that performance can also serve as a site of resistance and transgression by reinventing and reinscribing, and ultimately, breaking the repetition of stylized acts of mathematics teaching and learning dynamics.

Our analysis, however, departs from extant studies in mathematics performativity in one critical way. We take performance, performativity, and performative acts to be literal constructions of phenomenological reality in contrast to metaphorical constructions of life as theatre. For example, Darragh (2015), following Goffman (2002), equates the classroom to the stage, the teacher as the director, and the audience as classroom peers in mathematics contexts. However, we seek to connect the deeply constructed nature of Blackness and girlness to performance—as a phenomenological reality versus a useful likeness. The marginalized, minoritized, and oppressed engage in performances for survival and to resist exploitation, vilification, or disposability (Scott, 1985). For example, Ritterhouse describes ways of being in the Jim Crow south (a time of overt racial oppression) among Black and white southerners:

> [W]hites demanded that blacks display not only civil but often servile behavior, to be manifested in a wide array of verbal and physical cues. The code could be complex and varied, but it outlined a fundamental pattern of white supremacy that both blacks and whites understood…Whenever blacks rejected the command performance of deference—whenever whites lost the zero-sum game of racial etiquette—violence could and often did result. Because small and seemingly insignificant behaviors were not only their weapons, whites were almost always prepared to take the zero-sum game of domination and subordination to the next-level. (p. 25).

In the performance of racial etiquette of the Jim Crow south, a performance was not as much a theatrical experiment or rhetorical device as it was a grim reality to be acknowledged and enacted with precision for fear of violent consequences. While the performances that took place in the 1920's South seem like distant artifacts of a racist past, the identity-based performances of children of color in mathematics (and science) contexts have similar life-shaping implications (Gholson & Wilkes, 2017). Similar to the southern racial etiquette, we call into focus a mathematical etiquette.

Taking such a literal stance allows us to comment on the modes of resistance to survive, as well as read a mathematical *performance as a text* with a variety of hermeneutic possibilities for understanding the manner in which Blackness, girlness, working-classness, and so on intersect in the construction of a mathematics identity. By interpreting the performance, we can learn about (1) meanings of Blackness and girlness, (2) what is involved in engaging in a performance of learning, and (3) the infrapolitics of the body that operate below the typically named suprapolitcs (or open politics) in mathematics teaching–learning dynamics. As Marche (2012) aptly notes, "Infrapolitics is to politics what infrared light is to light", and "encompasses the acts, gestures, and thoughts that are not quite political enough to be perceived as such" (p. 3). That is, infrapolitics are the imperceptible politics that operate below overt and conventional mobilizations within the everyday. Mathematics education has done well to name the suprapolitics within the field (Valero, 2004; Gutierrez, 2013). We seek to expand this discussion of the political to the everyday and every moment of mathematics teaching–learning dynamics.

4 Analyzing blackgirl mathematical performance

4.1 Researchers' positionality and the multistability of oppression

We identify as critical Black scholars in mathematics education research (Martin & Gholson, 2012). As a Black woman and man, respectively, and once-Black girl and boy[2] in US schools, we identify with various aspects of racial oppression experienced by Cameryn—the focal student in this analysis. Our experiences also sharply diverge from Cameryn and one another in important ways. For example, I, as first author, identified as a middle-class Black girl child who grew up in a developing, predominantly White, rural community in the South. The second author identified as a working-class Black boy child who grew in a racially mixed but predominantly White, urban community in the mid-West. Similar to Cameryn, we respectively crafted performances of Black girlness and boyness that allowed for the navigation of our local communities. However, in contrast to Cameryn, our performances allowed us to be recognized as competent mathematics knowers and doers. Our institutional positions now as professors and researchers in mathematics education confer a great deal of power to craft images of Cameryn as a mathematics learner. As a matter of ethics, we openly acknowledge the role that our positionality plays in the writing about Cameryn (Andersson & le Roux, 2017), as well as in the analytical process. As part of that responsibility, we also wish to note that all names are pseudonyms, and informed consent and assent have been obtained in accordance with the institutional review.

