Becoming an Activist-Mathematician in an Age of Austerity

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Abstract: In the wake of the global economic crises of the 21st century, governments worldwide have implemented austerity policies, involving dramatic reductions in expenditures. These economic policies provide context for mathematization, as ordinary people grapple with the ways these policies affect their daily lives. In this article, we present an analysis of interviews with members of a Toronto-based activist network that fought against the City's proposed budget cuts in 2011 and 2012. We found that the context of activism spawned a wide variety of mathematics problems related to the activists' overarching goals: understanding the City's use of mathematics, creating their own mathematics, storytelling to the public, and behind-the-scenes tactics. We highlight the ways mathematical activity was always ideological, always accomplished through a division of labor within the group, and always strategically selected. We close by considering processes by which activist mathematicians can be better supported by formal and informal education.

Mathematical Activism in an Age of Austerity

In the wake of a controversial January 2012 Toronto City Council meeting to amend and approved the proposed budget (including hundreds of millions of dollars worth of cuts), both supporters and opponents of the budget cuts announced their victory. According to our informant Maria (all names of activists are pseudonyms), Mayor Rob Ford declared his victory because for the first time in many years, there had been no increase to the City's operating budget. Activists and other opponents to the mayor's cuts celebrated that they had defeated $80 million in proposed cuts to public services and community programs.

Both sides used mathematics to justify their perspective, yet their statements were diametrically opposed. Which side was correct? We argue that both were correct, and this example highlights several interesting aspects of mathematics outside of school: *what* is computed is just as important as *how* it is computed, and the choice of mathematical problems and methods has an ideological component. The budget conflict in Toronto in 2011 and 2012 is but one example of contemporary debates about economic policy, debates that are taking place at the local, provincial, national, and international levels in the wake of the global economic downturn in the 21st century. Governments at all levels have introduced austerity policies, in which they dramatically reduce spending, resulting in cuts to services that disproportionately and negatively affect poor and working class people. These policies affect everyone, however; therefore everyone has a stake in understanding the policies and in making their voices heard either for or against (and often, somewhere in between) the policies that their government representatives put forward. Because these policies have a mathematical component, people who represent all sides of the debate around this issue are called on to become political mathematicians.

In the fall of 2011, when international Occupy movements were talking about "the 1%" and Toronto activists were holding mass public meetings to protest City budget cuts, we began to investigate how activists become mathematicians. The public nature of activism makes activists a particularly accessible group of people to study, if we are interested in how people are mathematizing their understanding of contemporary economic policy. When faced with complex equations rooted in peoples' real lives, like how many people will be displaced from a homeless shelter or how many jobs will be eliminated through restructuring, these activists have necessarily become mathematicians. Their work is not only the public protest that people may expect, but also includes mathematical negotiation, interpretation, and mobilization in order to contest the mathematics circulated by those in favour of austerity, and to replace this mathematics with their own mathematically-based narratives of the impacts of austerity on their communities.

Our analysis examines one case study of activist work to understand the ongoing work of practicing and becoming a mathematician and an activist in an age of austerity. The major issues addressed in our study include the relationship between identity, becoming, and mathematics in activist networks, as well as an analysis of everyday mathematics as it is employed and contested in activist work. This study sheds light on the politicized nature of mathematics learning and practice and offers new contexts for studying mathematical learning in community settings.

In the analysis that follows, we introduce a theoretical framework centred on sociocultural and situated theories of learning. After explaining our methodological approach, we then turn our attention to the Toronto Stop the Cuts network (StC), briefly describing their work before analysing the ways activists in the network talked about and used mathematics in order to contest the austerity agenda of Toronto Mayor Rob Ford. We focus particular attention on activists' overarching goals, and the ways that mathematics intersected with other forms of knowledge as they worked towards these goals. We conclude with a discussion of how mathematics for social justice was accomplished collectively, and consider the implications for supporting and enabling people to better learn, teach, and deploy mathematical strategies in their struggles for equity and social justice.

