What Were You Thinking? A Deleuzian/Guattarian analysis of communication in the mathematics classroom

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Abstract

The primary aim of this article is to bring the work of Deleuze and Guattari to bear on the question of communication in the classroom. I focus on the mathematics classroom, where agency and subjectivity are highly regulated by the rituals of the discipline, and where neoliberal psychological frameworks continue to dominate theories of teaching and learning. Moreover, the nature of communication in mathematics classrooms remains highly elusive and problematic, due in part to the distinct relationship the discipline has with verbal language and thought. I first discuss current attempts to better address the embodied nature of communication in mathematics classrooms, and argue that these remain overly logo-centric and language-centric in their conception of thinking. I then show how the work of Deleuze and Guattari on thought as a radical disruptive event can be used effectively to critique current pedagogical practices that privilege a narrow conception of communication in the classroom. I examine a set of exemplary classroom videos used in mathematics teacher education to argue that the current approach fails to honor the highly creative and disruptive nature of thinking.

Keywords: Deleuze, language and communication, mathematics, classroom interaction, assemblage, thinking

Introduction

Although many mathematics classrooms remain sites where little to no dialogue occurs, during the last twenty years the educational reform movement in the U.S. has advocated for increased emphasis on student communication. Policy and curricular changes reflect this new emphasis, and mathematics teachers are now meant to engage students in ‘whole-class conversations’ where participation and expression are highly valued:

Mathematical communication is a way of sharing ideas and clarifying understanding. Through communication, ideas become objects of reflection, refinement, discussion, and amendment. When students are challenged to communicate the results of their thinking to others, orally or in writing, they
learn to be clear, convincing, and precise in their use of mathematical language. (National Council of Teachers of Mathematics, NCTM, 2000)

The communication standard is one of the more problematic process standards mandated by the NCTM because of its tacit assumptions about the relationship between thinking and communicating. State curricular guidelines and state-sanctioned textbooks demand that communication be a central activity in the mathematics classroom, without adequate interrogation of the very concept of communication. Teachers often take up the concept of communication as though it were merely a matter of student speaking or writing, without recognizing the embodied and deeply material nature of all interaction.1 Although there is a burgeoning research literature on the multi-modal nature of mathematics classroom discourse,2 some of it exploring issues of embodiment and materiality,3 one finds for the most part that teachers address the communication standard by asking students to verbally share their thinking. This ‘think aloud’ strategy is also prevalent in reading instruction where it is sometimes referred to as ‘languaging’ (Swain, 2006).

The primary aim of this article is to bring the work of Deleuze (1993, 1994) and Deleuze and Guattari (1987, 1994) to bear on the question of communication in the classroom. I focus on the mathematics classroom, where agency and subjectivity are highly regulated by the rituals of the discipline, and where neoliberal psychological frameworks continue to dominate theories of teaching and learning. Moreover, the nature of communication in mathematics classrooms remains highly elusive and problematic due in part to the distinctive relationship the discipline has with verbal language and thought.4 I first discuss current attempts to better address the embodied nature of communication in mathematics classrooms, and argue that these remain overly logocentric and language-centric in their conception of thinking. I then show how the work of Deleuze and Guattari on thinking as a radical disruptive event can be used effectively to critique current pedagogical practices that privilege a narrow conception of communication in the classroom. I examine a set of exemplary classroom videos used in mathematics teacher education to argue that the current approach fails to honor the highly creative and disruptive nature of thinking.

**Communication in the Mathematics Classroom**

Stockero and Van Zoest (2011) note that mathematics educators ask students to share their thinking for a variety of reasons, including such diverse aims as enhancing student problem solving skills (Fello & Paquette, 2009), broadening student views on what constitutes mathematical activity (Hodge, 2009), and offering opportunities for teachers to study student thinking (Kastberg, Norton & Klerlein, 2009). Similarly, Bochicchio et al. (2009) suggest five essential components of successful whole-class conversation, the second being ‘publicizing’ student thinking:

