

“Just don’t:” The suppression and invitation of dialogue in the mathematics classroom

David Wagner
University of New Brunswick, Canada
dwagner@unb.ca

Beth Herbel-Eisenmann
Iowa State University, USA
bhe@iastate.edu
Michigan State University, USA
bhe@msu.edu

Responding to concerns raised by grade 11 mathematics students, we examined a broad set of mathematics classroom transcripts from multiple teachers to examine how the word ‘just’ was and could be used to suppress and invite dialogue. We used corpus linguistics tools to process and quantify the large body of text, not to describe the nature of the discourse, but rather, in the tradition of critical discourse analysis, to prompt reflection on a range of possibilities for directing classroom discourse. We found that the word ‘just’ was one of the most common words to appear in these classrooms. Drawing on Bakhtin’s (The dialogic imagination. Austin: University of Texas Press, 1975/1981) distinctions between monoglossic and heteroglossic utterances, we found that the word ‘just’ acted as a monoglossic tool, closing down dialogue. We propose, however, that ‘just’ can also be used as a heteroglossic tool as it can focus attention and thus invite dialogue.

Just is OK for students to use. Teachers shouldn’t use *just*. Teachers JUST shouldn’t do it.

[W]hen [teachers] use *just* it’s kind of an aggressive word. It’s kind of like they just use *just* because they don’t want to explain why it is. They just say, ‘It’s just that.’

The above two utterances come from grade 11 mathematics students who were participating with their classmates in conversations about their language practice over the course of a semester. The aspect of discourse that prompted the most animated discussion was the word *just*.

At first, some of these students expressed concern that when the word *just* implies simplicity it can frustrate students who may not find the process so simple— “And you just change it to two square root five,” for example, which was the utterance that prompted these students’ discussion. The first of the above excerpts comes from a note a student wrote in his workbook to himself about this concern. In the following weeks, other effects of the word were noticed, including the observation represented by the second excerpt above.

These students' exploration of the word *just* was significant because it gave a sense of how they felt about the word and, more importantly, about the classroom dynamics it represented. As illustrated in the above two quotations, they sensed that the word embodied suppression that they felt in their classroom relationships. (For further detail of this conversation see Wagner, in press.) However, this conversation about *just* did not consider actual uses of the word except for the one instance that initiated the discussion. Indeed, these students and their teachers used *just* regularly in their mathematics discourse with no apparent student complaints even while they were mulling over the pain the word could cause.

It may seem somewhat frivolous for educators to obsess about one word to initiate reflective practice, but the vehemence with which the students in the above-described situation asserted the significance of their concerns surrounding the word and their tenacity to sustain conversation about it over two months justifies serious consideration of the word. Perhaps research questions too often arise out of the experiences of educators and thus ignore the questions raised by mathematics students or assume the questions would be the same.

Taking these students' perspectives seriously, we looked for evidence of their concerns in a large corpus of mathematics classroom discourse collected during the 2005-06 school year (section 2 details this body of discourse). The word *just* was the 27th most common word used in this body of classroom interaction (out of 4672 unique words): nine times more common than *multiply*, four times more common than *why*, twice as common as *because*. We asked:

- How is the word *just* used in mathematics classroom discourse?
- What can we learn about the way students and teachers relate to each other in mathematics classrooms by looking at the word's use in practice?

Our framing questions focus on this word *just* in a particular context. Both the conversation with students that prompted this investigation, and the classrooms from which the corpus of analysis was drawn were situated in North America, where *just* is used differently from other contexts, even other English-speaking contexts. This limitation is significant in the quantified description of practice, but does not diminish the importance of the questions and issues raised in the interpretation of the quantified results. It is important for educators in any context to consider how the words they use open or close dialogue. It is not only the word *just* and its (perhaps rough) equivalents in translation that do this.

1. Methodological Frame

Following traditions of critical discourse analysis (CDA), our approach “includes linguistic *description* of the language text, *interpretation* of the relationship between the [...] discursive processes and the text, and *explanation* of the relationship between the discursive processes and the social processes” (Fairclough, 1995, p. 97). Thus we have adopted this approach to organize our findings (section 4): we describe the language phenomena, interpret them in terms of possible meanings, and consider their role in mathematics classrooms. Consideration of possible meanings of language can raise awareness of interpersonal dynamics in mathematics classrooms and quantification can help us recognize common discourse patterns that may help us notice such dynamics in our own discursive practice or in the practices that we study.