Learning as Becoming

Learning is a social process that happens when people engage in collective practices together (Saxe & Esmonde, 2005). Collective practices are "semi-stable, socially organized activities in which individuals participate and communicate with one another" (p. 176). Over time, as people work together to get things done, regularities begin to emerge in the kind of problems that are framed, the resources that are used to solve these problems, and the roles that people take on. Of course, each new problem or situation is an opportunity to begin anew, to adapt and change the resources one uses, or to take on a new role.

In sociocultural and situated frameworks for understanding learning, learning can be understood as a process of becoming, both individual and collective, that is always understood in relation to the practice in which one learns. For example, children who were competent candy-sellers on the streets of a Brazilian city, were mostly unable to complete school mathematics tasks, and successful schoolchildren were unable to complete the tasks required for candy-selling (Saxe, 1991). As Saxe points out, the goals that are constructed in these two contexts differ. In candy-selling, the main goal is to make a profit and to sell a lot of candy. In school, the goal is usually to solve problems in a teacher-approved way. The resources also differ, with a much wider variety of strategies, tools, and other people available in out-of-school contexts.

Similar to Saxe's findings, research in mathematics outside-of-school has predominantly found that people are quite successful in the non-school mathematical tasks that they encounter on a daily basis, in the workplace, in the home, and in their hobbies (Esmonde et al., 2013). Again, this competence should be understood in context: it is not that people are smarter outside of school. Rather, non-school contexts afford many more resources than classrooms typically do, and people have much more freedom to organize their activities in ways that lead to success. Most striking, for our purposes, is the collaborative nature of many out-of-school activities. Like social justice activism, carpet-laying (Masingila, 1994), dairy-work (Scribner, 1984), home improvements (Esmonde et al., 2013), and video games (Stevens, Satwicz, & McCarthy, 2008), all allow people to help one another and ask for help, and even allow them to extend the division of labor beyond their immediate circle by using a variety of resources, including seeking expert help (via the internet, visits to hardware stores, etc.).

Research examples outside of school make particularly visible the role of *values* in mathematical practices. Although mathematics is often seen as a positivist science, mathematical models of the real world are based on a worldview, and therefore on a set of values (Frankenstein & Powell, 1994). In home improvement, one may balance aesthetic values with a value for cutting costs. In game play, one may search for a particularly elegant strategy. School mathematics also encodes a set of values that are embedded not only in the textbook examples of mathematics, but in the ways students and teacher are expected to interact together. In contexts in which these values are brought to the fore (such as, contexts in which ideology is explicitly discussed and debated), the relationship of one's values to one's mathematics will be more clearly visible.

Drawing from this theoretical framework, in this study we investigate a context for mathematics practices in which the work is collaborative, mathematical work is embedded with other forms of content knowledge, and the values underlying mathematics are made explicit. In an age of austerity politics, social justice activism is a hub of value-laden mathematical work.

Methods

Toronto Stop the Cuts (StC) [http://www.torontostopthecuts.com/] was a network of community organizations, concerned individuals and neighbourhood committees who advocated to stop the budget cuts being proposed by Mayor Rob Ford in Toronto. Formed in 2011 as a response to the cuts to city services outlined in the proposed City budget for 2012, StC organized meetings in various neighbourhoods across Toronto and urged residents to take actions against the cuts to services such as transit, housing, daycare, and shelters. These actions included meetings, marches, dinners, councillor visits, lemonade stands, etc. StC also advocated through organizing online campaigns such as citywide petitions. Overall, StC was committed to forming relationships with allies in order to fight austerity at all levels. In particular, the network had three main demands for the City's Mayor and councillors: 1) Stop the budget cuts to public services and, relatedly, to stop the attacks on public sector workers in an effort to advance a privatization agenda; 2) Expand city services for all, because StC argued that public services in the city were inadequate even before the proposed budget cuts for 2012; and 3) Increase the corporate tax rate, and reduce spending on the City's police services. Implicit in these demands was a critique of austerity policies that "bail out" corporations while sacrificing public services, and a fear that increases in the police service's budget would negatively affect, and disproportionately so, the people who would be most affected by the other budget cuts (the city's poor and working class, as well as racialized and undocumented people).

