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A Counterstory of a Black Girl's Forms of Resilience in a Standards-Based Mathematics Classroom

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Scholars have called for critical research that positions Black girls in a positive light while centering their constructed meanings and resistance against stereotypes and dominant discourses in mathematics spaces, particularly in reform-oriented instructional contexts. Black girls may resist deficit master-narratives about the intellectual ability of Black women and girls (macro-level) in moment-to-moment classroom interactions (micro-level). In this article, we tell a counterstory of how sense-making and silence became forms of resilience for a Black girl during a standards-based whole-class mathematics discussion. Using theoretical perspectives rooted in critical race theory and positioning theory, we operationalized Black girls' forms of resilience as repeated acts of resistance, which were evidenced by negotiated or rejected positions. Amari's mathematical brilliance was centered in this counterstory while showcasing how forms of resilience emerged from repeated acts of resistance at a micro-interactional timescale. Implications point to a need to specify micro-level responsibilities in classroom settings that challenge racism, sexism, and oppression that exist in macro-level reform efforts.

KEYWORDS: Counterstory, Positioning, Resilience, CRT

The humanity of Black girls encompasses a range of their lived experiences, realities, histories, languages, brilliance, character, and bodies, as well as their physical, emotional, and mental health. However, in the United States, Black girls' humanity is a fundamental right that has yet to be fully realized (Joseph et al., 2019, p. 133). According to Joseph et al. (2019), Black girls are still "positioned as 'outsiders' to mathematics learning" despite having an equal right to a high-level and quality mathematics education (p. 133). Additionally, Black women and girls are often excluded from discourse in mathematics education research, partly due to studies that do not explicitly center their experiences as important phenomena

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(Gholson, 2016). Despite their right to a high-quality mathematics education and inclusion in research, Black girls have been largely overlooked in studies focused on mathematics achievement and participation (Gholson, 2016; Joseph, 2017). It is crucial to provide space for Black girls in mathematics education research (Joseph et al., 2016), where the focus is on their constructed meanings and resistance against stereotypes and dominant discourses in mathematics spaces.

In this article, we present a counterstory of how sense-making and silence became forms of resilience for Amari (pseudonym), a Black girl, during a standards-based[1] whole-class mathematics discussion. We argue that this exchange of interactions among Amari, her peers, and the teacher, all of whom are situated within a classroom culture, reflects the power dynamics and values within an urban school due to factors such as location, size, and student demographics (i.e., SES, race). Additionally, this study examines the power dynamics and racial dynamics associated with being a Black girl in a mathematics classroom, as well as how one can resist the barriers that many Black girls face in urban mathematics classrooms. Therefore, we contend that Amari's story is relevant for all participants in educational spaces, but particularly for those in urban classrooms.

During moment-to-moment classroom interactions, Black girls may resist deficit master narratives about the intellectual ability of Black women and girls (Haynes et al., 2016; Leyva, 2021), which can be perceived in relational interactions such as conveying low expectations (Evans-Winters, 2005; Pringle et al., 2012) and micro-invalidations of their mathematical thinking (Gholson & Martin, 2019). Defining Black girls' forms of resilience as repeated acts of resistance, our study addressed the following research question: What forms of resilience played a role in how Amari managed her position during whole-class interactions in a 4th-grade standards-based mathematics lesson? We argue that by describing Amari's forms of resilience in this mathematics classroom space, her mathematical brilliance, agency, and ability become visible, challenging existing deficit master narratives about Black girls' mathematical ability.

In the remainder of this article, we situate the study in the literature on Black women's and girls' resilience in education and explain the theoretical perspectives supporting the study design and data analysis. Then, we provide details about the methods, followed by the counterstory in the results section. Finally, we conclude with a discussion about the implications and limitations of the study.

Black Women's and Girls' Resilience in Education

Early conceptualizations of resilience for Black adolescent girls in school were limited by an overemphasis on individual effort, rather than considering the structural forces that hinder their success, as well as access to resources that reflect white, middle-class familial success (Evans-Winters, 2005). Subsequently, resilience among

Black women and girls in education has been defined in terms of coping strategies (e.g., Leyva, 2021), persistence (e.g., Evans-Winters, 2005; Joseph et al., 2017), and accommodation or adaptation (e.g., Evans-Winters, 2005; Gholson & Martin, 2019) in the face of opposition, adversity, or stress. Furthermore, resilience among Black women and girls in school has been viewed from the perspective of resistance against racism and sexism (e.g., Joseph et al., 2016). Throughout this review, we examine conceptions of resilience among Black women and girls in the literature to (re)construct a definition of resilience at the interactional level, specifically in terms of social interactions between Black girls and their teachers and peers within the immediate learning environment. In the context of moment-to-moment classroom interactions, we conceptualize forms of resilience as repeated acts of resistance, which will be further described in the following sections. Then, we explore the possible mechanisms through which Black women and girls resist during classroom interactions.

Black Women's and Girls' Acts of Resistance and Forms of Resilience.

Black women and girls engage in various acts of resistance against racism and sexism in school contexts, such as standing up for themselves (Joseph et al., 2016), actively countering dominant perspectives of the "good student" (i.e., polite and quiet) that reflect white womanhood (Chavous & Cogburn, 2007; Fordham, 1993; Joseph et al., 2016), and exercising their agency when it comes to academic decisions and achievement (Evans-Winters, 2005; Joseph et al., 2016). How Black girls enact resistance in school settings should not be oversimplified, as stressors and accompanying resistance are complex, context-dependent, and change depending on situations and the people involved (Evans-Winters, 2005). For instance, when encountering explicit acts of racism in school, Black girls might stand up for themselves as an act of resistance (Joseph et al., 2016). Conversely, when confronting (implicit) narratives that deny their agency (e.g., deficit narratives), acts of resistance in classrooms may look different but serve a similar purpose (i.e., reassert their agency). Take, for example, Esmonde and Langer-Osuna's (2013) study that showed how Dawn (pseudonym), a Black girl, challenged a "guiding style" of mathematical interaction in favor of a didactic style, which created space for her to engage in a meaningful mathematical activity (asking questions, constructing arguments to challenge). In this classroom context, Dawn resisted certain interaction styles that reflected a discussion-based classroom "figured world" (Holland & Leander, 2004) to assert her agency in learning mathematics.

Resilience has been defined and measured by academic success in school (e.g., Borman & Overman, 2004). Black women's and girls' academic resilience has been conceptualized in terms of long-term success and persistence in school (Evans-Winters, 2005; Joseph et al., 2017). To better understand factors contributing to Black women's and girls' persistence in mathematics, Joseph et al. (2017) conducted a systematic literature review using critical race theory (CRT) principles and Black feminism to guide their analysis. Their synthesis of 62 articles identified resilience strategies as an essential component of Black women's and girls' persistence in mathematics, which consisted of (but was not limited to) quality mentorship, overcoming cultural expectations related to gender roles, and developing a sense of self-esteem through their achievements. Similarly, over a three-year ethnographic study, Evans-Winters (2005) described how the resilient adolescent Black girls in her study found ways to cope with classroom-level stressors (e.g., uncaring teachers, teachers with low expectations) by seeking mentorship from other women in the school (e.g., role models), or relying on their personalities (e.g., helping others) and individual agency (e.g., self-motivation).

Stereotype management (e.g., McGee, 2013; McGee & Martin, 2011) points to another resilience strategy that can support the academic persistence of Black women and girls in mathematics (Joseph et al., 2017). Joseph et al. (2017) argued that high-achieving Black women and girls may feel isolated and as if they do not belong in mathematics "in part because of societal stereotypes of being perceived as 'less than' and not capable" (p. 214). Furthermore, Joseph et al. (2017) asserted that although stereotyping may result in academic disengagement (due to feelings of not belonging), stereotype management can support the motivation and high achievement of Black women and girls. This finding suggests that the negative consequences of stereotype threat do not have to persist. Moreover, the Black adolescent girls in Evans-Winters' (2005) study demonstrated resilience over time, eventually deciding to conform to an image of what it looked like to graduate from high school. It is possible that the girls in her study conformed in order to adapt, manage, and bounce back from the adversity and stressors they regularly experienced.

Resisting Low Expectations and Deficit Narratives in Classroom Contexts.