The teacher must support students in sharing their ideas so that other students have the opportunity to hear and comprehend those ideas and subsequently think about and respond to them. Without this step, discussion is not possible. The teachers’ actions can include asking students to go to the board and share their work or thinking as well as having a student’s idea restated by the student, other students or the teacher. (p. 608)
Although Stockero & van Zoest (2011) suggest that teachers need to move beyond a ‘replication’ model where students are simply asked to share their thoughts in order to enhance engagement and participation, they continue to support the notion that ‘explanation’ can capture student thinking, and they fail to problematize the relationship between thinking and the verbal processes of ‘making thinking public’. Van Zoest et al. (2010) define thinking as students’ ‘ideas about approaching problems, what led them to their solutions, their justifications for solutions, and their reflections on mathematical activity, as well as their solution methods and answers to problems’ (p. 50). Such a definition confines thinking to a matter of signification (justification, reflection, method, solution). Similarly, drawing on Vygotsky (1986) and his assertion that ‘thought is not merely expressed in words; it comes into existence through them’ (p. 218), Shreyar et al. (2009) define mathematical thinking as ‘a reflective activity of making sense of indeterminate problematic situations by organizing (mathematizing) them with semiotic mediation tools (models)’ (p. 1). Although this research has contributed significantly to the study of classroom discourse, it often imposes an overly rationalistic linguistic or semiotic model on creative and potentially disruptive acts of thinking. Conceptions of thinking and its relation to language remain dualistic and simplistic in much of the research on mathematics education, often reducing the concept of thought to a form of inner speech. Sfard (2008), drawing on Blaktin, Vygotsky and Wittgenstein, proposes that we overthrow this tradition by recognizing how thinking is an inherently public activity, an always already collectively performed patterned activity, ‘an individualized version of interpersonal communication’ (Sfard, 2008, p. 81). For Sfard, communicating is a patterned collaborative activity which comes before individual thinking. This approach helps us revise our interpretation of classroom discourse by pointing to the externality of thinking. Sfard’s work tackles the well-entrenched beliefs of those who would defend an ontology of private cognitive acts. The challenge for such an approach, however, is to move beyond the language-centric assumptions about thinking (and communication) that one often finds in Vygotsky-inspired work. Sfard announces that ‘thinking encompasses more than inner speech’ and addresses ‘all forms of communication’ (p. 100), but she tends to rely on language-centric examples. For instance, when Sfard states: ‘I expect little disagreement regarding the claim that self-communication (for example, in the form of “inner speech”) can be considered as a case of thinking’ (2008, p. 82), and then proceeds to argue that all thinking can be considered an instance of self-communication, I am concerned that there is no room in this approach for thinking as a radical asignifying creative act. One wonders what is lost if thinking remains chained to, and contained within, a regime of signification that cannot fathom (nor abide) the disruptive and rupturing nature of thought outside of communication?

Hwang and Roth (2011) have drawn extensively on phenomenology to theorize the role of the body in learning math and science, arguing that Vygotsky’s ‘logocentric approach’ conflated or reduced thought to language (p. 25). According to these authors, the typical classroom task of recounting or explaining one’s thinking—on demand and supposedly after the fact of thinking—fails to capture the complex embodied nature of communication: ‘There is not first thought, which is then emptied out into the public. Speakers find out about their thinking as much as listeners. This more holistic theory of conceptions considers different, irreducible modes of communication as a whole’ (p. 29).
According to this approach, ‘the living body constitutes the mediating hub in communication; my body is my expression rather than merely a tool for expressing what is in my mind’ (p. 29). In an effort to further center the body as the locus of learning, they broaden their conception of communication to include all sensory modalities—gesture, intonation, appearance, etc. And although, in arguing that ‘thought is dynamically related to the whole unit of communication rather than to words alone,’ (p. 28), they rescue thinking from a purely linguistic frame, they continue to confine thinking to models of communication, albeit more broadly conceived.

Language and Assemblage

Deleuze and Guattari (1987, 1994) challenge us to think the radical nature of thought outside a communication model. Instead of a logic of communication and its requisite binaries of sender/receiver or signal/noise or content/message, they offer a logic of intensities, a logic of ontogenetic ‘assemblages engaging in irreversible durations’ (Brunner & Rhoades, 2010). According to this logic, interaction is a creative practice of material experimentation within rhizomatic ecologies (Guattari, 2008). In a rhizomatic assemblage, there is no center nor root, but a proliferation of entry and exit points, a dispersal of lines (traits) that erupt outward and often loop back. This is a topo-philosophy in which regimes of signification impart more and more signifier, saturating the acentric network, while disruptive lines of flight spur new potentialities. This radically material ontology of interaction demands that we think the ‘thiness’ or ‘haecceity’ of becoming, so that we might study classrooms in terms of fluidity, affect and the exteriority of thought.