The StC network reflected the diversity of the city of Toronto, including diversity as considered in terms of race/ethnicity, gender, sexuality, immigration status, neighborhoods in Toronto, socioeconomic status, age, linguistic background, and more. StC operated as a network with a number of subgroups. The primary focus of organizing happened at the neighborhood level. StC started several neighborhood groups and encouraged anyone in the City to start their own neighborhood group and join the network. The only requirement was that all members had to agreed with StC's three main demands as described above. Each neighborhood group was expected to meet regularly and organize actions that made sense within their own contexts. However, these subgroups were expected to bring their decisions to the "network meeting" for discussion and approval. The network meetings consisted of regular meetings with representatives from all neighborhood groups and committees. At these meetings, neighborhood groups updated one another on their news, jointly decided on policy, collaborated on larger actions and campaigns, and made requests for help. There were several committees that were created to support the work of the neighborhood groups and the network as a whole. These included the research committee, tasked with doing research to answer questions that arose at the neighborhood level (e.g., creating reports for each neighborhood committee about the demographics and key issues in their neighborhoods), and the media committee, which was tasked with creating press releases and monitoring the media for news about the budget process.

For our research, two of us joined StC as participant observers for four months, from October 2011 to February 2012. We were members of the Research Committee and helped field research requests from the various neighborhood groups. We also collected data at various public meetings and protests. Our dual role as researchers and participants was clear to all StC members with whom we interacted. Our participation probably had a positive influence on our ability to recruit interview participants (described below), and also informed our data analysis because we had sufficient background knowledge to be able to interpret the interviews.

Data and Interview Questions

This paper is based on an analysis of interviews with seven activists from the StC network. These activists were all engaged regularly at network meetings, in addition to their activity within their neighbourhood group or subcommittee. Our interview pool was small, but generally reflected the diversity of the StC network and the city as a whole, with the exception that all of our interview participants had post-secondary degrees. We had recruited our participants by inviting anyone active with StC to conduct an interview on the use of mathematics in activism. Informally, we were told that many people were reluctant to agree to an interview because they did not feel qualified to discuss mathematics. Since our analysis in this paper focuses on elaborating the range of mathematical practices of StC, we feel that our interview pool was adequate, but readers should remember that we were informed by a set of participants who felt more comfortable with mathematics than perhaps the average activist did.

Each activist was invited to an hour-long, semi-structured interview. The interviews were video-recorded and stored on a secure data drive at the University of Toronto. The interview questions were informed by our theoretical framework in that our goal was to obtain a broad understanding of the collective practices of activism, and the specific role of mathematics as one aspect of the broader practice. The questions focused on elaborating the context of StC's activism by asking them about the goals and mission of StC, the City's use of mathematics, and StC's use of mathematics. We asked activists to be specific about their own roles and responsibilities, especially in relation to mathematics, and we asked them what helped, and what hindered, people in doing, using and learning mathematics towards social justice.

Research Questions and Data Analysis

There was one major research question for this study: *How is mathematics used outside of schools to analyze, educate about, and take action towards broad social justice goals?* Within this question, we were interested in both the types of mathematical tasks that were taken on, as well as the process by which these tasks were accomplished. However, as noted in the introduction to this article, we do not believe that it is useful to analyze mathematical tasks separate from the context in which they arose. Thus, we were also interested in understanding the complex forms of knowledge that were woven together in the work of Stop the Cuts activists.

To investigate this research question, we began with creating a content log for our seven interviews. These content logs recorded a basic summary, minute-by-minute, of what was discussed in each interview. Following this, we began with a very basic round of coding, knowing that we were interested in how the activists identified the mathematics that was used ("kinds of math") and the ideological nature of mathematics ("ideology"). As the analysis progressed, we created a listing of all the different mathematical tasks that were named by the activists. This list was separated into themed categories, based on the overarching goals to which mathematics was being used. (It is important here to note that due to the nature of the interview data, we were unable to gain insight into the details of the mathematical tasks or the process by which they were accomplished. Such an analysis would require a very different set of methods. Thus, rather than analysing mathematical *reasoning*, here we present an analysis of the activists' stories about the ways they used mathematics, as well as its place within the broader collective practice.) After completing the coding of various kinds of math, we considered what the activists' stories about mathematics could tell us about some of the central aspects of our theoretical framework: resources, division of labor, and ideology/values.