Black girls' forms of resilience in the immediate learning environment can be defined as repeated acts of resistance. This section explores the mechanisms through which Black women and girls resist during classroom interactions. Relational interactions with teachers during class affect the interactional realities of Black girls (Battey & Leyva, 2013; Gholson, 2016; Gholson & Martin, 2014; 2019). For example, teachers who held low expectations of low-income young Black girls in upper elementary grades perceived them as having limited skills and knowledge, and causing social challenges in the learning environment, which negatively affected the girls' learning experiences in science and mathematics (Pringle et al., 2012). Teachers' low expectations have also been shown to impact the resiliency and success of Black girls in education (e.g., Evans-Winters, 2005) and mathematics education (e.g., Joseph, 2017).

On a broader level, deficit master narratives about the incompatibility between Black women and girls and mathematics affect their academic resilience and persistence (Haynes et al., 2016; Leyva, 2021). School systems have been built with white middle-class women's values and behaviors in mind, which inherently devalues and discredits Black women- and girlhood (Chavous & Cogburn, 2007; Fordham, 1993; Haynes et al., 2016). Reflecting on their school experiences (as Black girls) to understand their persistence as Black women doctoral students, Haynes et al. (2016) explained how a theme in their collective experiences in grade school was a loss of dignity. One of the authors told how she became the "White, Black girl" in class, praised by her teacher for being a good student because she was quiet and polite. The authors argued that the master narrative equates getting good grades, listening quietly in class, and being polite and undisruptive with white womanhood. When such master narratives are enacted in classroom spaces, the immediate learning environment becomes a space where Black girlhood is 'othered' (Fordham, 1993; Haynes et al., 2016). We assert that such racialized ideologies (e.g., deficit master narratives) can be perceived in relational interactions (e.g., low expectations, deficit perspectives) between participants during classroom interactions.

The reviewed literature suggests that the forms of resilience exhibited by Black women and girls are not only complex and varied, but also essential for understanding the experiences of Black girls in and out of mathematics classrooms (Gholson & Martin, 2019; Martin, 2012). This review also indicates that while the resilience of Black women and girls has been explored in various contexts (e.g., Evans-Winters, 2005; Joseph et al., 2017; Leyva, 2021), research has not explicitly focused on the forms of resilience displayed by young Black girls as acts of resistance against racialized and gendered oppression during micro-level interactions in mathematics classrooms. Furthermore, Black women and girls persist academically by challenging deficit thinking and interpretations (e.g., Haynes et al., 2016), yet the processes through which this type of resistance occurs in the immediate learning environment have been underexplored in research (Evans-Winters, 2005). Our study adds to this growing body of research by integrating CRT-informed counterstory telling methodologies and positioning theory (Davies & Harré, 1999) to empirically investigate a Black girl's in-the-moment positioning and resulting forms of resilience during a standards-based, whole-class mathematics discussion.

Theoretical Perspectives

We frame our study using principles from critical race theory (CRT; Solórzano & Yosso, 2002). CRT in education has been described as a collection of basic assumptions, viewpoints, pedagogy, and methods that "seeks to identify, analyze, and transform those structural and cultural aspects of education that maintain subordinate and dominant racial positions in and out of the classroom" (Solórzano & Yosso, 2002, p. 25). In alignment with other scholars, we leverage CRT to assert that "mathematics spaces are not neutral, thereby making learning mathematics while Black a complex phenomenon" (Joseph et al., 2017, p. 207; see also Martin, 2012). Underlying our work, CRT tenets in education allowed us to assert that: 1) racism is salient in Black children's experiences and cannot be divorced from other forms of subordination and oppression (i.e., sexism, classism), and 2) Black children's experiential knowledge and constructed meanings are legitimate and critical to understanding and analyzing racial oppression. These assumptions helped us conceptualize the intersectionality of Black girls' complex social realities in mathematics spaces where they likely must resist various forms of subordination and oppression (Evans-Winters, 2005; Leyva, 2021; Martin, 2012).

The following CRT principles provided additional foundational assumptions undergirding our work: 1) Reform-oriented instructional practices are advocated to improve equity, access, and inclusion so long as such practices continue to benefit those who already hold power (Barajas-López & Larnell, 2019; Jett, 2012; Ladson-Billings, 2021; Martin, 2008, 2009, 2019; Martin & McGee, 2009); and 2) voice or counterstory telling can be used as a tool "for exposing, analyzing, and challenging the majoritarian stories of racial privilege" (Solórzano & Yosso, 2002, p. 32; see also Battey & Leyva, 2016). Considering these assumptions, we sought to center Black girls' mathematical brilliance amidst interactions in a reform-oriented mathematics classroom. The second principle provided the groundwork for telling a counterstory to challenge (unwarranted) societal narratives that position Black girls along a racialized-gendered hierarchy of ability (Gholson, 2016; Leyva, 2017).

To conduct such an examination, we used positioning constructs to analyze classroom interactions. Generally speaking, positioning refers to the processes through which individuals use action and verbal communication to assign roles to others and structure interactions (DeJarnette & González, 2015; Kayi-Aydar & Miller, 2018; van Langenhove & Harré, 1999). The underlying goal of positioning theory is to explain how communication acts, storylines, and resulting positions restrict or allow possible emerging actions and messages, as well as how individuals assign responsibilities to others in relation to larger shared cultural narratives that shape interactions (Davies & Harré, 1999; Harré, 2012; Herbel-Eisenmann et al., 2015; Kayi-Aydar & Miller, 2018). In classroom interactions, students' positions are relatively unstable entities that can change in an instant (DeJarnette & González, 2015; Esmonde, 2009; Wood, 2013); in other words, "a student who holds a position of mathematical authority at one moment may lose that position at another moment" (DeJarnette & González, 2015, p. 7). However, as students and teachers continuously mediate positions between each other during whole-class interactions, patterns in discourse from moment to moment can be observed (Moschkovich, 2007; Wood, 2013).

One such mediating factor in the positioning that occurs in classroom interactions is underlying storylines. Storylines are implicit narratives, ideologies, and cultural practices that participants draw on in interactions (Harré, 2012; Herbel-Eisenmann et al., 2015). Storylines are intertwined with communication acts and positioning, so they can be conceptually difficult to perceive in interactions (Herbel-Eisenmann et al., 2015). To provide grounding for possible storylines at play in classroom interactions, we drew from Louie's (2017) analysis of classroom practices indicating inclusive or exclusive ways of framing mathematical activity and ability. The frames/framing theory underlying her work shares commonalities with the storyline construct in positioning theory. Both frames and storylines capture tacit and fluid narratives that potentially drive participant interactions (Herbel-Eisenmann et al., 2015). For example, the Hierarchical Ability frame/storyline – mathematical ability is distributed along a linear continuum where some people have a lot and others have very little – was substantiated in Louie's (2017) classroom data by explicitly valuing speed and correctness and positioning certain students as experts or helpers and others as needing help. Comparatively, the Multidimensional Math frame/storyline – everyone has both intellectual strengths and areas for growth that are relevant to mathematics learning – was indicated by practices such as a "variety of students are positioned as resources for their peers' learning" (Louie, 2017, p. 496, emphasis added). The practice of positioning students evidenced either exclusive or inclusive storylines; however, explicit attention to who is positioned differently and how students are positioned requires different analytic tools.

We operationalize positions/positioning as rights and duties (Harré, 2012; Herbel-Eisenmann et al., 2015), as positioning restricts or permits what others must do for someone (rights) and what one must do for others (duties/obligations). From this operationalization, we define forms of resilience in terms of repeated acts of resistance that arise from negotiated or rejected positions (i.e., rights and duties). For example, an act of resistance in a mathematics classroom may look like a participant in an interaction (student) being obligated to ignore their mathematical intuition and agree with others. Nevertheless, they might reject or negotiate this obligation by maintaining their right to use their intuitive mathematical ideas.
Situating our positioning analysis within a framework for constructing counterstories provides a theoretical connection between our assumptions rooted in CRT and the examination of Black girls' forms of resilience in mathematics classrooms (see Adiredja, 2019).

A counterstory begins from an anti-deficit perspective which presupposes that Black girls are mathematically capable and bring valuable resources for learning to mathematics spaces. Adiredja (2019) further asserted that, over time, counterstories from an anti-deficit perspective contribute to a counternarrative to challenge (and ultimately dismantle) deficit master narratives – broad societal collections of stories about the mathematical ability of students of color (see Haynes et al., 2016). Deficit master narratives (i.e., storylines) and positioning are immensely entangled with social differences based on race, gender, and status in the classroom (Esmonde & Langer-Osuna, 2013; Wood, 2013). Applying CRT in education asserts that counterstories work towards breaking down oppressive structures (racism, classism, sexism) in educational settings. Furthermore, such counterstories center Black girls' brilliance in these spaces, which often remains hidden in mathematics education research (Gholson, 2016; Joseph, 2017).