Claiming a particular standpoint orients us to particular understandings of Cameryn's lived experience as a mathematics learner. As a Black adolescent girl, Cameryn's experiences broadly and, more specifically, in mathematics education have been rendered theoretically invisible in mathematics education research due to a lack of epistemological resources for making sense of Black girls' and women's learning experiences (Gholson, 2016). Such invisibility is a function of oppression as a multistable phenomenon (Dotson, 2014). Dotson explains the multistability of oppression in this way:

> Taking oppression as a multistable phenomenon is to say that it admits of an open range of 'topographic' possibilities. Oppression in a given society will have multiple ways one can understand it, and these multiple ways will have certain 'apodicticity.' That is to say, one's certitude that oppression simply is a certain way originates from such and such place, or can be understood according to such an such orientation, can be experientially fulfilled time and again. This is not simply to say that we see what we want to see, though that is certainly part of it. Rather oppression admits to a number of interpretations and a number of manifestations and a number of conceptions. How a multistable phenomenon is interpreted

[2] Once-child is a term used by Ransom (2017) to invoke experiences and memories of childhood.

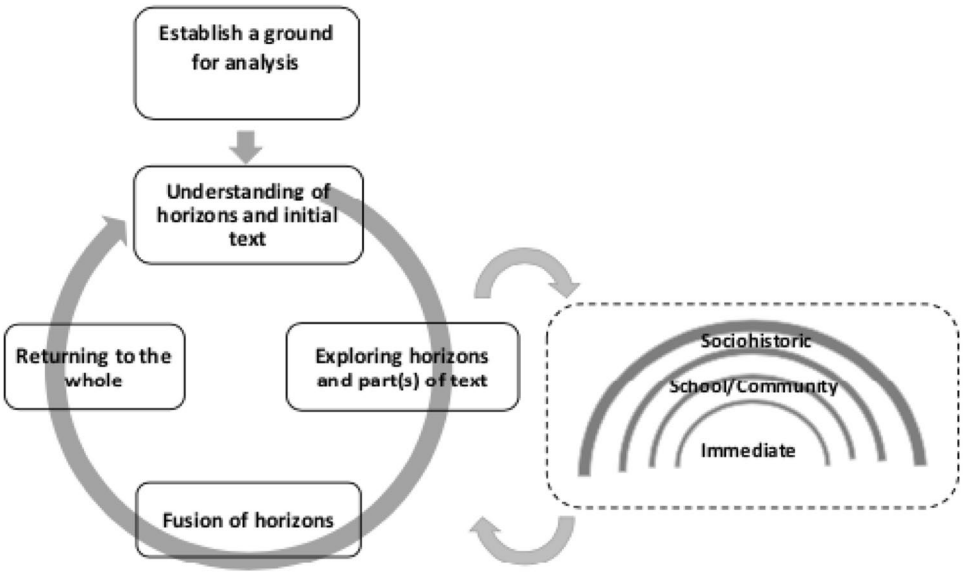

Fig. 1 The hermeneutic process for studying a Black girl's lived experience in mathematics classroom

> *in space* will depend on a variety of factors, not least of which will be one's 'perspectival perceptions' and goals, including, but not limited to, cultural inheritances, cognitive commitments and embodied location. The way oppression is perceived will also depend on its social effect and one's relation to it. (p. 51).

The multistability of oppression has implications for us as researchers, as well as the reader. Meaning that one's ability to interpret an account of Cameryn as trusthworthy emanates from the cultural inheritances, cognitive commitments, and embodied locations of the writer *and* the reader. As *we* read Cameryn's mathematics learning performance through images and words, we do so collectively but with different resources for sense-making. In the following section, we provide our analytical approach in interpreting Cameryn's mathematics learning experience as a particular performance of Blackgirlhood understanding that it is one of many topographic possibilities for understanding her pain and oppression in the mathematics classroom.

4.2 The study of lived experience and the hermeneutic process

In this paper, we use hermeneutic phenomenology to characterize the performance of Cameryn as a Black girl learner of mathematics. Phenomenology is the study of lived experience and hermeneutic phenomenology is a method of studying lived experience by understanding and interpreting texts (Wilson & Hutchinson, 1991). As described by van Manen (1990), hermeneutics, by focusing on the seemingly trivial aspects of our lives, "makes us aware of the consequential in the inconsequential, the significant in the taken-for-granted" (p. 36). The study of lived experience is engaged through the hermeneutic circle—a reflexive process of questioning a text through different horizons of understanding. Gadamer (1998), an influential figure in the development of hermeneutic phenomenology, describes horizons as contexts of meaning. "A person with no horizon, in Gadamer's view, does not see far enough and overvalues what is nearest at hand, whereas to have a horizon means being able to see beyond what is close at hand" (Laverty 2003, p. 25).