Our results, as presented here, rely on an analysis of the interviews alone, but we were able to draw from our background knowledge and participation in the group to help interpret some of the stories we were told. At times in our presentation of findings below, we mention specific documents or websites that were used or created by StC. These artifacts were all mentioned in the interviews, and our discussion of them is limited to what we were told in interviews. Below, we link to specific documents or sites to make them accessible to readers interested in the specifics of activist mathematics, but we did not do a formal document analysis for this paper.

What Is Activist Mathematics?

We identified four overarching mathematical goals, which form the basis for the bulk of the analysis in the paper: understanding the City's use of mathematics, countering with their own mathematics, storytelling to the public, and behind-the-scenes tactics. All of the interview participants were able to describe many instances of the use of mathematics to achieve the four activist goals. We will discuss each of these themes in turn, but we acknowledge that activities within each theme were interconnected; for example, understanding the city's use of mathematics informed activist strategies for mathematics, as well as the storytelling that they engaged in for the public.

Understanding the City's Use of Mathematics and its Implications of the Budget Cuts

In order to fight the budget cuts, first the activists needed to understand precisely what the cuts were, and further, they wanted to go beyond a surface understanding of the cuts to understand how the cuts would affect their communities. Activists expressed especial concern about the effect of the cuts on communities that were already marginalized, including racialized people, undocumented people, homeless people, and people living in poverty.

One of the most foundational tasks for StC was to deconstruct the City's reports, including the Core Services Review (City of Toronto, 2011) that had been produced by external consultants in order to find the 'gravy'[1] in City services. These reports (which can be found on the City's website at http://www.toronto.ca/torontoservicereview/results.htm) were filled with charts, tables, and mathematical arguments. To further understand the impact of the cuts, StC members created maps (thus using spatial and geometric reasoning) to display which services were likely to be affected by the cuts, in which neighborhoods. An example of such a map was displayed on the StC website (http://www.torontostopthecuts.com/january-10-%e2%80%93-mapping-the-cuts-part-ii/) and was used to argue that the City's high-poverty neighborhoods would be more directly impacted than wealthier neighborhoods. The map included locations of cuts to public housing, libraries, homeless shelters, childcare centres, public recreation centres, and long-term care homes. The map was created by another Toronto-based advocacy group, Social Planning Toronto (http://www.socialplanningtoronto.org/). StC borrowed the map and displayed it on their website.

Some of these numbers required further analysis. For example, the activists had a special focus on childcare, and were able to draw from information contained in City websites to determine the number of existing childcare spots available in each neighborhood, and the number of spots likely to be cut. They could then consider the impact of these cuts by considering the number of people who would be unable to work due to inadequate childcare. For libraries, activists identified each of the libraries that would face cuts and were able to pinpoint how many hours of service would be cut, or the numbers of staff, and from there, were able to discuss the impact on library services. They drew on a proposal for cuts to the City's public transit network (Toronto Transit Commission, TTC) to alert City residents to which bus routes would have longer wait times. For cuts to homeless shelters, they could describe how many more people would be "out on the street" than previous. In all of these instances, StC members were required to make sense of pre-existing mathematical calculations, and organize them in ways such that their real-life impact could be easily understood.

Countering With Their Own Mathematics

One major mathematical project was the creation of the activists' People's Poll (with results reported on the StC site (http://www.torontostopthecuts.com/peoples-poll-results/). This poll was created for multiple reasons, one being that the activists felt that the City's public consultation process was highly skewed. Aziz told us that "We didn't see uh, these, city-run, uh, town halls, which produced their own statistics, as legitimate by any means." He said that within StC there was wide agreement that "we need our own statistics." The activists were concerned about several aspects of the City's polling. In interviews, several participants described how group members had disagreed with the method of recruitment, because they felt that many City residents were unaware of the polls that were conducted online and at Town Hall meetings around the City. In addition to recruiting online, StC's major strategy was to go to public places to recruit participants for the People's Poll. A second critique of the City's data-gathering was that StC felt that the City's poll questions were biased towards cuts. Stephanie pointed out that the City was asking people *which* services should be cut, rather than *whether* services should be cut.