Methods

In this section, we provide the research context and background for this study, situated within a larger project,[1] the data selection criteria, and background information to contextualize the selected lesson. Then, we detail the analytic procedures used to examine the selected lesson and develop interpretations of the findings.

Research Context and Selection Criteria.

The focal lesson was recorded as part of a large-scale professional development (PD) efficacy study conducted in elementary schools in an urban school district in the United States (see Melhuish et al., 2022). The purpose of the original study was to test whether a standards-based PD would 1) increase teachers' mathematical knowledge for teaching (MKT; Ball et al., 2008), 2) increase the mathematical quality of instruction (MQI; Hill, 2014), 3) increase student achievement outcomes on standardized tests, and 4) reproduce equitable student outcomes found in similar studies (e.g., Boaler & Staples, 2008). While instructional knowledge and practice changed in anticipated ways, they found a "widening opportunity gap for students from minoritized groups," particularly for Black students (Melhuish et al., 2022, p. 308).

As part of the larger project, two subsequent lessons taught by each participating teacher were video-recorded at the end of each school year. The lesson analyzed for this study was selected because it reflected the more significant trend in Melhuish et al.'s (2022) study. That is, the participating teacher's instructional practice resembled the research-based instructional practices emphasized in the PD model, measured by the Math Habits Tool (Melhuish et al., 2020). However, the Black students in the class were predicted to score substantially lower than their peers on the year-end standardized assessment (using the student outcome model from Melhuish et al., 2022). Furthermore, compared to other lessons and teachers in the same school district, the selected lesson received a high score on the validated MQI measure (see Hill et al., 2012), and the teacher received a high score on an MKT assessment (see Ball et al., 2008).

Additionally, Black students participated at high rates during whole-class discussion (measured by participation rates). A lesson with these qualities was selected because, on the surface, it meets many of the criteria for best practices and does not reflect barriers for Black learners in terms of access to high-quality conceptually-oriented instruction and knowledgeable teachers (Martin et al., 2017; Tate, 2008), or participation in mathematics discussions during class time (e.g., Reinholz & Shah, 2018). We hypothesized that examining subtle power dynamics through Black learners' positioning on a micro-timescale (Herbel-Eisenmann et al., 2015) could provide one possible explanation as to how instruction may be standards-based and reflect best practices (e.g., National Council of Teachers of Mathematics, 2014) yet amplify inequities in the immediate learning environment.

Teacher, Student, and Lesson Information.

The selected lesson comes from a 4th-grade classroom focusing on a conceptual understanding of fractions using visual representations. The teacher, Ms. M (all names are pseudonyms), had been teaching for 12 years when data were collected[1] and participated in over 60 hours of PD (see Melhuish et al., 2022 for a description of PD models). Ms. M self-identified as female, White/Asian, and a native English speaker. Table 1 provides demographic information for the students[2] in the selected lesson.

Table 1
Student Demographic Information in the Selected Lesson

	Girls	Boys	Free Lunch	Black	White	Asian	Hispanic	Pacific Islander	Native American
n=24	12	12	21	9	3	3	6	2	1
Percent	50	50	87.5	37.5	12.5	12.5	25	8	4

Background Context of the Lesson.

Ms. M began the lesson by reminding the class what they did in a previous lesson: "we found out that idea that when we're splitting something up into fractional parts that those fractional parts must be.. [equal]." She then referenced a public record on poster paper of their previously developed ideas (Figure 1). The focal task of the lesson was given to students as an "exit" task in the previous lesson, which asked "is this shape divided into fractional pieces? Why or why not?" (Figure 2). As Ms. M handed back students' responses to the exit task, she commented that "about half" still said yes "on this new shape" then stated: "that tells me a couple things, we had a lot of yeses the other day but I just don't think you guys understood why you answered yes." She continued to say that they should be able to demonstrate an understanding of the focal task (Figure 2) "because it's not enough to just say 'yes' or 'no,' I want to really understand that you... know mathematically what's going on, okay?"

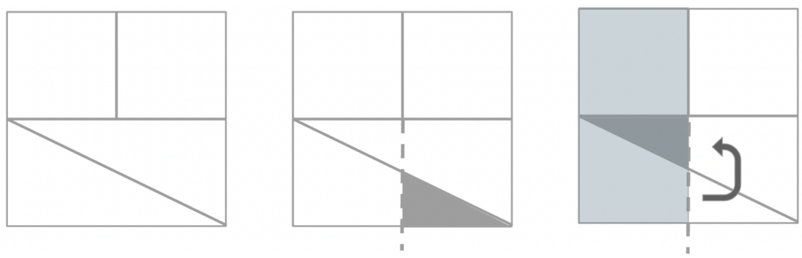

Figure 1. Public Record[1]

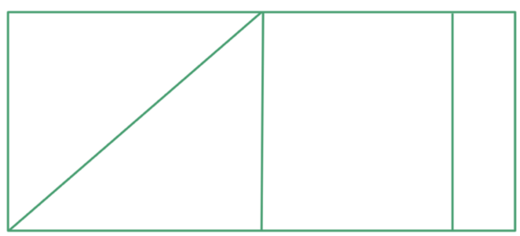

Figure 2. Focal Task[2]

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[1] (Leftmost image) a square with a horizontal line across the middle, a vertical line dividing the top rectangle into two equal pieces, and a diagonal line from the top left corner to the bottom right corner of the bottom rectangle; (Middle image) the same square with dotted vertical line extending through the bottom rectangle and the left bottom triangle piece shaded; (Rightmost image) the same square with an arrow showing the shaded triangle moved to show equal-sized pieces.
[2] A rectangle with a line drawn vertically down the center, a line drawn diagonally from the bottom left corner to meet the corner created by the vertical line, and a third line drawn vertically down the right side, approximately one-eighth of the whole rectangle.

The teacher was using a mathematical convention that if a shape is cut into "fractional parts" then "those fractional parts" must all be "equal" (meaning the same size/area), but the parts do not have to be the same shape. Ultimately, students in this class were expected to use this convention to demonstrate that they understood the shape in the focal task (Figure 2) was not divided into fractional pieces because the pieces were not all equal. Different textbooks and curricula may have different conventions for defining fractions (and, consequently, fractional parts), and such mathematical conventions are typically arbitrary rather than necessary (Hewitt, 1999). This becomes important in this lesson because proving whether the shape in the focal task is (or is not) divided into "fractional" pieces is essentially a matter of mathematical convention rather than mathematical correctness. That is, while it is possible to prove that the pieces are not all the same size, proving whether this means the shape is divided into fractional pieces is entirely determined by the convention being used for "fractional pieces" (cf. Hewitt, 1999).

As Ms. M launched partner work, a student asked if they could be grouped with some "yeses" and "noes." Consequently, the class spent time getting into groups of about 4-5 students so at least one person with an opposing answer was in a group. Ms. M then launched group work by stating, "your job is to convince, your argument whether it's yes or no, be convincing to each other…" Students spent about 5-6 minutes debating about the focal task.

Following group work, the teacher invited four students to discuss their debate, which is where our results story begins. The class spent about 30 minutes of the 60-minute lesson in a whole-class discussion focused on making sure everyone agreed (or was "convinced") that the shape in the focal task (Figure 2) was not divided into fractional pieces because the pieces were not all equal. This was the expected response based on the convention being used for fractional pieces. Amari, a Black girl, became the focus of attention in the discussion as she persisted in making sense of why she thought the shape *was* divided into fractional pieces. Although Amari's thinking was mathematically valid, it did not align with the expected response. It is worth noting that toward the end of the discussion, Amari eventually stopped persisting with her ideas in favor of going along with the expected response in the classroom.

Data Analysis.