As noted by Chouliaraki and Fairclough (1999), CDA researchers need to be aware of the social ‘problem’ that drives and informs their interpretation. Our concern (sense of a ‘problem’) is for mathematics students’ positioning in their classroom discourse, especially the aspects

noted by students in Wagner's (in press) conversations mentioned at the beginning of this article—the students' concern for implications of simplicity and their opportunity for agency, both of which relate to current scholarship in mathematics education. Reform movements may be characterized as a concerted effort to increase student agency (e.g. NCTM, 2000)—getting students to take action with mathematical conjecturing and reasoning. The students' concern for implications of simplicity relates to their sense of identity, their feelings about mathematics, which is known to be a significant factor in learning mathematics (e.g. Hannula et al, 2004).

Both identity and agency relate to our sense of classroom positioning. Identity issues relate to a student's positioning in relation with the mathematics discipline and its human representatives, and questions of agency relate to interpersonal positioning, an aspect of identity—who is authorized to take initiative in the classroom. The word *positioning*, as described by Harré and van Lagenhove (1999), refers to the way people use action and speech to arrange social structures. For example, there are language forms that a teacher can use to structure a social arrangement that resembles the physical arrangement common to many classrooms—students sitting apart from each other beneath the teacher who stands front and centre. Any utterance in a conversation casts participants in certain roles¹ in a known “storyline” (discourse), sometimes attempting to resist the casting set by another participant.

Ellsworth's (1997) ground-breaking work on classroom positioning made it clear that all classroom interactions are as much related to interpersonal dynamics as they are to content development. We consider Yackel and Cobb's (1996) explication of sociomathematical norms, as an example of this: for students the kind of action or agency available to them in mathematics classrooms is part of what mathematics is. For example, Cobb et al (1992) described how mathematics can be constructed as a discipline of tradition called “school mathematics”—a practice of repeating conventional procedures—or as “inquiry mathematics”—a discipline involving conjecture, justification and other forms of reasoning and interaction.

Though all classroom discourse positions students, we argue that some discourse moves are more powerful than others in directing the student's sense of what mathematical action is. Participant students in Wagner's (in press) research found the word *just* especially significant. More general linguistic work (e.g. Aijmer, 2002) on the word supports these students' claim: discourse particles², like *just*, are known to be especially prevalent in speech that is strongly oriented to interpersonal interaction. That the word is much more common in the mathematics classroom than in more general speech (the 27th most common word in our study vs. 54th in Aijmer, 2002) suggests that interpersonal dynamics are perhaps more significant than one would expect in this apparently objective discipline.

Though the traditions of mathematics classroom discourse already position students and teachers in certain ways relative to each other, discursive moves within particular instances of the discourse substantiate, and have the potential to alter, these structures. With our interest in positioning, we find significance in a distinction made by White (2003) in his “appraisal

¹ It is important to note that people who draw on literature related to positioning typically do not use the word “role” in a static way. Roles are always fluid and changing throughout discursive situations.

² Discourse particles are words (e.g., *well, like, just*) that generally do not carry a lot of meaning in terms of content but play important roles in organizing the flow of the conversation and in communicating attitudes and expectations of the speaker.

linguistics,” which draws on Bakhtin’s (1975/1981) notion of heteroglossic interaction as opposed to monoglossic utterances. Heteroglossic communication includes and recognizes the multiple points of view of the individuals involved in a discourse, whereas monoglossic communication represents only one unifying voice. White suggested that linguistic resources can be “broadly divided into those which entertain or open up the space for dialogic alternatives and, alternatively, those which suppress or close down the space for such alternation” (White, 2003, p. 259). The content of speech can invite or suppress expressions of agency, but this can also be done with the form of the speech, which is the medium through which content is indexed.

White’s (2003) interpretive frame has not been applied to studies of the word *just* in general or in specific contexts, but it relates to other linguists’ studies of the word. Aijmer (2002), for example, noted the restrictive nature of *just* when it is used as an adverb. It closes off aspects of potential dialogue. More significant to our analysis, she and others note the power of the word in persuasion. Weltman’s (2003) study of political discourse demonstrated how *just* was used to ‘justify’ the refusal to give explanation. Such refusal defies a strong social expectation identified by Grice (1975): his maxim of quality describes the expectation for adequate evidence. Linguists and others also note less overt ways in which *just* represents closed dialogue. Weltman showed how it represents repression, “nudging the conversation away from certain sensitive matters” (p. 351), and Spruiell’s (1993) consideration of the word in psychoanalysis reminds us that such repression may not always be conscious. Whether the repression is rhetorical or subconscious, there are consequences—dialogue is suppressed.