It should be noted that there was some disagreement within StC about the use of the People's Poll. Some felt that since their poll "would never pass muster in terms of how surveys should be done" (Maria) and acknowledged that it would not be "statistically reliable" (Maria). Still, they decided to conduct the poll so that they would have some control over the data collection and reporting process. In addition, they felt it was a valuable organizing tool because it allowed StC members – especially new members – to go out into communities and talk with people about the issues. Thus, this mathematical task also served non-mathematical purposes.

The interviews did not contain many other specific examples of StC activists countering with their own mathematics, although several interview participants referred to this general process. For example, Aziz told us about some analysis StC had done on library use. He said, "our issue isn't so much with the use of math. Our issue is how are you using it and what are you quantifying." The City had decided in advance that it would cut hours at selected libraries. In choosing libraries to cut, our interview participants said that the City had looked mainly at circulation (how many books are checked out). StC felt that this was not a good measure of the use of libraries; instead, they looked at the programs that libraries supported, and the number of people who made use of the various resources at the library – internet, reading rooms, children's programs, and more.

Maria reported on a mathematical task that StC had decided *not* to do, for ideological reasons. She told us that some members of StC had wanted to create an alternative budget, to recommend how the city should use its funds. Others felt that this process would "pit vulnerable groups against each other" (Maria). This strategy went against StC's three basic demands and was ultimately rejected. As Peter pointed out, liberals who did not oppose capitalism and were simply trying to shift the budget slightly would need to argue that their proposals "add up" mathematically (i.e., that there is enough funding for their proposals). As a radical anti-capitalist activist, Peter did not feel that StC was obliged to argue that their three demands were economically feasible. As he put it, StC was "not concerned with the wellbeing of their [capitalist] system."

Storytelling to the Public

StC activists told us that numbers and mathematical arguments were an important part of their campaign to convince the public of the rightness of their cause. "The use of statistics kind of carries this very factual, very objective kind of truth to it," said Aziz, and this statement about the rhetorical value of mathematics was supported by several other interview participants. On the other hand, four out of the seven interview participants mentioned that they believed that many people (activists included, but not limited to activist circles) were afraid of mathematics and didn't feel qualified to engage in argumentation about the big numbers that were used in the budget. Thus, although StC wanted to use numbers in flyers, speeches, and press releases, they were cautious to make those numbers relatable to people (although they admitted to, at times, using big numbers as a scare tactic, just as they felt the City was doing).

"Organizing is storytelling," Ahmed told us, as he emphasized the importance of constructing stories that people can relate to. The People's Poll was one tool that StC used in this storytelling, to convince the public and the City government that vast numbers of people were opposed to budget cuts and austerity measures. The results of the People's poll (and, in fact, the results of the City's polling, flawed as they believed it to be) gave StC a kind of "numerical legitimacy" (Ahmed) to show that overwhelmingly, City residents rejected the proposed cuts.

Other examples of mathematics used in storytelling included key numbers that were included on flyers or press releases. For example, when StC discussed cuts to public transit or a proposed expansion of TTC services, they sometimes included figures about ridership, or the number of people who have access to the TTC, speed, or cost. They would often place their own mathematical arguments side by side with the City's, to argue that the City's plan did not make mathematical sense. For example, when the mayor argued that the City would have a very large deficit (approximately $700 million), activists pointed out that he had cut the vehicle registration tax ($60 per car) and the land transfer tax (a tax on real estate purchases), and that if he had not made those cuts, the supposed deficit would be significantly smaller (both Ahmed and Stephanie discussed this storytelling narrative).

The activists chose their numbers carefully for maximum effect. For example, Ahmed argued that large numbers are very difficult for people to understand, so instead of presenting a large number like, for example, 3000 people, StC would say something like "twenty-seven subway cars" (Ahmed came up with this number as an example during his interview; thus, it may not reflect an actual calculation that StC made, but is an example of the type of calculation). They argued that numbers like these were easier for people to relate to. However, in the spirit of storytelling and relationship-building, they sometimes chose not to represent numbers. Ahmed said that early on in the organizing, they tended to use more data and numbers in their arguments to the public. Later on, when they had built relationships with individuals in different communities who would be impacted by the cuts, they tended to report more personal stories. For example, instead of reporting on the number of people who would be impacted by cuts to WheelTrans (a public transit service for people who use wheelchairs), they might create a video with one person telling their story and describing how they would be affected if they could not access WheelTrans anymore.