In this section, we provide details of the analytic procedures to address the research question: What forms of resilience played a role in how Amari managed her position during whole-class interactions in a 4th-grade standards-based mathematics lesson? The analysis was carried out in three phases: 1) creating a data set and delineating relevant episodes, 2) analyzing mathematical discourse and positioning in each relevant episode, and 3) developing and checking interpretations. Here we share our positionality as researchers, which informed every stage of the study. The first author is a queer, white, cisgendered, able-bodied, and neurodiverse woman from a low-middle-class background. The second author is a Black-White heterosexual, cisgendered woman from a low-income background. Our collective and individual experiences in all levels of mathematics classrooms and educational spaces have informed our awareness of the intersections of race, gender, and class in these settings. Activities such as conversations with each other, colleagues and friends, and reading and reflecting on literature (among other things) have expanded such awareness, which has made us wary of interpreting individual experiences and participation in mathematics from essentialist or deficit viewpoints. Due to these experiences, we can attest to the need to resist the dominant narrative to succeed in mathematics. As researchers, we position our analyses of the data as highly situational, subjective, and interpretive. This allowed us to openly discuss possibilities for interpretations of what we observed in participants' interactions in this urban setting, with specific attention to power, race, gender, and privilege.

Phase 1: Constructing a Data Set and Relevant Episodes.

The first author constructed a detailed transcript of the video data, including all verbal and nonverbal activity at each turn in the speaker (Erickson, 2006; Wood, 2013). Positioning and storylines do not surface from a single or even a handful of utterances. Therefore, akin to Louie (2017), the transcript was separated into episodes where the delineations represented instructional transitions (e.g., shifting to a new topic in a whole-class discussion or addressing a new group/student during small group time). The first author then identified all episodes that contained sustained, public interactions between the teacher and students as they progressed in the focal task of the lesson. This subset of episodes formed the basis of relevant episodes for further micro-level analysis (which will be described in detail in Phase 2). Once this subset of relevant episodes was identified, the first author re-watched each relevant episode and transcribed the discursive activity of both the speakers and reactions of the listeners to create a detailed set of notes "on the complementary verbal and non-verbal behavior of all persons participating in the interactional occasion, showing the relationships of mutual influence between speaking and listening" (Erickson, 2006, p. 184).

Phase 2: Analyzing Mathematical Discourse and Positioning.

For each relevant episode (i.e., all episodes with sustained whole-class interactions between participants about the focal task), the first author analyzed the mathematical discourse, communication acts, storylines, and positioning (i.e., rights and duties; Harré, 2012; Herbel-Eisenmann et al., 2015). Power dynamics through interactive positioning in the classroom have been shown to hinder student agency or marginalize specific students (Herbel-Eisenmann & Wagner, 2010; Wood, 2013). We chose to apply positioning theory because it allowed us to document potential power dynamics playing out on a micro-timescale via discourse (Herbel-Eisenmann et al., 2015). Furthermore, we drew on Wood's (2013) methodology because she also used discourse and positioning constructs to analyze interactions on a micro-timescale. This provided us with a clear guide for how to document micro-level positioning during the whole-class interaction. Participants' mathematical discourse was recorded by answering the questions: What mathematical concepts, especially relating to fractions, were communicated and how? What mathematical words and representations (especially pertaining to fractional pieces) were used, and for what purpose?

Once all mathematical discourse and communication acts were recorded, the first author recorded possible storylines and resulting positions (i.e., rights and duties) in the interactions between participants. First, to guide the analysis of possible storylines, the following questions were answered at each turn in speaker: What already established culturally shared collections of practices, beliefs, values, etc., underlie the communication act? What collections of practices are being constructed as participants interact? Participant interactions are in constant flux and can have multiple meanings depending on the surrounding context, as is true for potential storylines that drive and emerge from participant interaction (Herbel-Eisenmann et al., 2015). Records of different possible meanings and storylines were kept. Then, to record available positions during interactions within a relevant episode, the guiding questions were answered at each turn in speaker: What rights do participants have relative to others? What duties do participants have? What positions are available in interactions? Table 2 summarizes the construct descriptions and guiding questions used to analyze each relevant episode.

Table 2

Constructs, Definitions, and Guiding Questions for Positioing Analysis

Construct	Definition	Guiding Questions for Analysis

Mathematical Discourse	Verbal and nonverbal (gestures, writing, and pictures) communication about mathematical objects, including communication with oneself (Wood, 2013).	**What mathematical concepts, especially relating to [the relevant math topic], were communicated and how?** What mathematical words and representations (especially pertaining to [the relevant math topic]) were used, and for what purpose?
Communication Acts	Describe the meaning embedded in the words and actions between participants in social interactions.	What meaning is communicated in the words/actions between participants?
Storylines	Explicit or implicit "ongoing repertoires that are already shared culturally or … invented as participants interact … Every storyline incorporates particular kinds of positions that relate to participants in various ways" (Herbel-Eisenmann et al., 2015, p. 188).	**What already established culturally shared collections of practices, beliefs, values, etc., underlying the communication act?** What collections of practices are being constructed as participants interact?
Positioning/ **Rights and Duties**	A process by which positions arise through rights and duties; 'rights' as in what others must do for someone (privileges, authority), and 'duties' as what one must do for others (Herbel-Eisenmann et al., 2015).	**What rights do participants have relative to others? What duties do participants have?** What positions are available in interactions?

Phase 3: Developing and Checking Interpretations.

After analyzing each relevant episode, Amari (a Black girl) became the focal student for this study because she negotiated and rejected inconsistent positioning during the whole-class discussion in various ways. We anticipated that different forms of resilience would emerge from a deeper analysis of her acts of resistance as negotiated or rejected positions. The first author cycled through relevant episodes when Amari was active in the interaction to identify moments when she negotiated or rejected positions for further analysis and interpretation development. The authors then conducted peer-debriefing sessions (Lincoln & Guba, 1985) to challenge the first author's interpretations of Amari's positioning and acts of resistance. During these sessions, we re-watched relevant episodes when Amari was an active participant. The second author recorded her interpretations of Amari's positioning and acts of resistance, which served as a catalyst for discussion. We logged memos during each session to keep track of alternative and multiple interpretations for each act of resistance established from the positioning analysis.

To further develop our interpretations, we returned to the relevant literature to better understand and contextualize how Amari was positioned and how her acts of resistance became forms of resilience. A central question that we continually asked ourselves and considered in the literature was, "acts of resistance against what?" Throughout this process, we created analytic memos (Creswell & Poth, 2016) to record our ongoing interpretations of Amari's acts of resistance. We started to conjecture that Amari was resisting deficit perspectives of her mathematical thinking, which were perceived at the relational level through micro-invalidations and low expectations. Adiredja (2019) asserted that deficit perspectives are "generally supported by principles that overprivilege (a) formal knowledge, (b) consistency in understanding, (c) coherent or formal mathematical language, and (d) immediate change in understanding" (p. 413). While these principles are not inherently deficit, the rigidity and over-privileging of such principles coupled with deficit master narratives about students of color provide the foundation for deficit perspectives on student thinking. We revisited relevant episodes and used these principles to construct a counterstory that centers Amari's mathematical brilliance and forms of resilience. To do this, we identified excerpts when Amari publicly shared her mathematical thinking and used the analytic memos to identify excerpts that contained moments when she negotiated or rejected available positions. The five excerpts shared in the results were selected based on their representativeness of Amari's mathematical thinking and forms of resilience that emerged from repeated acts of resistance.

Amari's Mathematical Brilliance and Forms of Resilience: A Counterstory

It is assumed as a fundamental belief that Black girls are proficient in mathematics and utilize effective resources for learning the subject. Throughout the findings, we focus on Amari's exceptional mathematical ideas and highlight how she demonstrated resilience in the face of low expectations and micro-invalidations[1] towards her mathematical ideas during interactions. Excerpt 1 establishes Amari's mathematical brilliance and then proceeds to illustrate how she became positioned in the whole class discussion. Excerpt 2 demonstrates how her ability to make sense of mathematical concepts became a form of resilience, showcased through repeated acts of resistance. Excerpts 3 and 4 establish silence as a means of resisting repeated micro-invalidations of her thoughts. Finally, Excerpt 5 sheds light on the emergence of resilience in the form of both sense-making and silence, exhibited through her repeated acts of resistance.

Setting the Stage for Excerpt 1.