In Fig. 1, the first author engaged hermeneutic circle in six general phases. First, I established a phenomenological ground based on Cameryn's interview data. Such a grounding provides the necessary subtext to interpret Cameryn's mathematics learning performance. After establishing the subtext, I selected a short video clip as the primary text to study Cameryn's mathematics learning performance. The performance was broken into parts and each part was annotated in detail to characterize her performance (i.e., within the immediate horizon). The characterization of the parts was deeply influenced by participation frameworks as developed by Charles Goodwin (2007). Next, I explored the parts of her performance at different horizons of meaning (e.g., the immediate horizon and the sociohistorical horizons). These horizons of meaning were synthesized and used to describe aspects of Cameryn's performance and make sense of her phenomenological reality. This process continued in a cyclical fashion until each part of the performance was analyzed and incorporated into the whole.

4.3 Research context

This analysis is part of a larger ethnographic study, which was conducted in a middle school located in large Midwestern city of the United States. The school community

is densely populated in several areas, predominantly Black (over 80%), and slightly over 40% of the population is considered low income. The community is sprinkled with gang territories that often overlap with elementary and high school boundary lines. Like many inner-city urban communities, this school community is faced with many hardships and shows the toll of structural neglect over several decades (Lipman 2013). The objective of the larger study was to capture the various aspects of Black children's identity development in mathematics and science contexts (Varelas et al. 2012). As a participant observer of the mathematical contexts, I (the first author) was particularly drawn to Cameryn, one middle school-aged Black girl, who held a visceral dislike of her mathematics class.

Cameryn was one out of twelve girls in her 8th grade Algebra class. We focus on her because of the complexity of the performances that she engaged as a Black girl. While she and others identified her as a girl, Cameryn's racialized performance of gender tended to be stereotypically masculine and, at times, hyper-masculine. She exemplified the well-known performance of cool pose but did so as a Black girl. Additionally, Cameryn narrated her mathematics identity with clarity—as someone who disliked mathematics and did not consider herself as good at mathematics—and this narration was consistent over the course of the academic year that we followed her class. Following Butler (1988), these aspects of Cameryn's fabrication as a mathematics knower and doer created a relatively well-defined menu of possibilities for dramatizing and reproducing performance that index mathematics learning.

In Cameryn's class, the first author collected a variety of data, including video recordings of her class, field notes, small group audio recordings, student work, classroom artifacts, achievement data, attendance data, student interviews (three interviews over the course of the year), and teacher post-reflection interviews. For the purposes of this study, we relied primarily upon the student interview data and video recordings. The interviews took place at three points during the academic year in the fall, winter, and spring and lasted between 34 and 43 min. Each classroom visit was videotaped with two cameras (i.e., one standing camera and one camera on a wheeled platform). We reviewed and annotated approximately 38 h of video in this analysis. Cameryn was visible in approximately one-third of the video footage and maintained relatively similar performance of mathematics learning across the video footage. We chose one clip from the beginning of the year that provided a clear view from an angle that allowed for the investigation of Cameryn's body comportment and clear audio but otherwise fairly typical for Cameryn in mathematics class.

Fig. 2 Cameryn leaving class with her backpack and sweatshirt over her shoulders

5 Mathematics learning as painful

5.1 Meet Cameryn

In Fig. 2, Cameryn is wearing her backpack and a large sweatshirt tied around her shoulders. She would often have hats, or keys hanging from her pockets. Her clothes hung from her body, but she was not sloppy nor careless. Her clothes were precisely oversized. She was relatively the same height as her girl peers, but was adorned with none of the accoutrements of Black girls in her community. She wore no makeup; her hair included no bows, headbands, or long straight hair. Instead of soft boot-like slippers, she wore construction site boots, and instead of skinny or tight-fitting jeans, she wore baggy khaki pants and loose fitting t-shirts or polo shirts. She commanded space with her presence and not as much with words. Her classmates, girls and boys alike, knew not to bother Cameryn. While she engaged in "flamin'"[3] (i.e., doing the dozens or signifyin'), there were limits that she seemed to set and others knew not to cross.