Behind-the-Scenes Tactics and Strategizing

The work of organizing – of reaching out to as many people as possible through flyers, news and social media, public actions and protests – requires many skills, including some mathematical skills. Since StC activists primarily focused their organizing efforts at the neighborhood level, they gathered publicly available information about the demographics of different neighborhoods so that they could tailor their organizing efforts to these neighborhoods.

When creating banners, flyers, and other graphic images, they used mathematics as they measured distances and centered text. When planning a march, they estimated the number of copies of flyers they should make based on the numbers of StC activists who could go out and flyer in the various neighborhoods. They estimated the number of participants they would have (using information from social media and other sources) and based their recruitment efforts on achieving targeted numbers for various actions. For example, they used a rough estimate that about half the people who rsvp'd for an event on Facebook would actually show up. At a march, they would count the number of participants by coming up with an estimate of the number of people who would fill a certain amount of space (e.g., a ten by ten foot square), and then estimating how many ten foot squares were filled. Or, they found estimates on the Internet of the number of people who could fill the street in a standard city block, two lanes wide, and then use this information to estimate turnout. When they timed events that included marches, they estimated the amount of time it would take to march from place to place, especially if there were several stops with speakers or banner drops.

They also collected data on their organizing efforts and analyzed them to see if they were reaching a broad demographic of the City. For example, they used Google analytics to see when people were accessing the Stop the Cuts website, and they collected demographic information from signatories to a Declaration that they had produced, to see who was joining the StC cause.

They used data to target their efforts in ways that they felt could be more fruitful. For example, using data about councilor voting patterns, they targeted city councilors in what was known as the 'mushy middle': rather than working to convince councilors who always voted for or against the mayor's policies, they focused on councilors who were more variable in their allegiance. They also used data regarding city resident voting patterns to figure out which neighborhoods were more aligned with the mayor, and which were less supportive.

Finally, within StC when there were conflicts, with some activists pushing for more radical or confrontational tactics, and others arguing for more mainstream methods. Some of the activists drew from data to argue that StC had not yet been successful in its aims, and an escalation of tactics was necessary.

Mathematics in Relation to Other Activist Tools

Given our theoretical framework, it is important to consider the *process* of activist mathematics, not as a series of disconnected cognitive tasks, but as part and parcel of the work of activist groups. In this section, we discuss three findings about the process of activist mathematics that align with, and extend, our theoretical framework. These findings include: the necessity of appropriate content knowledge in order to mathematize inequality; the division of labor within the group; and the intentionality of activist mathematics.

As Aziz pointed out, StC activists often disagreed with the City's mathematics because they differed in "how you are using [mathematics] and what you are quantifying." For example, with the library cuts, the City used primarily circulation numbers, whereas StC argued that the number of people who used the library, for many reasons beyond just taking out books, should be taken into account. In order to decide how to mathematize a real-life situation, deep content knowledge was necessary in order to make sense of how a given political and economic decision would affect people's everyday lives. StC's disagreements with the City highlight that mathematical modeling of the world is *always* ideological. The ideological nature of mathematics was revealed throughout the data reported above. StC's deconstruction of the City's math aimed to reveal the underlying ideology of the cuts, their own mathematics was explicitly based on their ideological perspective (e.g., not being concerned about "the well-being of [the capitalist] system"), they selected numbers (or decided against numbers) to make their stories to the public as convincing as possible, and their behind-the-scenes strategies were based on an understanding of democratic ideologies in which getting as many people involved as possible, to show "numerical legitimacy," was paramount.

In a related point, StC members often expressed much more certainty about their ideological standpoint than their mathematical models. As Alex explained to us, in StC there were "more people who could explain Marxism to you than could explain fractions." Some mathematical tasks could be performed by any newcomer to the group: collecting data for the People's Poll was considered an entry level task that could help newcomers learn about the issues and build connections to the broader community. Other tasks, such as reading and summarizing government reports, or collecting demographic information about the various neighborhoods, fell primarily to the Research Committee. StC was an example of a community of practice in which various specializations emerged; no one member of the group would have been able to accomplish all that the group could accomplish together. Mathematics was one, but certainly not the only, aspect of activist work that was specialized to a subgroup. In this case, the division of labor extended beyond StC into other groups and individuals who were pursuing similar goals. Through the Internet, news stories, and public forums and events, StC had access to the mathematical activist work of other organizations.