Our analysis, like the linguistic analyses, addresses the grammatical positions, and the meanings represented by *just*. However, our analysis differs in that it is oriented around one particular pragmatic frame. With our choice to follow White’s distinction between discursive moves that can invite or suppress involvement in dialogue, we focus attention on this ‘problem’ we identify as central to mathematics classroom conversation.

2. Data Sources and Analysis

The data set from which we draw includes 148 classroom observations³ from eight different mathematics classrooms (grades 6 through 10) in seven schools in the U.S. The teachers in these classrooms were purposefully selected to vary gender, context of teaching situation, certification level, years of teaching experience, and so on. They taught in different kinds of communities (rural (n=2), urban (n=4), and suburban (n=2)), with students from varying levels of poverty (free and reduced lunch percentages varied from 12% to over 65%) and in different kinds of schools (e.g., a school where over 65% of the students are achieving well below grade level, a school where all of the students are labelled as talented and gifted). Three of the teachers were working in schools where National Science Foundation-funded curriculum materials, which were designed to embody the vision put forth by the National Council of Teachers of Mathematics, have been used for more than ten years and five were using more conventional curriculum materials. Five of the teachers were female and three were male. Five of the teachers were certified to teach secondary mathematics and the remainder were elementary certified. The number of years they had been teaching ranged from two to 18 years.

³ This data was collected as part of an NSF grant (#0347906) focusing on mathematics classroom discourse (Herbel-Eisenmann, PI). Any opinions, findings, and conclusions or recommendations expressed in this article are those of the authors and do not necessarily reflect the views of NSF.

Each set of classroom observations took place for one week at a time in September, November, January, and March. All classroom observations were transcribed in Transana (Fassnacht and Woods, 2005). For this article, we drew on the classroom observations from January because the classroom discourse patterns were fairly stable by this point in time, and more of the student talk was captured in these observations because higher quality microphones were used as compared to previous observations. The January observation data comprised 184,695 words, which included 931 instances of the word *just*.

Our description of language practice used corpus analysis—the quantification of utterances from a large corpus (body of discourse). Our corpus is reasonably-sized, though smaller than some corpora used by linguists (e.g. Aijmer, 2002). Aijmer noted that corpora of oral speech are typically smaller than written corpora because of the complexities of compilation. Our corpus is larger than the oral corpus analyzed by Tagliamonte’s (2005) investigation of *just* and other ‘discourse particles’ in Canadian youths.

There can be diverse reasons for considering a corpus. Much mathematics education research is based on discourse samples—for example, interview or classroom transcripts, which could be characterized as small corpora. This work, however, typically uses only qualitative research methods, not corpus linguistic software and tools to quantify and examine pervasive patterns in the transcripts. An exception to this is the work of Monaghan (1999), who used corpus analysis to document various uses of the word *diagonal* in the mathematics register in order to support clarity in classroom communication. Our primary interest is to draw attention to alternative, more than it is to document an exact description of the discourse, which is the focus of most linguistic studies of corpora and of Monaghan’s.

Though corpus linguistic scholars and CDA scholars sometimes criticize each other’s work (e.g. Chouliaraki and Fairclough, 1999; Stubbs 1996, 1997), we synthesize these methodologies and use corpus linguistic analysis for CDA purposes—to draw attention to particular instances of language and their socio-cultural contexts to make common discourse practices seem strange and no longer innocent. Kress (1990) called this the ‘denaturalization’ of language. We use corpus linguistic tools to identify patterns in the discourse, and then take examples from the corpus as starting points for critical consideration of classroom positioning.