5.2 Blackgirl face as ecologically situated

While cool pose has previously been conceptualized as a performance of Black masculinity, Cameryn had developed her own form of cool pose–which we characterize as *blackgirl face*–and moved quietly, smoothly, and confidently through her school and classroom. The outward performance

[3] These are different terms of a rhetorical game of one upmanship in levying playful insults, typically about someone's appearance or family members.

of blackgirl face as displayed by Cameryn appears stoic and smooth. However, Majors and Bilson (1992) in reference to cool pose suggest a stoic facade used by many Black men is to mask the stresses of constant exposure to environmental risks in urban contexts. Through our interviews with Cameryn, we learned that she was subject to a traumatic childhood event, as well as the constant surround of poverty and drug-selling. Cameryn shared that she still had nightmares related to her trauma. Cameryn also shared that she was a good physical fighter, when asked about her talents. Blackgirl face allowed Cameryn a way to carry herself in a protective manner through her neighborhood. In the same way that blackgirl face served to protect Cameryn in her neighborhood, Cameryn uses this Black masculinized performance to mask her vulnerability as a mathematics learner.

5.3 Narrating a persistent dislike of mathematics

During interviews, on multiple occasions over the course of the academic year, Cameryn stated, "I hate math". She described mathematics as hard, headache-inducing, and confusing. The following are examples of how Cameryn (C) expressed her deep acrimony towards mathematics to the first author (M) during her interviews in the fall, winter, and spring. The opening question in this first excerpt builds on informal conversations between Cameryn and the first author about her feelings about her mathematics class.

5.4 Fall excerpt

M: So, tell us—let's go back to this math thing. So why that was one of the first things we talked about when we first met each other is that you didn't like math. So, tell me why you don't like math and when did that start?
C: It's hard.
M: It's hard.
C: Like sometimes I get numbers mixed up. And I… When I see numbers It's just blur. It's hard to (..) do to me.
M: Has it always been that way or is it just more recently it's become increasingly difficult
C: Yea. Nah, no 'cause I always didn't like math, but it's just that I don't like it even more now as I grow. I don't know why. It make my head hurt.

Here, Cameryn clearly articulates her distaste for mathematics, which has been amplified this year. She describes mathematics as "hard," "makes my head hurt," and something she "always" disliked. In the winter, she is more explicit about her dislike.

5.5 Winter excerpt

M: Ok. Um. So get me I know we talked a little bit about this but is there anything that you don't
C: Math.
M: Ok. Tell me more about that
C: I hate math.
M: You hate it?
C: Yes.
M: And tell me why you hate it?
C: Cause….it's confusing. The numbers. Numbers confusing

In this excerpt, Cameryn is more direct in her language and states unequivocally, "I hate math." She attributes her hatred to the confusion she feels when working with numbers. In her final interview, Cameryn describes her feelings about mathematics in comparison to other school subjects.

5.6 Spring excerpt

M: When you think about your grades is it because you're doing your hundred—you know hundred percent best or you just you know it doesn't…I guess my question is: Is school hard or is it just boring to you?
C: Math class hard. But the rest I don't get but it–it just that math class throw me off.
M: Are you doing pretty good in your other classes other than math?
C: [Cameryn nods head.]
M: Pretty good? Tell me what kind of grades and stuff you're getting in your other classes.
C: Like ~ A's and ~ B's since I don't since I don't like math, social justice in the same room I can't concentrate 'cause everything always have something to do with math I don't know why I don't like math it make my head hurt.

Over the year, Cameryn describes her mathematics class with general disdain and hatred. The repeated references to her head hurting indicate a feeling that is embodied and experienced in a visceral way. However, when observing Cameryn in her mathematics classroom, she is engaging in the routinized ways of doing mathematics in many urban classrooms.

5.7 Mathematics as painful

The routine ways in which Black children experience mathematics are characterized by "an emphasis on repetition, drill, right-answer thinking that often focuses on memorization

and rote learning, out-of-context mathematical computations, and test-taking strategies" (Davis & Martin, 2008, p. 20). In her winter interview, Cameryn describes the routine ways of her algebra class.

M: And what about math class what is math class usually like? Like from start to finish if you had to describe math class what would you say?
C: painful…endless-less
M: {laugh} but I want you to describe it to me like you walk into the class and then and then
C: A'ight, so like walk into the class do the do now. Do now take like ten minutes in class or fifteen. We'll do the do now and we open our textbooks algebra one book the main book. She'll [Mrs. Ahmed, the lead teacher] tell us what page and then Ms. Bryant [the student teacher] come over and then she'll tell us how to do our work or whatever. And it's only easy if you know how to do it sometimes I just be loss.
M: And then what happens after you do the work in the book?
C: We, like before we get done with the books. We—like the if we got numbers assigned to us, like one through five. The whole—if you take the whole period—she'll stop us before like ten minutes of class, then she'll like have people come up and explain what they did and how they did it. That's the only— that's another reason I get how to do it.