Deleuze & Guattari (1987) push back at the totalizing eye of linguistics and other discourse frameworks that reduce activity to language. A rhizomatic assemblage is ontologically heterogeneous, incorporating and developing in and through diverse entities, so that language becomes just one trait (or line) in the assemblage. Perhaps more importantly, lines (traits) in the rhizomatic assemblage are not all ultimately linked to linguistic features. The rhizomatic assemblage is composed of diverse realities, most of which are not bound to language. In other words, there are ways of expression that do not pay lip service to an image of thought (or becoming) that is entirely dominated by linguistic or discourse models: ‘semiotic chains of every nature are connected to very diverse modes of coding (biological, political, economic, etc.) that bring into play not only different regimes of signs but also states of things of differing status’ (Deleuze & Guattari, 1987, p. 7).

This approach aims to decenter language from the analysis: ‘A semiotic chain is like a tuber agglomerating very diverse acts, not only linguistic, but also perceptive, mimetic, gestural, and cognitive ...’ (Deleuze & Guattari, 1987, p. 7) They criticize Chomskian linguistics for not being sufficiently abstract in that it fails to connect ‘a language to the semantic and pragmatic contents of statements, to collective assemblages of enunciation, to a whole micropolitics of the social field’ (Deleuze & Guattari, 1987, p. 7). Linguistics, like psychoanalysis, is too keen to reduce difference and repetition to marks of an underlying sameness. It’s not that we aren’t to study language as part of the system of affect, but just that arboreal models—unlike rhizomatic ones—are always imposing images of language on the assemblage that make language the transcendental coding, ‘A
method of the rhizome type, on the contrary, can analyze language only by decentering it onto other dimensions and other registers’ (Deleuze & Guattari, 1987, p. 8).

Not only is language decentered, but language itself is reconceived outside of a communication model. Language is neither informational nor communicational. Language is itself a ‘collective assemblage of enunciation’ which forms one of many regimes of signification whereby bodies are inscribed with power. In the context of the classroom, language is less about information and more about imposing ‘semiotic coordinates’ on the child. The bodies in the classroom are ‘emitting, receiving, and transmitting’ the ‘order-word’ that constitutes language as obedience (p. 77). Language is not a code nor is speech the communication of information. Language is a material act or effectuation: To ‘order, question, promise, or affirm is not to inform someone about a command, doubt, engagement, or assertion but to effectuate these specific, immanent, and necessarily implicit acts’ (p. 77). One can no longer imagine a clean distinction between speech and language (parole and langue), since there is no pre-existing syntax or primary signification.

Nor can one imagine language as the translation of prior thinking into verbal expression. For Deleuze and Guattari, the only possible definition of language is ‘the set of all order-words, implicit presuppositions, or speech acts current in a language at a given moment’ (p. 79). It is not the case, however, that order-words are equal to language, but that they constitute its very possibility. Language-use is performative in that it ‘presupposes a conventional context of eligibility’, prescribing or in the least confining the possible manner of response (Massumi, 2002, p. 9). While communication relies on the mirror-like function of language, order-words realize the molding function of language.

The interesting tension is thus between the ‘indisciplines at work in language’ and the order-word as discipline. It is precisely the sites of indiscipline where an asignifying thought bores a hole in the surface of language and disrupts the order word. If we speak in indirect discourse, that is to say, if the ‘collective assemblage of enunciation’ speaks through us, then speech acts are multifarious and emit ‘all the voices present within a single voice’ (p. 80). But these same acts must, on occasion, function as points of disruption and nodes of emergence whereby the collective assemblage of enunciation is broken or torn, and the site marks the emergence of something outside of language—if only momentarily, a line of flight tears off from the rhizome and zigzags away, creating a new territory. Direct discourse (speech on one’s own behalf) ‘is a detached fragment of a mass and is born of the dismemberment of the collective assemblage’ (p. 84). Accordingly, ‘There is no individual enunciation. There is not even a subject of enunciation’ (p. 79), but there are sites or events of asignifying disruption where thinking punches its way through the surface of language.