Finally, this study's findings differ from most out-of-school mathematics research in one significant way: the intentionality of the mathematics. In many studies of people's participation in out-of-school activities, mathematics emerged as an invisible aspect of their work. People did not always recognize that the tasks they accomplished every day were mathematical. StC resembled these studies in one way: many of our interview participants told us that the group never discussed the question of whether they should or shouldn't use mathematics. Rather, they discussed specific tactics: Should we conduct a poll? How might we analyze it? Would it pass muster? However, despite the lack of the label "mathematics," the discussions and actions of the StC group showed the intentionality of their engagement in mathematics. All of our interview participants told us that the City was using mathematics to intimidate the general public by using big numbers and doomsday language about deficits and inevitable cuts. With mathematics used as a weapon against them, all of the activist interviewees told us that it was critical for them to be able to understand, and to counter, the City's use of mathematics. This suggests that community activism may actually be fertile ground to support people in understanding and using mathematics more intentionally and towards liberatory ends.

Implications: How Can We Foster Activist Mathematicians?

The StC campaign against austerity agendas in Toronto was partially successful. The group's role was instrumental in eventually defeating some of the budget cuts and preserving most City services for the 2012 budget. While the findings of this study, related to the grassroots mobilization of mathematics for social justice, are interesting in their own right as an example of informal mathematical engagement, we believe these findings also raise some questions about the role of formal education in supporting progressive social change.

If we consider Alex's argument that more activists could explain Marxism than fractions, several questions are raised. First, how can mathematics education support people in learning, doing and using mathematics for social justice? In recent years, many educators and researchers have brought social justice into mathematics classrooms, with some success (Enyedy & Mukhopadhyay, 2007; Gutstein, 2006; Gutstein & Peterson, 2013; Turner, Gutiérrez, Simic-Muller, & Díez-Palomar, 2009). We would like to see more studies, like Gutstein (2006) in which mathematics students describe how these experiences supported their mathematically-engaged activism in their lives outside of school. As an anonymous reviewer suggested, the four themes we presented in our findings (understanding government use of mathematics, countering with their own mathematics, storytelling to the public, and behind-the-scenes tactics) might serve as a useful heuristic for organizing mathematics teaching for social justice.

Second, the flip side of Alex's argument suggests the need for social and political education that integrates mathematics as a lens through which to see the world. Why is it that so many StC activists were comfortable with the complexities of Marxism but frightened of the complexities of the City budget documents? Perhaps mathematics education researchers could venture into contexts devoted to social and political education, to develop an understanding of how mathematics is used (or possibly pushed to the background) in such contexts.

Finally, many of those responsible for mathematical aspects of StC's activism were from middle-class backgrounds with post-secondary degrees. How can educational contexts that are not limited to K-16 schools support the integration of mathematics with all of the complex knowledge necessary for imagining and working towards a better world?

Future studies in this area could address all of these issues: the ways in which mathematics education supports the mathematization of global and local economic policy; the ways in which social sciences or political education support people in drawing mathematics in to their understandings, and the ways people learn to mathematize the world through participating in out-of-school community organizing. We are particularly interested in detailed analyses, to supplement our broad view of the role of mathematics, to uncover tools, resources, and divisions of labor, which are effective at broadening people's participation in political mathematics.

Endnotes

(1) Ford had promised that if elected, he would end the "gravy train" of City services and employment. The phrase refers to a situation in which a person can earn a lot of money with very little effort.

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Acknowledgments

This research was funded by the Social Sciences and Humanities Research Council of the Government of Canada. We would like to thank the members of StC for allowing us some insight into their important activist work. We would also like to thank Scott McDonald, Jennifer Langer-Osuna, Niral Shah, GLITTER (Group for the study of Learning, Identity, and Teaching Towards Equitable Relations, including at that time Lesley Dookie, Allison Ritchie, and Miwa Takeuchi), and anonymous reviewers for reading an early draft and providing feedback.