The excerpt indicates three routine phases in Cameryn's everyday experience. The first part of class comprises a "Do Now," or warm-up activity for the day which lasts about 10–15 min. After the warm-up, the second part of class, according to Cameryn, is a mathematics assignment from the textbook in which students are allowed to work independently with the lead teacher and student teacher monitoring and supporting students (for approximately 25–30 min). The third and final phase includes the public presentation of solution strategies by students on the whiteboard (for approximately 10 min). Interestingly, Cameryn uses the word "painful" when asked to describe walking into her mathematics class. However, her description more or less characterizes the typical use of class time in secondary mathematics classrooms (Grouws et al., 2010). The typicality of Cameryn's mathematics classroom coupled with her feelings of dislike and pain encourage us to question what exactly is painful about the experience. Said differently, (1) why might it be painful to be Black girl in the context of mathematics learning and participation? and (2) why might it be painful to be a learner and doer of mathematics in the context of being a Black girl? To explore these questions, we now pivot to a 5-min exchange in Cameryn's mathematics classroom that typifies her daily interactions to understand how everyday pain might be performed and experienced by a Black girl mathematics learner.

6 Deconstructing pain in the mathematics classroom

As our text, we selected an episode that was videotaped in Cameryn's classroom toward the beginning of the academic year. The lead teacher Ms. Ahmed has worked through a lesson on graphing equations by plotting points. In the following segment, the students are engaged in the second phase of their independent work from their textbook.

6.1 The opening of Cameryn's performance

This episode begins with Cameryn sitting close to her table partner, Tamara. The student teacher, Ms. Bryant who the students refer to as Ms. B, has just sat down with the girls. Ms. B helps Tamara first. This is a typical set of events in Cameryn's classroom, insofar as Cameryn and Tamara are known to be struggling algebra students. As Tamara and Ms. B discuss one of the exercises, Cameryn picks up her calculator and begins pressing the buttons with her thumbs. In Fig. 3a–d, Cameryn's body contracts into a 'C' shape around her calculator, and her head and eye gaze follows. Her shoulders transition from a rounded and outwardly facing to hunched and inwardly facing. In this short episode, her body converges on itself like a cocoon.

While it is not apparent from her closed posture, Cameryn appreciates Ms. B and describes her as a helpful instructor:

Yeah. She give you, she explain it easy—not like other people. I mean other teachers I've known. They can't explain it good…. She like, she'll give hints but we can tell what she's talking about when she try to give a hint.

Here, we believe it is important to note that Cameryn found Ms. Bryant to be a trusted instructor who helped her make sense of the mathematics that she was learning.

6.2 Into Cameryn's performance

In Figs. 4 and 5, Ms. B changes seats and is now sitting next to Cameryn. On Cameryn's desk is a textbook, a calculator, and a sheet of notebook paper. Cameryn is writing on the notebook paper with a pencil as Ms. B looks on with her pen poised to write on the notebook paper.

Ms. B has advised Cameryn to write down an equation. Following this directive, writing and hunched closely to her paper, Cameryn then sits up with her shoulders rounded and asks whether she has written the equation correctly, as shown in Fig. 5a. The learning interaction is established

Fig. 3 Cameryn closing her participation framework

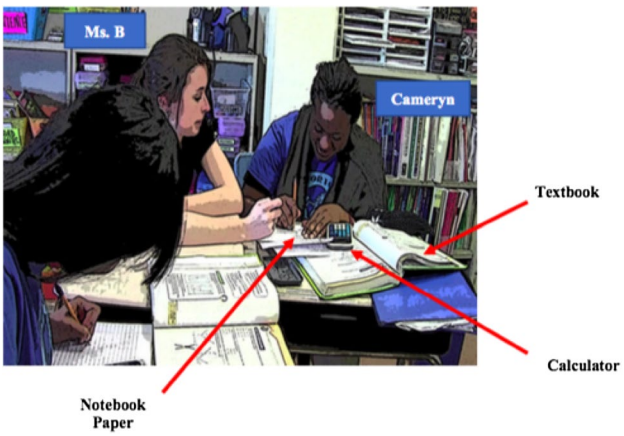

Fig. 4 Cameryn working on her assignment with the help of Ms. B in a shared participation framework

through both Ms. B and Cameryn's body positions and eye gaze. Ms. B looks onto Cameryn's paper, peering over an invisible boundary demarking a field of participation between herself and Cameryn.