The communication model has long been suspect because of the way it privileges the existence, intention and rationality of an interior life that is both subject of and subject to the transmission of information between private and public spheres (Massumi, 2002). Deleuze and Guattari (1987) appeal instead to the concept of expressionism. Expression is never simply a matter of representing, describing, corresponding or complying, but neither is expression the causal construction of content or thought. Instead the linear causal link between content and expression is disrupted or inflected by chance.Expression’s potential is linked to accident, event, singularity, change. The singular is not an instance or a member of a set, but an occurrence that envelops a potential collective. It
is a disruptive event which nonetheless acts as a magnet in structuring the behavior of others around it. Deleuze’s concept of singularity comes directly from the mathematics of discontinuous curves—mathematical singularities mark ruptures in a curve, sudden shifts in direction, and the flight of the infinite (Deleuze, [1968]1994; Smith, 2005). They break through the ontological rules that structure the relationship between language and content. Thus the singular act of expression is not an act confined to language, despite it being spoken in some sense by a collective. As Massumi (2002) suggests, one can accept that the subject is ‘in a sense spoken by extra-linguistic forces of expression’ without reducing the expressing individual to an instantiation of a system (p. 7). In the gap between thought and language, or content and expression, lies ‘the immanence of their mutual deterritorialization’ (Massumi, 2002, p. 9). It is in these gaps or breaks that the classroom as assemblage (a mix of machinic and ennunciative operatives) reassembles itself, and the points of suture or ‘expression-content articulations’ migrate and re-couple, the one form passing over to the other (Massumi, 2002, p. 10). Expression and the act of expressing are meant to capture the absolute materiality of the thinking-speaking relationship. There are thus intermediate entities between thought and language, asignifying particles of expression. These particles are atypical and stammering, constituting the ‘cutting edge of the deterritorialization of language’ (Deleuze & Guattari, 1987, p. 99 cited in Massumi, 2002, p. 15).

Analysis of the Video

The videos discussed in this article are from a teacher education resource entitled Connecting Mathematical Ideas: Middle school video cases to support teaching and learning (Boaler & Humphreys, 2005). The video resource, which is based on a Noyce-funded video study of middle school mathematics teaching, is used extensively in mathematics teacher education. The videos document a series of grade 7 algebra lessons in California. The classroom was videotaped everyday for a full year. Every few weeks the teacher, researcher and research assistants together watched and discussed videos that were collaboratively selected. The resource consists of a series of edited videos documenting Cathy Humphreys teaching. The accompanying book includes Humphreys’ reflections as well as commentary by Jo Boaler, the principal investigator of the project. Boaler has written significantly about reform mathematics during the last ten or more years, and is a well-established scholar in math education. The book’s foreword is written by Deborah Loewenberg Ball, who has authored or co-authored over 150 publications, acted on various national advisory boards, and has lectured and made numerous major presentations around the world.

Boaler and Humphreys’ goal in offering the case study ‘was to provide a landscape of teaching and learning interactions that others could use to explore their own thoughts and questions about teaching’ (Boaler & Humphreys, 2005, p. 3). I offer this Deleuzian/Guattarian analysis as one such exploration, inspired by the compelling nature of these videos as teaching instruments, while at the same time deeply concerned by the misguided notions about classroom communication that are exhibited therein. The authors claim that they selected videos that focused on ‘particularly interesting, unexpected, and sometimes difficult moments that occurred during ordinary lessons’ (p. 10). But what
disturbs me about these videos is the sense that there is almost nothing ‘unexpected and sometimes difficult’, and that they capture instead an all-too-sedate and state-sanctioned performance whereby the radical nature of thought is twisted into submission.5

I have chosen to analyze these popular videos because they function as pivotal texts in the production of legitimate classroom practice. To what extent the original researchers have edited or processed the original video data is of less relevance than that these video-texts are sanctioned and circulated as teacher education resources. Of the various classroom videos in the resource, I have chosen to discuss the first because (1) the focus on algebra allows me to show how algebra itself—as a regime of signification—functions in the delineation of thought from language, and (2) the whole-class discussion is typical of many classrooms where communication is central, whereas the later videos reveal a more nuanced approach to interaction. My analysis of the video borrows strategies found in intercultural sociolinguistics, which examines the shape and form of interaction in relation to both governing power relations and unconscious cues and framing.