After transitioning from group work to a whole-class discussion, a group of four students - Amari, Justin, Isaak, and Hector - were standing at the front of the classroom with their teacher, Ms. M. She had invited them up to discuss their debate related to the focal task (see Background Context of the Lesson). Justin restated that he and Isaak thought the shape was not divided into fractional pieces, which aligned with the expected response. In contrast, Hector and Amari thought the shape was divided into fractional pieces, which was mathematically valid yet did not align with the expected response. After recapping, the group of four remained standing together at the front of the room. Prompted by Ms. M, Hector explained his thinking while she and several students asked him questions (e.g., "what do you know about the area?"). As Isaak explained to Hector that the "little rectangle" (labeled D in Figure 3) and another piece "are not equal," he brought Amari into the conversation by saying he was "telling Amari" that "those" pieces (Figure 3A-D), "they're not together, cuz Amari tried to measure them together, um, to say they were equal." Excerpt 1 begins less than two minutes after Isaak's remark.

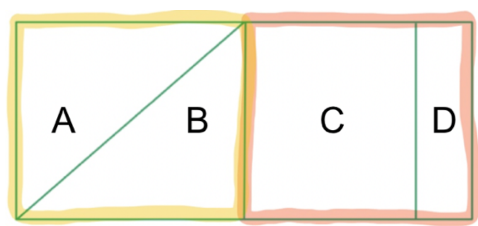
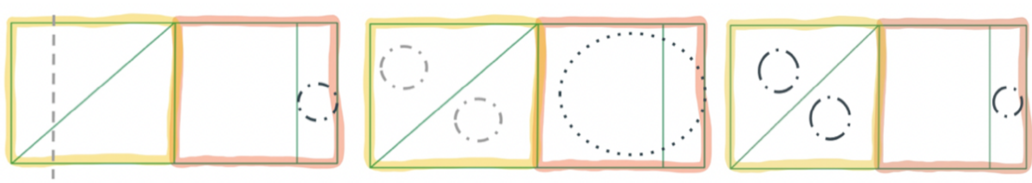


Figure 3. Image of the focal task shown on the document camera.[3]



[3] The "two big squares" had been highlighted yellow and orange around the two triangles (labeled A and B) and two rectangles (labeled C and D), respectively.

Figure 4. Amari's nonverbal communication with mathematical objects.[4]

Amari's Mathematical Sense-Making: An Act of Resistance.

Excerpt 1 establishes the brilliance of Amari's mathematical sense-making and shows how she began to manage inconsistent positioning. The excerpt begins when Darius, a boy sitting at a table group near the front, referenced the ideas in the public record (Figure 1) to ask Amari whether she could "use" one of the triangles (A or B) "to make" the smaller rectangle (Figure 3D). Taking a step toward the document camera, Amari publicly responded to Darius's question (Figure 4 illustrates her nonverbal communication throughout Excerpt 1).

[4] (Left) dotted line indicates placing her pencil down to make a cut; (Center) the larger dotted circle indicates circular gesture with her pencil; (Right) small, dotted circles represent pencil tapping on respective pieces.

Excerpt 1, Relevant Episode 18, 28:00 [5]

1 Darius: last time we cut the triangle, we made a rectangle, we made a square of the other one (points to public record [Figure 1]), so we can do this one.. can you use this (points to a triangle in Figure 3), use this to (points to the smaller rectangle) make the little skinny part on it?

2 Amari: well, like if I cut um... I cut this part (places pencil down on the picture showing where to make a cut [Figure 4 left]) it would make that part (taps pencil on the "skinny" rectangle [Figure 4 left]) but I could, I could definitely not make these.. (taps pencil around two triangles [Figure 4 right]) this whole thing, to be like here (taps pencil toward the two rectangles [Figure 4 right]) .. I could make these (taps both triangles [Figure 4 right]) to be this whole thing (gestures around the two rectangles [Figure 4 center]) but I could not make these (tapping on both triangles [Figure 4 right]) to be this (taps the smaller rectangle [Figure 4 right]).

3 Ms. M: okay, (hand on chin, speaking quickly) so wait, stop for right there.. so let me just restate what you're saying.

4 Ms. M: (walks toward doc cam), scooch over here and then, (quieter) Isaak I'm gonna let you go.. (points to the screen) with what you wanna say.

5 Ms. M: (loudly) so you: just sai::d .. (to the class) are you listening, (gesturing with hand) sit up ta::ll, especially you:: .. (points to Amari) she's a yes, so you yeses listening she's talking about this..

6 Ms. M: (to Amari) scoot back here (gestures) so I can see.. so what you're saying,

7 Ms. M: Justin (gesturing) you gotta scoot towards the back here too, (louder) what she's sa::yin', i::s .. that she:: kno:::ws... that you can make, say it again?

8 Amari: you can like make, this (points to the two rectangles) whole thing, out of these (pointing) two triangles.

9 Ms. M: okay, can we prove that?.. //who's got, // who's got um=

10 Student: =just have to fold it!

11 Ms. M: // here // .. here's one, triangle.. who's got the other one, cut already, okay.. show us what you're talking about when you say that. (7-second pause)

12 Amari: this.... (places two triangle pieces on original image)

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[5] Transcript conventions capturing discursive activity (Temple & Wright, 2015):

.	sentence-final intonation
?	sentence-final rising intonation
.	continuing intonation
..	noticeable pause, less than 0.5 seconds
…	half-second pause; each extra dot represents additional half-second pause
underline	emphatic stress
:	lengthened sound (extra colons represent extra lengthening
=	speaker's talk continues or second speaker's talk without noticeable pause
/ /	slash marks indicate uncertain transcription or speaker overlap
( )	information in parentheses applies to talk that follows
[XX]	overlapping brackets indicate two speakers talking at the same time

13 Ms. M: (to Amari) okay, so you're sayin' that you kno::w that you can use (points) those two::.. pieces ... over there.
14 Amari: mm hmm.
15 Ms. M: (turns to the class) do you guys agree with that?
16 many: // yeah //
17 Ms. M: right, okay so those two pieces are equal, okay but then you said, "but you know" what?
18 Amari: but I know that these .. these two triangles (picks up the two pieces) .... these two triangles, alone .. these two triangles could not make, (points along the smaller rectangle piece) only this one, they would have to make (points) these two.

Brilliance in Amari's Mathematical Sense-Making.

We interpreted Amari's mathematical discourse in Excerpt 1 as meaning that she knew she "could definitely not make" the triangles (Figure 3A, B) "to be like" the smaller rectangle piece (D) (lines 2, 18). This communication act directly answered Darius's question (line 1) and showed that she understood the individual pieces were not all the same size. She continued elaborating that she "could make these [two triangles in Figure 3A, B] to be this whole thing [square created by the two rectangles in Figure 3C, D]" (line 2). After prompting from the teacher (line 7), Amari restated her point that "you can like to make, this [square created by the two rectangles] whole thing, out of these two triangles" (line 8). From her prior informal thinking (line 2), she made a more concise mathematical statement (line 8) that the rest of the class could "prove" (line 9): the two triangle pieces can "make" the two rectangle pieces together ("this whole thing").

After Ms. M prompted Amari to use two cutout triangle pieces to show the class what she was talking about (line 11), Amari accepted the pieces and placed them over the representation the class had been working with to visually demonstrate what she meant (see Figure 5). Her informal mathematical ideas laid the foundation for proving the statement: yes, the shape is divided into fractional pieces. In other words, her notion that the two (equal) triangles together "can make" the two rectangles together indicated that the entire rectangle is divided in half or two identical pieces (i.e., fractional parts).

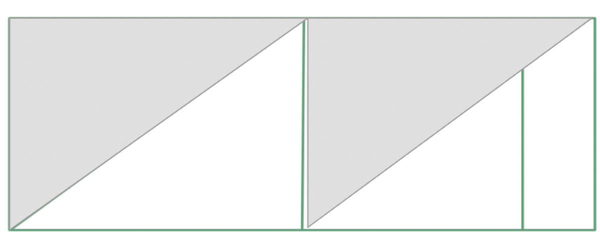

Figure 5. Two cut-out triangle pieces placed over the focal task image.

Amari's mathematical thinking shows how she used informal language to talk about fractional pieces (i.e., one piece "cannot make" another piece) and how she viewed the pieces as movable and related to different "whole things" rather than as static objects. After continued prompting by Ms. M (line 17), Amari confidently reiterated what she knew: "these two triangles, alone... these two triangles could not make, only this one [small rectangle (Figure 3D)], they would have to make these two [rectangles together (Figure 3C,D)]" (line 18). We considered two potential meanings in her mathematical discourse: the two triangles together could not make the smaller rectangle, meaning they would have to make both rectangles together; or that "alone" one triangle "could not make" the smaller rectangle, the two triangles "would have to make" the two rectangles together. From either interpretation, it was clear she knew the pieces were not all "equal" pieces. We assert that her informal mathematical thinking not only supported a mathematically valid argument for why the shape was divided into fractional pieces but also supported a flexible understanding of the part/whole relationship when learning about the conceptual meaning of fractions.

