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THE MATH DONE TO US: STORYLINES OF OBJECTIVITY AND SUBJECTIVITY IN MATHEMATICS EDUCATION

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I reflect on a storyline that says mathematics is (or should be) done objectively, and the corollary that disavows subjectivity. I use Gabriel Marcel's distinction between mystery and problem to think about potential mathematical discussions in which students are implicated by the results of the math—assessment, seating arrangements and allocations, and group formation. These examples raise questions of ethics related to power relations. And I consider the storyline in contestations of what kinds of research belong in the field of mathematics education. I close with consideration of the positioning available for students and researchers given the pervasiveness of this objectivity storyline.

STORYLINES

There is math in schools. Of course. The math done in math class usually comes to mind. But there is more math, which is rarely (or never) discussed with students—the math done to them or on them. I reflect, here, on a storyline—the story that mathematics is (or should be) done objectively, and the corollary that disavows subjectivity.

In current research projects, colleagues and I look for storylines associated with mathematics students who identify with historically marginalized groups (Indigenous and recently migrated students). The storyline focus stems from our earlier work using and theorizing positioning (Herbel-Eisenmann et al., 2015): people position each other, and enact positions within storylines, which are described as known stories. In this way, storylines are the social structures available for making sense of interaction, and positioning is the allocation of roles within these structures. Both carry politics: storylines are the structures of power, and positioning is the allocation of power within a structure. Research that focuses on storylines addresses the fundamental structures underneath interactions.

THEORIZING SUBJECTIVITY

My home political activism has led me to reflect on the importance of subjectivity for understanding mathematics as a social force. I drew on this context along with experiences of teaching mathematics to argue that people need to study the mathematics that operates on them to understand mathematics most deeply (Wagner, 2022). In recent invited talks I have reflected more about this, using the word *diamathematics*—which I have been describing as the mathematics that works in and through us.

Most recently, the writing of Gabriel Marcel has provided me language to distinguish between this diamathematics and the mathematics typically done in schools. His distinction between mystery and problem centres on the role of the subject in action. If I am addressing a situation in which I am not implicated by the results of the choices, I am working on a *problem*. If I am implicated, it is a *mystery*.

> In contrast to the world of the problematic which […] is wholly apart from me and in front of me, the world of mystery is a place where I find myself committed, and, I would add, not partially committed, not

> committed in regard to some determinate and specialized aspect of myself, but committed as a whole [person] in so far as I achieve a unity which, for that matter, by its very definition, can never be grasped in itself, grasped as something apart from me. (Marcel, 1952/2009, pp. 40-41)

SUBJECTIVITY IN SCHOOL MATHEMATICS

I argue that school math (the math *taught* in schools) is exclusively in the realm of problem, using Marcel's distinction: school math obsess with mathematics removed from the direct experience of the students. The math done *on* students, for example quantified assessment, is also in the realm of problem when it is done by others (e.g., teachers) who are not directly impacted by student results. The mathematics of assessment would be mystery if students were drawn into that mathematics—not analyzing it from the outside, but engaging in the politics of structuring assessment. There are high stakes in assessment. Authentic assessment criteria include engaging students in the co-construction of assessment criteria (Nieminen & Lahdenperä, 2021), but there is more that could be co-constructed. I am interested in the mathematical aspects—e.g., the justification of weightings, the way averages are calculated, the use of linear scales. I suggest that the students' highly implicated positioning in the discussion would help them learn how mathematics is used for political purposes, and they would also have high motivation to understand the mathematical procedures and processes at play.

I see ethical challenges that would be present if mathematics teachers drew students into the politics of assessment. The power relations of the classroom would be significant. And the dialogue would change the power relations. It would be messy: I think mess is inevitable when engaging in mystery.

Maybe it would be better to learn about these ethics in mathematics mysteries that have more minor impacts on students—for example, the *allocation* of seating as I discussed in Wagner (2022). Another possibility for school math mystery work is dialogue about the *arrangement* of seating in math classrooms, in which students could think about how geometric structures used in the seating arrangement can be used to close or open dialogue: how is it different to sit in a circle than in rows or in groups/pods? How do these experiences and this dialogue change the way we think about circles and lines? But the relatively ephemeral impact of seating allocations and arrangements may not be sufficiently similar to the high stakes of assessment to inform the ethics of such dialogue.