What strikes one immediately when watching the videos is the considerable emphasis on oral communication and whole-class conversation. Although the camera records some of the student contributions during small group work, the focus is primarily on the whole-class segments. Students’ hands shoot up, as many want to share. As the authors state in the introduction, ‘Student thinking and sense making are at the heart of each case, as we see students wrestle with new ideas and conceptions of themselves, of mathematics, and ultimately, of their world’ (Boaler & Humphreys, 2005, p. 4). The teacher adeptly calls on students, ‘re-voices’ their responses and asks other students to re-voice as well, while she simultaneously documents on the white board their various procedures. Students are invited to go up to the overhead projector and use the diagram as they explain. From the perspective of the reform mathematics education movement, the focus on communication and multiple representations is sound pedagogy. Indeed, the teacher does an impressive job of moving the students towards generalizing their procedures so that they might begin to think ‘algebraically’ about finding the answer to a more general question. But it is precisely this emphasis on the verbalizing of thought that seems problematic in its implementation, despite my well knowing that ‘thinking aloud’ is considered good practice in mathematics classrooms.

The classroom video exemplifies the verbally share your thinking approach to communication. The class begins with the teacher placing a diagram of a 6x6 square border (picture frame) on the overhead projector (Figure 1), and asks the students to determine how many unit squares are in the border. Students are first asked to ‘mentally’ determine the number of unit tiles. The teacher asks them to do so ‘without talking, without writing, and without counting one by one’ and then asks them to verbalize their methods. During the ten minute whole class conversation episode, the words ‘thinking’ or ‘think’ are used 21 times (15 times by the teacher). On all but two of those occasions ‘I was thinking’ declares a verbal representation or reportage of cognition.6 After listening to the video numerous times, and counting and mapping the way this utterance occurs, one begins to hear the compulsive inscription performed by the discursive move ‘what were you thinking?’ repeated again and again as the teacher moves from student to student. One begins to notice the oppressive function of ‘what were you thinking’ as it repetitively reinstates a
regime of signification and disallows disruptive thought. As Lecercle (2002) suggests, ‘the speaker is in constant danger of being burked by language: a wet blanket of signification smothers any attempt at expression’ (p. 6). In this video, the repeated refrain ‘what were you thinking?’ actually betrays thought because language can never reproduce the radical event-structure of thinking. The refrain ‘what were you thinking’ actually functions as a wet blanket, smothering the students’ capacity to think otherwise, while enforcing the use of language as denotation/manifestation/signification.7

Just as ‘I was thinking’ fails to represent the thought to which it refers, it is the ‘aura of signification’ (Lecercle, 2002, p. 249) which is substantiated and validated through the repeated act of asking students to verbalize their thinking. Serres (2008) suggests that ‘words fill our flesh and anaesthetize it’ and that speaking in particular is like a ‘discursive breastplate’, a shield to numb our encounters (p. 59). This ceaseless talking and listening leaves no space for the senses. There is no place to think in this diluvian din of order-words. If thinking is in the flesh, then this constant turn to verbalize our thinking seems to work against embodied conceptions of learning. In the transcript excerpt below (see Table 1), and elsewhere in the video, Sharmeen submits to language so obediently and masterfully that she is often called on to manage the more stuttering students. Colin, on the other hand, speaks in terms of doing instead of thinking, and the teacher invites him to use the diagram and the pointer, and thereby opens up a space for expression and the body to re-enter the interaction. Might this significant break with the sitting-speaking subject—instead a subject that moves across the room and interacts with the diagram—be exactly the kind of event when links between expression and content are broken and re-assembled? Colin’s language becomes completely indexical as he touches and interacts with the diagram. And yet the task itself is in essence trapped within the denotation/manifestation/signification circle since it is merely an exercise in naming.8

This aura of signification9 finds further substantiation in the actual focus of the lesson—the development of ‘algebraic thinking’. The lesson aims to enculturate the students into habits of generalization and skills at generating algebraic rules. During the episode when students share their thoughts, each ‘different method’ described by each student is recorded by the teacher on the whiteboard as a different numeric expression. A major goal of the lesson, however, is to help the students grasp that all these
differences are reduced to sameness through the power of algebra. The one correct answer—confirmed at the outset of the lesson—drives the diversity towards a unified and singular utterance. Ultimately, the differences in student thinking are deemed superficial, as the algebraic letter is enlisted to erase any divergences.

The teacher’s well intended attempts to subject this fluid affect and perception to the algebraic letter and the regime of language (as communication) functions quite literally as a confining axiomatics that imposes the state sanctioned forms of legitimate formulation—that being algebra and its power to obliterate difference. Algebra has a long history of erasing the body and the diagram from mathematics (Netz & Noel, 2007), and it functions here in the classroom to serve the state’s algebraic image of mathematics. Algebra will only liberate these students when, or rather if, the letter is somehow breached.