In Fig. 5b, Ms. B breeches this field with her hand by briefly pointing to the paper, and Cameryn also brings her hands (that have been withdrawn) into the shared space to begin writing with her pencil, as Ms. B dictates a mathematical expression (i.e., $\frac{5-5(-3)}{2}$). Cameryn transcribes the expression and Ms. B withdraws her hands from the notebook paper. In Fig. 5c, Ms. B's hands return immediately—grabbing the pencil from Cameryn and writing on the notebook paper and then her hands and arms are pulled back into her personal field. At this point (Fig. 5d), Cameryn and Ms. B share the interactive learning space through their joint attention of the mathematical expression and speech. Ms. B asks Cameryn, "Alright, so what are you gonna do now?" After this inquiry, Cameryn begins to rock her body back and forth rhythmically while staring at the notebook paper. The mathematical problem that Cameryn is expected to solve is now primarily computational (i.e., evaluating the expression $\frac{5-5(-3)}{2}$). She rolls her head around her shoulders and her eyes dart off to the side and then settle on the calculator in front of her. As shown in Fig. 5e, Cameryn picks up in one smooth motion in rhythm with her body still rocking and states, "Let's see." In Fig. 5f, Cameryn then points to the paper asking, "I do that first, right?" Ms. B confirms and then Cameryn moves the calculator closer in her lap as Ms. B maintains her gaze on the calculator.

6.3 Exploring horizons of meaning: topographic possibilities in Cameryn's performance

In the previous sections, we have provided an account of Cameryn's performance. Invoking Gadamer, we can accept this account of Cameryn's performance and value what is nearest at hand. That is, we could read this performance in the ways that many Black girls' bodies are read, for example, as disinterested, apathetic, and defiant. With no additional interpretative horizon, we are simply left with a Black girl and a White student teacher computing a mathematical problem. However, if we are "to see beyond what is close at hand", then we may endeavor to ground our read of Cameryn's performance in the pain that she consistently articulates. For this reason, we use a horizon (or an interpretative context) of Cameryn's local community to make different sense (and, we would argue better sense) of the performance.

Recall that Cameryn has developed a performance of stoicism, which we call *blackgirl face*, to navigate her community. We recognize her performance of blackgirl face as a protective coping mechanism as she moved between a variety of social spaces.[4] Researchers have shown that such emotionlessness and indifference is often perceived by others as academic disidentification or apathy (Czopp et al. 1998), yet this seems to misconstrue the purpose for engaging in blackgirl face as an adaptive mechanism for the various contexts children in urban settings must traverse throughout her

[4] Spencer (1995) refers to the complexity of Black children developing a suite of adapative and maladaptive responses or coping mechanisms within her model of phenomenological variant ecological systems theory (PVEST).

C: Like that, right?

Ms. B: *((looks closely))*

(a)

Ms. B: Five minus five times negative three overrrr...two.

C: *((mouths inaudible word; begins writing))*

(b)

Ms. B: Over the whole thing. *((takes pencil from Cameryn and writes))*

(c)

Ms. B: Alright, so what are you gonna do now. *((looks at paper))*

C: *((hunches over, begins rocking and rolling her head and looks at paper))*

(d)

C: *((smoothly picks up calculator after rocking forward))* **Let's see.**

Ms. B: Ok.

(e)

C: I do that first, right? *((points to paper and then moves calculator to lap))*

Ms. B: Yea, do that first.

(f)

Fig. 5 Cameryn and Ms. B construct a cooperative participation framework

day. To protect herself and mask any vulnerabilities invited by her gender, Cameryn performs toughness, coolness, and confidence in her community, through the hallways of her school, and into the mathematics classroom.

In the mathematics classroom, her performance of blackgirl face encounters the demands of mathematical work. In the opening moments, we see Cameryn's body constrict in the presence of a mathematical authority figure in the classroom sitting next to her. Similar to the stances developed by Goodwin (2007), we see Cameryn take up a *protective stance*, i.e., a closed posture that disinvites joint attention and participation. To continue performing as a mathematics learner, Cameryn fiddles with her calculator and curls her body when Ms. B sits down. This move of working with her calculator simultaneously allows her to stay in-character as a mathematics learner and stave off Ms. B in any joint interaction.