Inconsistent Positioning as a Mathematical Sense Maker.

Excerpt 1 showed how Amari was positioned inconsistently throughout the lesson, which she sometimes negotiated or rejected by persisting in her mathematical sense-making. Darius asked Amari if she could "use" one of the triangles (Figure 3A,B) to "make the skinny part on it [Figure 3D]" (line 1). We interpreted this communication act as Darius taking on a teacher-like role to help Amari apply what they did "last time" (see Figure 1) to show that one of the triangle pieces (Figure 3A,B) was not "equal" to the smaller rectangle (Figure 3D). This communication act evidenced that the Hierarchical Ability Storyline was at play in the interaction: some people need help from others to see the 'right' way of doing math (Louie, 2017). Rather than accepting the available position of 'student' (i.e., someone who needs help from a more expert peer), we view Amari's use of sense-making as an act of resisting this positioning (line 2). While she did respond to Darius's question directly, she also negotiated this position by elaborating on what made sense to her beyond answering the question, positioning herself as mathematically competent.

Throughout Excerpt 1, it is evident that Ms. M interpreted what Amari was trying to convey as an obvious fact. Ms. M prompted the class to agree that "you can use those two... pieces... over there [Figure 3A,B]" (line 13), and after some agreement (line 16), Ms. M confirmed, "right, okay so those two pieces are equal" (line 17). We identified two possible meanings in this communication act: either the two triangle pieces were equal, or the two "big squares" that had previously been highlighted were equal (see Figure 3). Shortly after Excerpt 1, Ms. M held up the two cut-out triangle pieces to emphasize what they had already "proved," that "this [triangle] piece... we know is equal to this one [triangle piece] for sure, we proved that." Given that it was perceived that Ms. M and the class "proved" (lines 9, 13, 15, 17) Amari's statement (line 8), it led us to believe that Ms. M interpreted Amari's communication acts in Excerpt 1 as demonstrating that the two triangle pieces "are equal" (line 17), rather than proving that the two triangle pieces together are the same as the two rectangle pieces together (which is what Amari actually proved). Since the equality of the two triangles was taken as an obvious fact by the students in the class, there seemed to be no need to provide further justification. We assert that this interpretation of Amari's understanding revealed low expectations for her mathematical ability.

Excerpt 1 also shows how two dominant storylines, the Hierarchical Ability Storyline and the Multidimensional Math Storyline, drove participant interactions simultaneously and contributed to Amari's inconsistent positioning as a mathematical sense maker. By attempting to restate what Amari said throughout the excerpt (lines 3, 5, 7, 13) and prompting Amari to repeat or demonstrate what she meant (lines 7, 11, 17), Ms. M positioned her as someone with valid ideas who should be listened to by the other "yeses" in the class ("she's a yes, so you yeses listening she's talking about this" [line 5]). After Amari first restated her idea (line 8), Ms. M posed the question to the class, "okay, can we prove that?" (line 9), which demonstrated the Multidimensional Math Storyline: mathematics includes activities such as collaboration, experimentation, and argumentation, not just rote practice (Louie, 2017). Amari continued to have the right to share her ideas as Ms. M confirmed with her before getting agreement from the class (lines 13, 15) and invited her to finish sharing her idea fully ("but you know what?" [line 17]). In subsequent excerpts, it became clear that the students who said 'yes' needed to be "convinced" that the desired response should be "no, the shape is not divided into fractional pieces because the pieces are not all equal." These communication acts (particularly line 5) demonstrated the Hierarchical Ability Storyline because they conveyed the message (albeit subtly) that those who said 'no' do not need to listen to Amari, presumably because they did not need to correct their thinking.

The counterstory continues in Excerpt 2, occurring just after Excerpt 1. At this point in the lesson, the class had labeled the four pieces 1-4 (corresponding to A-D in Figure 3). Excerpt 2 began when Gabe, a boy sitting at the table group with Darius, entered the whole-class discussion.

Excerpt 2, Relevant Episode 19, 30:04

1 Gabe: is <u>that</u> (points) one equal to this (points) one.
2 Ms. M: is number one // is <u>one</u> equal to which one.
3 Gabe: (points) to number 4.
4 Ms. M: number 4, is this (gesturing along the left triangle in Figure 3A) one equal to (points to the smaller rectangle in Figure 3D) number 4.
5 Amari: no.
6 Ms. M: no (to the class) do you guys agree with that //

7 Ms. M: Bobby, do you agree with that?.. you were on the::.. yes side, do you agree with that?
8 Student: mm hmm.
9 Ms. M: okay who (gesturing) else was one of my yeses still, there were 8 of you=
10 Darius: =the question is asking is this.. shape divided into fractional parts, which is equal.
11 Ms. M: (speaking loudly) but the question is askin:g, thank you Darius, i::s thi:s (gestures toward the screen).. shape, divided into fractional parts, (speaking quickly) and what do we know about fractional parts, that all the fractional parts have to be, Nikki?
12 (inaudible)
13 Ms. M: they all have to be equal, so::.. (puts hands together)
14 Ms. M: (to Amari) what did you just prove.... Amari.
15 Amari: (points to herself as if confirming the question was directed to her)
16 Ms. M: mm hmm.
17 Amari: // that.. we proved like, these two, it's like literally equal to this // so like [I think these are like]
18 Darius: [we're talking] // we're talking one of the shapes though //
19 Ms. M: [hmm]
20 Darius: [not] two shapes are equal to two shapes=
21 Ms. M: =okay so you: (places hand to touch Amari's shoulder) still need some convincing, // but we have some, good ideas out there.. um
22 Ms. M: (to Amari, taps her on the shoulder) [you go sit down, (points) you go sit down]
23 Darius: [they're asking which shape equal to // what // shape]

Sense-Making as a Form of Resilience.

We argue that Excerpt 2 shows how Amari persisted in her sense-making as an act of resistance, establishing sense-making as a form of resilience. That is, Amari's sense-making was an act of resistance against low expectations and micro-invalidations of her mathematical thinking. Despite her prior sense-making, two boys, Darius and Gabe, were positioned as more expert helpers who had the right to "convince" Amari that the shape was not divided into fractional pieces because the pieces were not all equal (lines 1, 3, 4, 10, 18, 20, 23). Excerpt 2 also signifies a shift from how Amari was positioned in Excerpt 1: Ms. M tells Amari to "go sit down" while being told she "still [needs] some convincing" (lines 21, 22).

First, we describe how Amari negotiated her positioning by persisting with her sense-making. After restating Darius's comment about what the question was asking and what they "know about fractional parts" (lines 11, 13), Ms. M suddenly shifted the focus of attention back to Amari by asking her, "what did you just prove.. Amari," (line 14). The suddenness of this shift was indicated by Amari's surprise that Ms. M had turned the question back to her (line 15). Then, Ms. M's right to decide valid mathematical thinking obliged Amari to say she proved that those pieces could not be "fractional parts" because the parts are not "equal" (lines 11, 13, 14). However, Amari negotiated this position by asserting that "we proved .. these two" triangles (Figure 3A,B) are "literally equal to" the two rectangles together (Figure 3C,D) (line 17), which is what she proved in Excerpt 1.

Communication acts by other participants in Excerpt 2 indicated micro-invalidations of Amari's mathematical thinking. Gabe began asking Amari if a triangle piece (Figure 3A) and the small rectangle (Figure 3D) were "equal," with Ms. M endorsing this line of questioning by restating which pieces he was referring to (lines 1-4). Despite having already demonstrated that she knew those two pieces were not equal, these communication acts, along with the Hierarchical Ability Storyline, resulted in Amari being obligated to say that the triangle piece and the smaller rectangle were not equal, which she accepted (line 5). Then, Darius referred to "what the question is asking" to explain that "they're asking" us "is this... shape divided into fractional parts, which is equal" (lines 10, 23). Ms. M validated Darius (positioning him as an expert) when she repeated verbatim what he said for the class to hear while thanking him (line 11). Darius accepted this expert position by interrupting Amari while she tried explaining her thinking and correcting her (lines 17, 18, 20) – micro-invalidations of her sense-making. Although Amari's response (line 17) was consistent with what she proved earlier, Ms. M told her, "You still need some convincing" and to "go sit down" (lines 21, 22), which were continued micro-invalidations of her sense-making. We argue that Amari's persistent conviction was misconstrued as a misconception, and the teacher and students were overrating the importance of an immediate change in understanding, which provides some evidence that her mathematical thinking was being interpreted from a deficit perspective (Adiredja, 2019).