Table 1

<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>1 Teacher</td>
<td>Did anyone think it was maybe thirty-eight first? A few people, OK. And, so, when you talked it over in your group, those of you [who] thought forty, what were you thinking? All right, Stephanie, what were you thinking?</td>
</tr>
<tr>
<td>2 Stephanie</td>
<td>Uh, I was thinking that one side is ten and then there’s four sides and times ten by four is forty.</td>
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<tr>
<td>3 Teacher</td>
<td>OK. How many were thinking just like Stephanie? All right, what about the thirty-eight people, what were you thinking? Uh, Mindy?</td>
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<tr>
<td>4 Mindy</td>
<td>I was thinking about the top two are ten and so ten plus ten equals twenty, and then the other two to get were nine each, so that really makes eighteen, and twenty plus eighteen ...</td>
</tr>
<tr>
<td>5 Teacher</td>
<td>OK. All right. So now let’s just see some different methods—you know how we like to gather different methods. Let’s see some different methods for getting the thirty-six. So, let’s see, let’s have Sharmeen. Sharmeen, what’s your method?</td>
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<tr>
<td>6 Sharmeen</td>
<td>Well, Krysta started out with forty from ten times forty [four] and then I subtracted four from that because there would be four squares overlapping, and so that got thirty-six.</td>
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<tr>
<td>7 Teacher</td>
<td>Raise your hand if you understand how Sharmeen did it. And the four was for ...?</td>
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<tr>
<td>8 Sharmeen</td>
<td>The squares that overlap.</td>
</tr>
<tr>
<td>9 Teacher</td>
<td>OK. And this four was for?</td>
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<td>10 Sharmeen</td>
<td>The four sides.</td>
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<tr>
<td>11 Teacher</td>
<td>And this ten was for?</td>
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<tr>
<td>12 Sharmeen</td>
<td>The ten squares on each side.</td>
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<tr>
<td>13 Teacher</td>
<td>OK. Another way to do it? Colin?</td>
</tr>
<tr>
<td>14 Colin</td>
<td>All right, how I did it was, I just put one side was obviously gonna be ten, so it’s ten, and then I did like the bottom one and that was gonna ...</td>
</tr>
<tr>
<td>15 Teacher</td>
<td>Could you go up and show us? I think that might help us.</td>
</tr>
<tr>
<td>16 Colin</td>
<td>Can I use like a pointer-thinger (unintelligible)?</td>
</tr>
<tr>
<td>17 Teacher</td>
<td>The pointer’s in the top drawer if you want to use it ... top ... right in the center ... there it is.</td>
</tr>
<tr>
<td>18 Colin</td>
<td>All right I found it. Anyway, so I, like, I know this side is ten so I just did like ten and then this one, this one’s the overlapping one, so then this would be nine, then this one would be nine, too, because this one’s overlapping. And then for this, one it’s be eight because these two, this one is being used by this one and this one is being used by that one.</td>
</tr>
</tbody>
</table>

What Were You Thinking?

Table 1

differences are reduced to sameness through the power of algebra. The one correct answer—confirmed at the outset of the lesson—drives the diversity towards a unified and singular utterance. Ultimately, the differences in student thinking are deemed superficial, as the algebraic letter is enlisted to erase any divergences.

The teacher’s well intended attempts to subject this fluid affect and perception to the algebraic letter and the regime of language (as communication) functions quite literally as a confining axiomatics that imposes the state sanctioned forms of legitimate formulation—that being algebra and its power to obliterate difference. Algebra has a long history of erasing the body and the diagram from mathematics (Netz & Noel, 2007), and it functions here in the classroom to serve the state’s algebraic image of mathematics. Algebra will only liberate these students when, or rather if, the letter is somehow breached.
from the whiteboard and made material and mobile in such a way that the students are able to leverage it as affect. But instead the regime of algebra is never dethroned, and grade 7 marks the beginning of its rule. In the excerpt below (Table 2), the teacher, after noting that some students had wrongly introduced a second letter in their attempts to generalize the problem to any size of picture frame, asks the class to discuss when more than one letter is needed in an algebraic expression or equation.