When Ms. B deliberately engages Cameryn in her mathematical work, Cameryn's performance of blackgirl face changes in its delivery and continues to mediate their learning interactions. They are both reserved in how they share and organize the learning space. Their hands are generally drawn close to their own bodies and only breach the shared space for a few seconds at a time. There are moments in this short episode that Cameryn's performance of blackgirl face is punctured by the vulnerability of learning. Her speech becomes tentative and affirmation-seeking, indicating her vulnerability as a mathematics knower and doer. At the same time, to maintain her "cool" or not to lose "face," she exposes very little about what she knows and understands (or not). Her statements are both questions, "Like that, right?" when writing a numerical sentence and "I do that first, right?" when inputting the numerical sentence into the calculator. Here, we can imagine how tiresome it must be as a learner to seek affirmation for every written term and every calculator stroke. Such tedious micro-confirmations in mathematical work for a student might be experienced as pain.

We can read yet another informative moment. Cameryn, in blackgirl face mode, hears Ms. B's dictation: "Five minus five times negative three over two". Cameryn moves her hands into the established learning space and begins writing on the notebook paper, only to have the pencil taken from her hands and to have her written work corrected (i.e., "over the whole thing"). We imagine, although we do not have

the student work to confirm, that Cameryn effectively wrote $\frac{5}{2} - 5(-3)$, instead of $\frac{5-5(-3)}{2}$. Mathematical micro-corrections serve as a small refutations and invalidations that can shape the performance of Black girlhood—its expressiveness and the certainty of self. Within the same moment, we could interpret the taking of the pencil through a *sociohistorical horizon* in which the Black girl's body, space, and property are continually violated by White men and women (Hartman, 1997) in the times of antebellum and postbellum America.

In a different moment, we see Cameryn smoothly rocking back and forth as she attempts to mentally compute the numerical expression $\frac{5-5(-3)}{2}$ before reaching for the calculator. In an algebra class, how does one exhibit coolness, calmness, and confidence—a performance of blackgirl face—with the lack of computational automaticity? Moreover, how does one accomplish the practice of persevering in solving a problem situation while being protected—it seems perseverance demands some measure of vulnerability and protective stance demands invincibility. In the following section, we describe how the reconciliation of such performances of blackgirl face and mathematics knower/doer can tell us something more about the experience of mathematics learning.

7 From performance to experience

We are cognizant of the potential discomfort in placing the Black girl body under such microscopic interrogation. We have characterized Black girls' posture and dress, as well as each mundane action of writing or holding a calculator. Such detailed inspection functions as a form of capture of the blackgirl form. There was a visceral, conflicting experience in producing this analysis of capture that harkens a dark history of the mathematizing and scientizing of the Black woman body (Chronaki 2015). On the one hand, we have been complicit in binding the blackgirl body (if only on paper and in time) and qualifying her form. On the other hand, we have amplified, animated, and punctuated the complexity of Black girls' experience as mathematics knowers and doers and the relational labor entailed in mathematical contexts. Such insights are only available through close attention to the embodied experience, as Black girls engage in the practices and contexts of mathematics. We are clear that the blackgirl body particularly in its performance is political.

7.1 The phenomenological pain inside blackgirl performances

Our analysis of Cameryn engages the question of the everyday performance of Black girlhood in mathematical contexts. We use the case of Cameryn to describe another formatting power of mathematics upon the Black girl body (cf. Skovsmose, 2013), as a constraining force that inhibits posture, gesture, and speech. Using different moments in Cameryn's performance, we bear witness to the potential pain she may be experiencing as a mathematics learner. This pain becomes embodied through the way she moves (and constrains her movement) and in the way she languages her performance with questions. Scale is particularly important to Cameryn's experience of pain, i.e., the "micro" nature contributes to her pain, as repetitive, constant (in mathematics class), and accumulating. Within the experience, there is no escape. Either each small move to write, input numerals and operations to a calculator, and every utterance creates the opportunity to be wrong and vulnerable; or each small move to write, input numerals and operations to a calculator, and every utterance requires confirmation from an outside authority. Such a tenuous agency is evidently painful. Microinvalidations, such as constant corrections in mathematical work, might be necessary to address error in mathematical thinking, however such constant negations of mathematical thinking and work could be considered a type of microaggression (Sue et al., 2007), which is known to result in adverse outcomes with respect to mental health. Microconfirmations of mathematical work operate in an equally, if not more, insidious fashion than microinvalidations. Microconfirmations require a student like Cameryn to constantly seek out affirmation and to fundamentally distrust her own thinking and intuition. However, in the case of microconfirmation-seeking behavior, the student must participate in their own subjection requesting the microinvalidation. Cameryn's questions toward Ms. B seeking confirmation of her written work and calculator strokes makes for painful work, especially for Cameryn who rarely defers to others within her performance of Blackgirl face.