All the example utterances in this article are drawn from our corpus. We used Wordsmith Tools 4.0, a corpus linguistics software, and simple spreadsheet software to manage the corpus. Wordsmith generates concordances, in which all the uses of a particular word (*just*, in our study) are listed. Figure 1 displays a sample excerpt from our concordancing of *just*. Computer-assisted corpus analysis has been used by Monaghan (1999) to demonstrate the value of the technique, though his orientation was different from ours. He catalogued the various ways the word *diagonal* is used in a written corpus to show how such cataloguing could help a teacher be more clear about defining and using the word.

ody have any questions on it? □ FS: No. □ T: Okay, so I'm	just	gonna go around and around as best as I can, which isn't
we'll talk about surface area and volume in	just	a second. Okay? Alright, ahm, now, if we think about the
radius times the slant height. Okay? So it's got two parts,	just	like that had two parts, they are the base plus the triangles.
r. □ T: Area of a rectangle? □ FS: I'll think about it.	Just	tell me the surface area. □ T: I'm working on it, you gotta hel
For which one are you looking at? □ FS: For any of them. I	just	don't know what the formula is. □ T: Well, what did you do

Figure 1: an excerpt from concordance results searching on ‘just’

We imported the concordance lists into a spreadsheet for inserting codes and sorting. Each instance of *just* was double-coded by a research assistant and one of the authors of this article. Consensus was drawn for each discrepancy. The first question we addressed in our analysis extended the students' discussion about *just* by looking at possible meanings of the word in the range of its uses. This coding typically required going back to the context of the utterances because context was important to considering the meaning of the word.

There are various ways of representing meaning. Instead of describing meaning in each instance by writing about it, we attempted to replace the word *just* with other text to understand the position it occupies. This paraphrasing approach is employed by linguists as well (e.g. Aijmer, 2002), and supports our overall interest in the consideration of alternative language practices. This kind of categorization is not an exact science though. As argued by Aijmer (2002) and others, any instance of the word *just* carries with it a fusion of its range of meanings.

We used Wordsmith to calculate collocations—instances of words that are commonly used together (co-location). Tagliamonte (2005) and Aijmer (2002) have said that collocation tables would be helpful for understanding what kinds of action are being modified by the word *just*. We address their important research agendas in our particular context and find that the words accompanying *just* can give us insight into classroom discourse. We also note some complexities of collocation analysis.

Though analyses such as ours are not commonplace in mathematics education and serious consideration of the word *just* are not prevalent anywhere⁴, linguists who study 'discourse particles' (the class of words to which *just* belongs) compellingly argue the necessity for discourse participants to understand such subtle carriers of meaning. Tagliamonte (2005) made the case strongly by demonstrating that youths are learning how to use the word *just*—as youth age, they use it with increasing prevalence. Furthermore, the word will become increasingly important in mathematics classrooms because successive age cohorts use the word more.

3. Interpretative Frame

Following our CDA framework, our description of the way *just* was used is followed by interpretation of this use in the context of mathematics education. Morgan's (1998) investigation of mathematical writing is probably the most relevant research, as it followed the same CDA framework. In her reflective consideration of the place of such methodology in mathematics education research, she also addressed a challenge we would face in our analysis: it is often difficult to distinguish between utterances relating to mathematics or to directing behaviour. All utterances relate somehow to both. As Morgan (2006, p. 220-221) pointed out,

Every instance of mathematical communication is thus conceived to involve not only signification of mathematical concepts and relationships but also interpersonal meanings, attitudes and beliefs. [...] Individuals do not speak or write simply to externalise their personal understandings but to achieve effects in their social world.

⁴ Studies of *just* are especially difficult to locate because it is a 'stop word' in many electronic research indices: it is ignored in searches. This demonstrates the lack of serious consideration of the word and its role.

Our interpretation also refers more to divergent scholarship that relates to our descriptions of how *just* is used in classroom dialogue. Aijmer (2002) and other linguists point to the strong interpersonal role discourse particles like *just* play. Thus Pimm's (1987) and Rowland's (1992, 1999, 2000) consideration of personal pronouns in mathematics classrooms are significant. Teachers feel justified speaking on behalf of the local classroom community, but students do not share this sense of authority. Pimm (1987) and Rowland (1992, 1999, 2000) have noted that teachers typically use *we* to represent the voice of the larger mathematical community. They represent the voice of the discipline, much like scholars use *we* to show themselves as insiders in their academic disciplines (Mühlhäusler and Harré, 1990). Pimm (1987, p. 73) illustrates a listener's point of view when *we* is used in this normalizing way: "The least that is required is my passive acquiescence [...] I am persuaded to agree to the author's attempts to absorb me into the action". Like the pronoun *we*, *you* can be used as a generalizer, referring to people outside the classroom, as described by Rowland (2000). These pronouns are used this way in diverse environments, but mathematics' attention to generalization makes them especially significant in mathematics classrooms.