Precisely when Kimberly’s ‘so I was thinking’ becomes inaudible, she is swiftly disen-cumbered of that mistaken belief by the teacher’s adept use of grammar in ‘OK. What do you think now?’ This stammering moment might have been the event or singularity that breached the wet blanket of language and opened up the interaction with new lines of flight, but Kimberly loops back into the regime of the letter with her dutiful response, ‘we don’t need it anymore’. Pam, who is an eager speaker in class, announces that it is exactly in the transition from numbers and their concrete specificity to letters and their aura of signification that confusion emerges. She points out that it is the very concepts of same and different that differ from one domain to the other. Indeed, Pam points out how language itself fails to adequately bridge the relation between number and letter, and the teacher, although too quickly packaging this confusion into something palatable, recognizes the significance of this insight.

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37 Teacher OK. That whole thing about when, why you might need another letter. Kimberly, you were thinking that you need another letter, right? Why were you thinking that? Because that’s a really important thing; when do you need another letter and when don’t you? Why did you think you did?
38 Kimberly Because we have, um, four letters and I was thinking, cause she read her, um, her thing there and I said it was kind of complicated so I was thinking that (inaudible) ...
39 Teacher OK. What do you think now?
40 Kimberly We don’t need it anymore.
41 Teacher You’re sure? You’re convinced? OK. Um, Travis, were you going to add anything to that? OK. Yeah, Pam.
42 Pam Well, the reason I was thinking we needed another letter is because in the beginning we needed two different numbers. So, maybe you needed two different letters.
43 Teacher Oh. Oh, that’s ... yeah, right, right.
44 Pam It kind of, like, if you were talking about what’s the same and what’s different. So in the algebraic formula it’s, the things that are the same and different are not the same and different on the numbers.
45 Teacher Right.
46 Pam So, I think that when you asked what was the same and what was different, it kind of confused me.
47 Teacher I’m glad it confused you in that way because it brought out a really important thing that we’re going to be grappling with in some other problems. Because sometimes you are going to need a different letter, and sometimes you’re not. Why don’t you need another letter in this case? I mean, like, if you can do it without another letter, you want to keep it simpler. Why can we, why can we? Sarah. Yeah, this Sarah. Sarah Stanley.

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Table 2
Conclusion

Although the contribution of Deleuze and Guattari to contemporary theories of subjectivity is undeniable, and one can trace the impact of their work across the social sciences, there remains a need to further explore the potential of this work within education (Semetsky, 2006). In particular, we need to study how the concepts of the assemblage, the rhizome and the fold might be leveraged so as to shed light on classroom interaction (Goodley, 2007; Gough, 2004, 2005, 2007). By looking closely at video and transcript data, this article attempts to show how these key concepts can be used as analytic tools for critiquing current practices regarding communication in the classroom. According to Bogue’s (1989/2001) reading of Deleuze, there is, within language, an anonymous nomadic ‘aleatory point’ which manifests itself as nonsense or paradox, a site that ‘possesses no particular meaning but is opposed to the absence of meaning.’ (Deleuze, 1990, p. 89, in Bogue, 1989/2001, p. 76). This point traverses the surface of words and things and is generative of life. The aleatory point is a mobile element or empty slot: ‘it lacks its own identity, it lacks its own resemblance, it lacks its own equilibrium, it lacks its own origin’ (Deleuze, 1969/1990, p. 55). Thought discovers its ‘higher power’ in an aleatory point, a Nietzschean inspired break with rational thought (Bogue, 1989/2001). Thinking is ‘no longer a ratio reinforcing a reactive, sensory-motor forces, but an unbounded creativity from which active affections flow’ (Hughes, 2011, p. 91). Or, in other words, as Deleuze states, ‘To think is to create’ (1994, p. 192).

Thought strikes like lightning, with sheering ontogenetic force. It is felt. The highest operation of thought is not to choose, but to harbor and convey that force, repotentialized. The thinking is not contained in the designations, manifestations, and significations of language, as owned by a subject. These are only partial expressions of it: pale reflections of its flash. The thinking is all along the line. It is the process: its own event. (Massumi, 2002, p. 28)