7.2 Relational labor: the hidden work of learning

Performance is the heavy work of 'manufacturing and sustaining fabrications through corporeal signs and other discursive means' (Ball 2000, p. 9). This performative work is a form of *relational labor*, which remains hidden although occurring in plain sight. It is the constant work of reading, assessing, and delivering on the questions of a performative society—did I do it right, am I doing enough, how will I measure up? Every child must engage in relational labor; however, in the case of Black girls, the judges who assess a singular performance may be located in different communities with distinct (versus overlapping) criteria, which makes the performance that much more difficult to pull off as authentic and convincing. We would argue this is *not* because Black girls wish to disidentify from mathematics. Rather, mathematics has been defined and has maintained

its prestige in its opposition to their very bodies as gendered and racialized beings (Levya, 2017).

Relational labor is the interpersonal expenditures between peers and teachers in the learning process. We describe relational labor as a useful way to conceptualize Black girls' learning, because it debunks a perceived cost-free automaticity of Black children's responses and properly construes mathematics learning as an active, intensive, relational process. Locher (2008) reminds us that every communication, which we will take as a performance, has an informational and interpersonal side, and these two parts are inseparable. Therefore, a performance always conveys some necessary content and context of relationships. Through the example of Cameryn, we note that the relational labor can be heavy both on the content side when seeking to understand the mathematical language and symbols, as well as maintain the relational complexity of her gender, race, and class. We are not suggesting that Cameryn's relational work is additive in some apparent sense (i.e., trebled by race, class, and gender), but we would argue that Cameryn's performative work *is* work and, thus, should be met with deep veneration in terms of the social complexity that she and other children must negotiate.

7.3 When pain becomes oppression

Pain and hate of mathematics are part of the mathematical learning experience (Black et al., 2009). When does pain and hate of school mathematics become oppression? Much has been made of working against systems of oppression, such as racism and sexism, in mathematics classroom but little time has been spent on the phenomenological qualities of racialized and gendered oppression at a scale in which individuals can implicate themselves and imagine individual change. Inadequate attention has been paid to the interactional-level and thus all serious reform efforts are pointed towards macro-level reforms, which leaves micro-level responsibilities underspecified in working against racism, sexism, and oppression generally. Given recent media examples of a Black girl being thrown across her classroom (Bullock, 2015) or a first grade Black girl being ridiculed for "confusing everyone" when working a mathematics problem, her paper torn in her face, and ordered to the chair to sit and "calm down" (Taylor, 2009), teachers are left believing that as long as they are not physically or verbally abusive in mathematics class, they are not part of an oppressive system within mathematics education. This inattention is most certainly a result of the scale in which oppression is often constructed—at the macro-level—in the realm of law, policy, and history, whereas teaching and learning micro-interactions are located at far more pedestrian and mundane spaces but still felt with force (e.g., Ball, 2018).

We need this word "oppression"; we also "need for it to be sharp and sure" (Frye, 1983). In this sense, every microinvalidation of a student's mathematical thinking that is experienced by every student does not rise to a form of oppression. However, for some groups and in many contexts, the structures that shape mathematics in many urban classrooms can "create feelings of oppression and being dominated by someone, they know not whom". This point is made clear by Cameryn who appreciates the student teacher, Ms. B, and still withdraws from the engagement of Ms. B. Oppressive forces created by mathematics class by Cameryn are not a function of the teacher, who Cameryn sees as a "nice" and helpful White lady, but the persistent socio-cultural and socio-mathematical patterns that *press* down on the Cameryn as a Black girl that is suffocating, headache-inducing, and painful. Our focus on the quiet, interior moments of Cameryn's performance contrasts with how we typically describe Blackness—as "expressive, dramatic, or loud" (Quashie, 2012, p. 3).

So much is made of what mathematics should be from an idyllic stance in mathematics education research that we do not bother to understand fundamentally what mathematics is for children who are engaged the learning on a day to day basis. Leveraging performance and performativity, we sought to expand the lexicon within identity-based research to include the everyday and every moment importance of children's social identities within mathematics learning.

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