Silence as an Act of Resistance.

Excerpts 3 and 4 illustrate Amari's resilience and how she used silence as an act of resistance against repeated micro-invalidations of her thinking. At this point in the lesson, Isaak and Hector remained at the front of the room, suggesting cutting one of the triangle pieces to show that it was not equal to the larger rectangle piece (Figure 6). Students were asked to make sense of Isaak and Hector's ideas with their partners. During this time, a group sitting near the front of the room (Amari, Gabe, Darius, and three other students) seemed to be having a spirited debate, with the focus of attention directed toward Amari. Excerpt 3 began when Ms. M transitioned from small group work back to the whole-class discussion. Throughout Excerpt 3, Gabe, Darius, Jane, and another student (it was unclear in the transcription exactly whose voice it was) were directing their communication acts towards Amari.

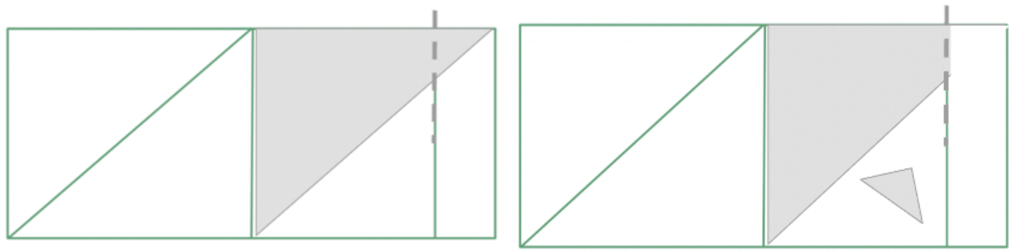

Figure 6. (Left) Shows where Isaak and Hector suggested cutting the triangle piece; (Right) shows how Ms. M placed the cut pieces over the rectangle to show they are not "equal" (same area) in Excerpt 5.

Excerpt 3, Relevant Episode 24, 36:35

1 Ms. M: (to the class) okay, so::: (speaking loudly) this team is rea:lly still trying to convince Amari, they're doing a really good job, (points one finger up) and.. // (laughing slightly) she's a tough cookie, (tone changes) and that's okay, cuz she- which is good cuz when. //
2 (inaudible, several students talking at once)
3 Ms. M: Amari.. // go ahead. //
4 Gabe: (to Amari) is this..
5 Ms. M: (speaking quickly) go ahead, Gabe.. really loud, yeah.
6 Gabe: (louder voice) is [this]
7 Ms. M: [look over here (points)] Gabe's talking to Amari. //
8 Gabe: (slightly aggressive or agitated tone) is this little skinny thing... equal to this?
9 Amari: no. //
10 Student[6]: we've been making=
11 Darius: =can you make a fractional part equal to that?.. that triangle?
12 Jane: and all fractional parts have to be, equal.. and those (gestures) are two. //
13 Student: // do you see it?
14 Darius: [asking if it's]
15 Gabe: [is this].. equal to this?.. (quieter voice) is this... equal to, that. //
16 Jane: cuz the question is asking, are they are they the fractional parts, and we know that fractions have to be=

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[6] It was unclear from the transcription who was speaking exactly, but all speakers in the interaction had their attention directed to Amari.

17 Ms. M: =okay, so (gentle tone) did you hear that, Nikki?... did you hear that?.. (points) okay, (parental tone) so turn this way. //

The interaction in Excerpt 3 highlights Amari's perceived resilience despite others' continued invalidations of her prior sense-making. Gabe continues to be positioned as an expert (lines 4, 5, 6, 8) when Ms. M invites him to "go ahead" (line 5) and tells others in the room to "look over here" while he talks to Amari (line 7). More importantly, he maintains the right to continue the same line of questioning from Excerpt 2 in a slightly elevated tone: "is this little skinny thing [Figure 3D].. equal to this [Figure 3A]?" (line 8). Despite Amari responding "no" (line 9), Gabe, Darius, Jane, and another student in the group continue directing questions and repeatedly explaining things to Amari (lines 10-16), including the somewhat patronizing question, "do you see it?" (line 13). We interpret these communication acts as dismissing Amari's previous sense-making (micro-invalidations), and such invalidations are acceptable as the teacher permits Gabe to speak instead of Amari (lines 3-5) and makes sure others are paying attention to what the students are telling Amari (lines 7, 17).

Less than one minute after Excerpt 3, Excerpt 4 shows how silence became an act of resistance for Amari. After Excerpt 3, Ms. M prompted Gabe to talk to Amari at the front of the room and placed four cutout pieces on the document camera (Figure 7). Excerpt 4 begins when Ms. M asked students in the class if they "agree that these are the four pieces" (line 1), then invited Gabe to continue the line of questioning directed toward Amari about whether the pieces are "equal" (line 3).

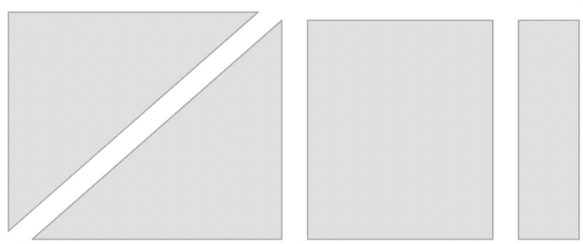

Figure 7. The four cutout pieces shown on the document camera.

Excerpt 4, Relevant Episode 25, 37:50

1 Ms. M: (loudly) if these, (speaking quickly) you guys agree these are the four pieces?
2 many: yeah
3 Ms. M: okay, so now go ahead and say what you were going to say Gabe?
4 Gabe: are these.. is [this one]
5 Ms. M: [(gesturing) team 4] eyes up here, everyone’s eyes are up here.
6 Gabe: is this one.. equal to, these?
7 (8-second pause)
8 Student: no?

9 Ms. M: how do we know?
10 Joseph: because um.. if you fit (gesturing with hands) that.. right there, you see the other half //

Throughout Excerpt 4, there was a noticeable shift in Amari's body language, from sitting in her seat with her hands in front of her to eventually placing her head on her arm with her body in a "C" shape curled over the desk. Considering the interactions in Excerpt 3 and changes in Amari's body language, we interpreted her silence in this excerpt as an act of resistance against the persistent micro-invalidations of her mathematical sense-making. Communication acts afforded Gabe the right to continue asking Amari the same question (lines 3, 5), positioning him as an expert who had the right to be listened to. Gabe accepted the position by asking (again) if the small rectangle was equal to other pieces (lines 4, 6). Amari had the apparent obligation to continue answering, despite repeatedly demonstrating that she knew the pieces were not "equal." Rather than continuing to accept this position, she potentially rejected the obligation by remaining silent (line 7).

Forms of Resilience: Amari's Persistent Sense-Making and Silence.

Excerpt 5 demonstrates how Amari persisted in her sense-making (a form of resilience) and how silence became another form of resilience (a repeated act of resistance). After Excerpt 4, Ms. M placed a cutout triangle piece over the larger rectangle piece on the document camera (see Figure 6) and asked the class if they were equal (to which several students responded "no"). This communication act served the purpose of getting everyone, especially Amari, to agree that the pieces were not all "equal." Excerpt 5 begins when Amari interjected to defend her previous sense-making.

Excerpt 5, Relevant Episode 26, 39:30

1 Amari: // it needs to // yes, but if you put the two triangles together, //and you uh.. // and you [put the]
2 Darius: [but we're talking about]
3 Ms. M: (speaking quickly in high pitched tone) hold on, let her finish, let her finish=
4 Amari: =and you put the two um.. the rectangles together, it'll make like the same square, and then like, in the- that one, like.. in that (points to the public record [Fig. 1]) one you- all you did is like split and then just (inhales quickly) add- add the tri-triangle to the square (inhales quickly) and even on that one (points) the triangle did not- when it was not the same as um as the last (inhales quickly) as the last part of the square.