Deleuze and Guattari (1987) point to the dangerous ‘private thinker’ whose thinking is oppositional (citing Kierkegaard and Nietzsche) (p. 376). They bemoan the term ‘private thinker’ because of the way it conjures an interiority that they are trying to subvert, arguing that it is these sorts of thinkers and acts of thinking that actually ‘place thought in an immediate relation with the outside’ (p. 377). Such thinking is not to oppose one image against another, but to depose image reproduction altogether. Making thought exterior is a method of undoing the subjection of thought to the true model or ideal form, it is a nomadic strategy for crushing the machine that regulates the distribution of copies. The form of ‘exteriority’ has no space for model and copy, no striated space for the point-by-point adherence to method, but occupies instead the smooth space of ambulant differentials. Deleuze and Guattari refer to the 19th century writer Heinrich von Kleist (2004) who describes thought as a proceeding or process and not a controlling conceptual regulator of speech and affect. For Kleist, thought is pure intensity, a swirling of inarticulate sounds and unanticipated conflations, and not that which controls language in some legalistic state sanctioned way (Deleuze & Guattari, 1987, p. 378). Thus we are as a foreigner in our own language. It is precisely through this decoupling of thought and language that the exteriority of thought is given life. Only then can thought participate...
in becoming-minor, in becoming event, problem, haecceity. As Massumi (2002) suggests, the event or singularity of thought must fall through the ‘propositional mesh’ of language and express ‘the field conditions that gave rise to it and the collective potential its occurrence envelops’ (p. 24). The individual student lives this expression as an intensity across his or her body, impacted by and impacting on the micro-perceptions and tiny molecular articulations that hum and twist in all interaction: ‘The body has become an expressive event: a voluble singularity’ (Massumi, 2002, p. 27).

I have focused on mathematics because it seems to enact so perfectly the severe harnessing of thought that Deleuze and Guattari bemoan, and because ‘think aloud’ strategies are highly touted as a way of making mathematics more public and social. A mathematics classroom where radical disruptive thinking is evident seems almost unimaginable. And yet surely the mathematics classroom, for this reason if no other, is precisely the place to interrogate the nature of thought and its relation to language. My aim is to think mathematics differently, to interrogate its mannerisms as a material-cultural enterprise, and to articulate a new philosophical framework for conceptualizing the learning of mathematics. My hope is that a critique of mathematical thinking, as it is conceptualized in current educational practice, might allow us to break free from the confines of royal or state mathematics, and create lines of flight where a more adventurous mathematics might emerge. We need to think mathematics out of the technical procedural tyranny of school mathematics, and inspire a resistance to the containment of such cultural capital. Deleuze and Guattari demand that we imagine another mathematics, in contrast to the ‘severe mathematics’ of the state, a ‘schizophrenic mathematics, uncontrollable and mad’.

Notes

4. Although there isn’t room here to address this complex relationship in full, it is worth noting that the standard philosophical treatments of mathematics (formalism, logicism, intuitionism, naturalism) are at heart concerned with the ontological status of mathematical entities and the epistemological issue of how one comes to know these entities and to what extent mathematical statements capture, represent or exhaust these entities.
5. It is important to mention that the critique I offer in no way intends to play into the recently reheated debate between ‘student centered’ versus ‘teacher centered’ instruction, triggered in part by the 2008 National Mathematics Advisory Report which reiterated this unfortunate binary. I fully support Boaler’s critique of the report, and I agree with her when she says that ‘Researchers in mathematics have worked to understand and analyse the different aspects of effective teaching, and few have concerned themselves with trying to show that one extreme approach is better than another (Boaler, 2008, p. 589). In addition, it’s important to say that I use these videos in my own work with pre-service mathematics teachers, and that the videos are of great value to the profession. I offer this critique as a way of opening the conversation up about communication in classrooms.
6. On the other two occasions ‘think’ is used modally to indicate the degree to which a student believes in what they are saying.
7. In the Logic of Sense, Deleuze (1969/1990) describes the confining circle of denotation/manifestation/signification as that which fails to address the event (sense) of the boundary between language and content.
8. Another reading of Colin’s contribution is that he is more confident and speaks without the use of a modal ‘I think’ to hedge his assertions (rather than an ‘I think’ that reports on thinking).

9. I follow Lecercle (2002) in the use of this term to underscore the ways in which we grant signification infallible referential power.

10. Deleuze points to a nomadic mathematics that troubles and threatens axiomatic mathematics. Although algebraic methods might be leveraged in either tradition, they operate all too often as a confining and legislative discourse in school mathematics. Of interest here is the tension between Deleuze and the work of Alain Badiou, who pursues a more axiomatic and set theoretic approach to mathematics.

References


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