The loss of explanation represented by *just* is connected to such generalization too because generalizations typically demand explanation. Related to this, we note that Schleppegrell (2004) illustrated how 'density' is an important distinction of the academic register: much is said with few words. When explanation is foregone for the sake of such density (as is the case with incidences of *just*) then there may be issues for students. The vagueness inherent in non-explanations is certainly different from the kind of vagueness Rowland (1995, 2000) deemed important to mathematical reasoning. Rowland's description of the 'zone of conjectural neutrality' emphasized the importance of vagueness in conjecture, not in explanation of something already known or in the description of process.

With regard to the vagueness of processes, which we will demonstrate as being related to the use of *just*, we will ask what kinds of processes are being obscured. For this, Rotman's (1988) classification of imperatives used in mathematics discourse is important. He distinguishes between 'exclusive' verbs, which describe action that can be done independent from others (e.g., *write*, *calculate*, *copy*), and 'inclusive' ones, which include action that requires dialogue (e.g., *describe*, *explain*, *prove*). Rotman also refers to exclusive verbs as 'scribbler' verbs because they are action oriented, and inclusive verbs as 'thinker' verbs, but the exclusive/inclusive distinction fits our analysis as it indexes more directly interpersonal positioning. However, the scribbler/thinker distinction points to the functional implications of such positioning. Verb choice influences the way people think about and relate with each other.

4. Findings

The following extended excerpt gives a sense of how the word *just* can carry various meanings. To get a sense of our approach to interpreting the ways this particular word is used, the reader might try to find a replacement word or phrase for each instance of the word *just*, and compare the student use with the teacher use of the word.

Teacher: Um, real quickly I want to go over just one type of each problem in case we're still having trouble with them before you take your quiz. Okay. If you would like to write them down to use them as examples if you are still kind of struggling with those that would be, this would be a good opportunity to do that. You don't have to write the problems down to use as examples on your quiz. If you want to just pay attention and participate

that way. Ok? It's totally up to you. If we have a problem that looks like this. Two sevenths times four ninths. How do we go about solving that problem for multiplication of proper fractions? José.

José: Just multiply straight across.

Teacher: Multiply straight across. Do we need to change the second one to its reciprocal?

Student: No.

Teacher: No. That was part of our confusion last time. If it's multiplication just progress straight across. Don't mix up rules. Okay? So you have four times two which is eight. Seven times nine is sixty-three. Is that in lowest terms?

Student: Yep

Teacher: Uh huh. So you have eight sixty-thirds. Don't confuse your rules.

In this excerpt, the word *just* is used four times: three times by the teacher and once by a student. We notice that in some cases *just* is attached to a mathematical reference ("just multiply straight across") and in other cases, *just* is associated with the direction of students' behaviours ("just pay attention").⁵ Here Morgan's (2006) observation about their interconnectedness is helpful. The same word can be used for different purposes, and can relate to multiple purposes.

To help decide what the purposes of the words are, we replace the words with other words that carry the same meaning. In this example, we find it difficult to paraphrase *just* with only one word: in the first line, *just* could be replaced with *only*; in José's utterance, *just* could be replaced by *simply*. In the following sections, we describe in more detail some of the meanings we found associated with the word *just* and argue that both the social and mathematical implications of this word need to be considered by teachers and researchers.

4.1 Shades of Meaning

In the most common usage of *just* in the corpus (28% of its occurrences), it serves as an adverb that seems to be synonymous with *simply*. For example, in José's utterance above, "Just multiply straight across," listeners may hear "*simply* multiply" —it is a simple thing to do. Significantly, this most common shade of meaning is the one to which we referred at the beginning of this article, which dominated student concerns regarding classroom language practice (Wagner, in press). In that conversation about language practice in mathematics class, students said it was acceptable for students to use the word in this way but problematic when teachers did because this usage positions students as relatively powerless. As student agency is suppressed when teachers use *just* in this way, the teacher is positioned as one who authorizes processes or procedures. This suppression relates to the repression described by Spruiell (1993) in psychoanalysis and by Weltman (2003) in politics.