In one of my current research projects I am engaging a group of Indigenous children in a school to identify storylines in their mathematics. They have talked about significant numbers in their culture and how numbers work in their math classes—particularly, in the formation of groups. They talked about how the number of people in a group impacts the nature of the conversation. They recognized the mathematics of this—especially the social force of even-numbered versus odd-numbered groups in the structure of small-group dialogue. But they did not talk about this mathematics as something teachers might use to manipulate or structure interaction in classrooms. They talked about *how they felt* in groups of a certain number of people. For the dialogue to be political someone would have to be forming groups of a certain size with purpose. So this discussion was perhaps an engagement on mystery in mathematics because the students were talking about how the person count is significant to them in an interaction, but the discussion was less political than it might have been.

SUBJECTIVITY IN THE FIELD OF MATHEMATICS EDUCATION

Recent feedback we have received as editors of *Educational Studies in Mathematics* (ESM) has provoked my thinking about subjectivity in the field of mathematics education too. While there has been development of socio-political research in the field, in my experience we have not received explicit complaints about these papers in ESM until papers part of the special issue on "Race, racism, and racialization in mathematics education" started appearing in online first. While there are several viable explanations for the timing of the complaints, one explanation relates to subjectivity.

As described by Beccuti et al. (2023), there are prevalent characterizations of mathematics that are sources of identity for mathematics teachers. I sense that most of these characterizations are present among mathematics education researchers too (which would be worth investigating). Two of them focus on the power of mathematics: "Mathematics is useful in everyday life" and "Mathematics is a tool of science". It seems that people in our field are fine with mathematics being powerful but some are embarrassed or angry when reminded how the power is used against people they care about. For example, in Alshwaikh's (2023) description of how mathematics and Israeli mathematicians served to restrict people's food supply to control the people in a region, the mathematics feels different. It is painful to feel associated with a discipline that is used to discipline a racialized group in this way.

The expressions of concern mostly claim to be interested in what counts as mathematics education research—not upset about the politics of Alshwaikh's concerns. In an editorial addressing the concerns, we said, "We know that not everyone will agree with our decisions about what to publish, but by publishing articles that cover the full range of the field, we hope to reflect the ever-broadening views on the identity of the field" (Wagner et al., 2023, p. 368). We asked: What is the core? I think the people with concerns assume that objective mathematics is the core and that political mathematics is on the boundary. But I think in reply: If mathematics is powerful, then we should expect it to do powerful things—good and bad. Mathematics that affects people might rather be seen as the core.

Nevertheless, feelings of identity are not easily argued (even when these feelings belong to scholars who may seem to avoid engaging feelings). The point is that many people who have leadership roles in the formation of mathematics education contexts (e.g., scholars in our field, mathematics teachers such as the ones analyzed by Beccuti et al, 2023) have the sense that subjectivity should not be part of the mathematics taught in school. In other words, mathematics should not be used to address real socio-political challenges. One of the characterizations of mathematics distilled by Becutti et al. (2023) is "Mathematics is a refuge from worldly preoccupations." Colleagues who do socio-political work in our field often point to the papers that identify a political turn in our field. One of them (Gutiérrez, 2010) is often cited as identifying a political turn, but she described a split rather than a turn:

> [W]hile many mathematics educators are comfortable with including social and cultural aspects in their work, most are not so willing to acknowledge that teaching and learning mathematics are not politically neutral activities" (p. 40).

REFLECTION—AVAILABLE POSITIONING

Theorization of storylines (see above) connects it to positioning. In my reflection on the storyline that disavows subjectivity in mathematics and in mathematics education, I think of the subject positions available to the people within the storylines. If the subjectivity of mathematics is excluded from the

experience of mathematics students, they construct a mathematics that operates only in apolitical contexts. I fear, and see in personal experience, that most citizens are ill-equipped to recognize mathematics at work on them—for example, in structures of democracy (c.f., Wagner, 2022), in gerrymandering[1], in assessments of their work or studies, in the foregrounding of money in decision-making, and in the presentation of data (described as facts). Of course, some people are able to make the turn away from this storyline, and begin to see the way mathematics and mathematics education is (often) political, but the weight of the people unable to make the turn dominates in democracies.

If the subjectivity of mathematics is recognized and eventually mandated in curriculum, there will be challenges for math teachers who grew up in the objectivity storyline. And, as noted above, even for educators who recognize the subjectivity in mathematics, the messiness of mystery raises significant questions of ethics. However, to avoid these potentially powerful interactions is a greater ethical oversight than engaging in difficult ethical spaces.

For mathematics educators and mathematics curriculum developers who wish to see the political aspects of mathematics recognized more in our field, how do we draw in our colleagues who fear it? Indeed, this is a question that is most pressing for me right now. Storylines cannot be forced.

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[1] Gerrymandering is drawing electoral boundaries to disproportionally favour the interests of certain political interests.