5 Ms. M: (to the class) // okay, (loudly) so here's // I- here's what's happening, you-she::s ta::king::.. what, we did with (points to the public record) tha::t ... and applying it (points to shapes on the doc cam [Fig. 7]) to here right?
6 Student: mm hmm.
7 Ms. M: (speaking quickly) you guys agree that that's what she's doing?
8 many: yeah.
9 Ms. M: (tone shift) and that's what a lot of you did.. (louder) but what is it about fractional pieces that we know, that they all have to be::
10 many: equal.
11 Ms. M: which means what, Amari, what does that mean.
12 (10-second pause)
13 Ms. M: Amari, let me put it to you // this way..

By continuing to defend her mathematical sense-making (lines 1, 4), Amari rejected the obligation of needing to ignore her ideas in favor of what others deemed to be the correct way to interpret the task: "yes, but if you put the two triangles together [Figure 3A,B]… and you put the two um.. the rectangles together [Figure 3C, D], it'll make like the same square" (lines 1, 4). She provided a rationale for her thinking by leveraging the public record from the last class (Figure 1), stating, "in that one you- all you did is like split and then just add- add the tri- triangle to the square," and continued to assert that, "even on that one, the triangle did not- when it was not the same … as the last part of the square" (line 4). We interpreted her mathematical discourse as meaning the pieces were not the "same" in "that one" (Figure 1), and since they could "split" and "add the triangle to the square" (Figure 1), her sense-making that "the two triangles together [Figure 3A,B]… make like the same square" as the "rectangles together" [Figure 3C,D] was both reasonable and consistent with what they did in the previous lesson. It is worth noting how Amari's discourse changed compared to previous excerpts. She spoke faster while inhaling quickly between words as if she needed to get out her ideas before being interrupted again. Additionally, her body language shifted as she spoke; she lifted her head and moved her arm to point to the public record (line 4), remaining slightly hunched over her desk in a "C" shape, then slowly started to sit back up in her seat.

Communication acts and storylines in this excerpt continue to demonstrate the inconsistent positioning that Amari had to manage throughout the discussion. Ms. M momentarily positioned Amari as a mathematical sense maker by stopping other kids from interrupting ("hold on, let her finish" [line 3]). Ms. M then turned to the class to explain "what's happening," stating that Amari was "taking what we did with that [Figure 1]" and "applying it" to this new shape (line 5), "which is what a lot of [students] did" (line 9). Ms. M further asked, "but what is it about fractional pieces that we know, that they all have to be [equal]" (lines 9,10). These communication acts, aligned with the Hierarchical Ability Storyline, meant that Amari (along with "a lot" of other students) were not applying what they had learned as the teacher intended. Moreover, the discursive move "okay but what..." continued to invalidate Amari's sense-making. Ms. M then redirected the focus back to Amari, asking "which means what, Amari, what does that mean" (line 11). It is unclear whether she was asking about the meaning of "equal" or the meaning of "it" in relation to all the fractional parts needing to be "equal". Interpreting this communication act within the broader context of the lesson, we understood it as a request for compliance with the intended response: the shape was not divided into "fractional pieces" because the pieces were not "equal." However, Amari remained silent (line 12), which we interpreted as negotiating or rejecting the obligation to respond in a specific way – a repeated act of resistance, establishing her silence as a form of resilience.

Discussion

The counterstory we shared centered on Amari's brilliance, while demonstrating how silence and persistence in communicating what made sense to her became forms of resilience against low expectations and repeated micro-invalidations of her mathematical thinking. The counterstory also suggests that Amari's valid mathematical thinking could have been built upon, rather than dismissed as incorrect. For instance, the class discussion could have focused on establishing the criteria Amari was using to say "yes," the shape was divided into fractional pieces. Amari (and other students who said "yes") could have been prompted to provide examples of shapes they would say were not divided into fractional pieces, rather than being repeatedly asked whether one piece was equal to another. From there, Amari's exact criteria could have been clearly stated and compared to the teacher's criteria. This could have led to a discussion about the mathematical convention, in which case, people typically choose what convention to communicate productively (Hewitt, 1999).

We speculate that Amari likely assumed the question was asking about the pieces, as the wording in the task suggests, rather than the collection of pieces (i.e., partition). Asking, "Is the shape divided into fractional pieces?" or "Are these fractional pieces?" does not make it clear that the intended question is, "Is this a partition of equal-sized pieces?" This distinction is essential for at least two reasons. First, Amari likely used criteria about some pieces being part of an equal-sized partitioning (i.e., "splitting") of the whole rectangle. Requiring that all the pieces be equal-sized to meet the criteria for "fractional pieces" is asking for an evaluation of a partitioning property (equal-sized) to be applied as a property of fractional pieces. This makes it unclear whether the evaluation is being made from the perspective of all pieces or each individual piece meeting the fractional parts criteria. This difference would be difficult to distinguish unless explicitly discussed. Second, the criteria Amari was using were not right or wrong, just different from the criteria the teacher was using. Had Amari been given space to articulate her criteria further, discussions could have taken place that positioned her ideas as valuable (rather than right or wrong).

Gholson and Martin (2019) argued that little attention has been given to the interactional level of understanding young Black girls' experiences in mathematics classrooms. This suggests that micro-level analyses are needed, since macro-level reform efforts "leave micro-level responsibilities underspecified in working against racism, sexism, and oppression generally" (p. 402). Therefore, our study contributes a necessary examination of complex interactions on a micro-timescale while keeping Amari's humanity and mathematical ability at the forefront to challenge racialized-gendered deficit master narratives about Black girls' mathematical ability (Gholson & Martin, 2019; Joseph et al., 2019; Leyva, 2017).

Amari's positioning and resulting forms of resilience provide insight into what Gholson and Martin called relational labor, or "the interpersonal expenditures between peers and teachers in the learning process" (p. 402). While all children necessarily engage in relational labor while learning mathematics, they assert that relational labor is 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" (p. 402). This means that the relational labor Black girls must engage in while learning mathematics does not come without sacrifice or consequence when falsely perceived as needing to be an automatic response pattern. In our findings, particularly in Excerpts 4 and 5, there was evidence of Amari engaging in unnecessary (and potentially harmful) relational labor due to repeated micro-invalidations of her sense-making through shifts in her body language and discourse. Gholson and Martin (2019) further argued that although micro-invalidations (e.g., repeated corrections) may be required to remedy mistakes in mathematical work, "such constant negotiations of mathematical thinking and work could be considered a type of micro-aggression (Sue et al., 2007), which is known to result in adverse outcomes concerning mental health" (p. 401). The constant negotiations we observed between Amari, her classmates, and the teacher could be viewed as micro-aggressions because of the ways in which her mathematical thinking was repeatedly invalidated (Casanova et al., 2018).

Some limitations of this study include repurposing classroom observation video data collected for a different research goal (see Derry et al., 2010; Ing & Samkian, 2018) and not using interview data to tell a counterstory, as is typical in critical race methodologies (see Adiredja, 2019; Solórzano & Yosso, 2002). First, while the lesson was carefully selected to document an instantiation of a significant trend in Melhuish et al.'s (2022) study, our interpretations were limited because we could not be physically present in the classroom space. Future research should use observational field note data and student work artifacts along with video data for a more holistic investigation of power and positioning dynamics in purposefully selected mathematics lessons (see, for example, Esmonde & Langer-Osuna, 2013). Second, the claims about Amari's positioning were limited by our own perceptions since interviews were not conducted with students as part of the larger study. Future educational research applying positioning theory and CRT methods should incorporate student interviews or focus groups as a way to check, revise, and contextualize researcher interpretations.

An implication of our study points to the need to take seriously scholars' work that centers on Black girls' experiences and identities concerning mathematics instruction and classroom environments (e.g., Jones, 2012; Joseph, 2021). For example, Joseph et al.'s (2019) recent work established inclusive teaching practices for supporting and nurturing the humanity of Black girls in mathematics classrooms. One such inclusive pedagogical practice is sharing power (see Tuitt, 2003), which means sharing decision-making responsibilities and authority (e.g., who gets to decide what constitutes valid mathematics, shared between teachers and students). For example, discussing conventions with students would support this practice because it allows students to explore why answers perceived as "wrong" may simply be using different conventions. Such discussions can humanize the learning process by explaining that the mathematics students learn includes choices made by people (rather than discovering facts). In conclusion, our study calls into question how discussion-based learning environments that do not also normalize the humanity and mathematical brilliance of Black girls may continue to perpetuate harmful racialized-gendered narratives about mathematical ability.

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