The second most common usage (21% of instances) is relatively synonymous with *only*, as in "I want to go over *just* one type of each problem," from the first line of the extended excerpt. This usage was not discussed by the students who were concerned about *just* and seems

⁵ In this example, the distinction between using *just* for social and mathematical purposes is fairly clear. This is not always the case (Christie, 1995).

relatively innocuous in terms of personal positioning in the classroom. However, many of the instances we coded with this shade of meaning were relatively ambiguous: whether we replace *just* with *simply* or with *only* the utterance makes sense but means something considerably different. For example, “we just do 11 through 29” could mean that it will be simple and unproblematic to complete these problems for homework, or it could suggest recognition of the (perhaps considerable) amount of work in the entire problem set by restricting it to 11 through 29. For this instance, contextual clues led us to code this with the second interpretation, but it is important to be aware that the first interpretation and others were possible for students in this classroom. This is an example of what Aijmer (2002) calls the fusion of meanings. Because it is unclear which is meant, both meanings are in force.

A powerful usage of *just* includes situations that represented varying degrees of frustration (22%), which is a usage that does not appear in the extended excerpt above. A strong degree of frustration can be seen in “Well, you *just don’t* want to have two that are [...] exactly the same lengths.” Here *just* could be replaced with an expletive or an expression with similar meaning: “You really, really don’t want to ...”. In a usage that expressed more mild exasperation, “Don’t look, just put your name down,” *just* might well be replaced with the aside: “do it without asking why.” This usage can also represent gentle encouragement as in “Hit, just hit enter,” which was a teacher’s reply to a student wondering how to do something with his calculator. This utterance is similar to “Trust me. Hit enter and don’t worry about why yet,” but students may read greater exasperation than the teacher intended. Again, these instances are often ambiguous. The teacher telling his student to hit enter could be pleading that this is a simple thing to do, representing the most common shade of meaning. To distinguish among these levels of frustration, interlocutors depend on paralinguistic cues, which may also be read in various ways. Significantly, *just* was used to represent frustration in our corpus, but not as a booster of emphasis as it is in more general conversation practice (e.g. “This is just wonderful.”).

Another seemingly innocuous shade of meaning of *just* is relatively synonymous with *recently* (6% of usages), as in “Four times larger, which is what we *just* found.” Yet again, this kind of use is often ambiguous in meaning. For example, “We just did the reducing before we multiplied,” could suggest that the reducing was unproblematic (synonymous with *simply*), or the word could be pointing at a recent position in time (synonymous with *recently*)—the most recent fraction reduction. Like the usage described in the previous paragraph, attention to intonation is necessary—for example, the teacher could be expressing exasperation for the fact that they recently did something (and may be insinuating that students did not listen).

So far we have described 77% of the instances of *just* we analysed. The remaining instances confounded our coding. Often this ambiguity seemed to be a result of the speaker’s frustration, as in “Oh, I know ... It’s just, as we started this ...” Aijmer (2002) refers to such incidents of *just* as representations of ‘planning’. When a speaker decides to change what he or she is saying, it is common to fill the temporal space with the word *just* before rephrasing an idea. We note that these incidents of planning seem in context to be moments of frustration in mathematics classrooms. The speaker may be struggling to convey a particular idea.

These cases of planning, which represent extreme ambiguity for the audience, in addition to the kinds of instances of ambiguity we have described above, in which we coded a particular meaning based on contextual clues, prompt us to ask, What is the experience of the listener? Listeners judge intentions and meanings quickly and subconsciously most of the time. All these

shades of meaning relate to each other in some way and all the meanings ought to be taken as activated to some extent every time the word *just* is used. In the next section (4.2), we interpret these findings in the context of the classroom dynamic. These interpretations led us to further investigate the corpus, paying particular attention to some of the differences between teachers' use and students' use of the word *just* (see section 4.3).

4.2 *Suppression and Invitation Associated with These Meanings*

When *just* implies simplicity it is a monoglossic tool: it is part of the language repertoire that can be used for excluding contributions that differ from the established norm. It suggests that thought is not necessary, and thus there is no call for others to respond. Such implications are more explicit in imperatives than in statements (indicatives). When *just* is in the imperative, there is a call for performance not reflection (e.g., "Just solve the equation"), and it directs others to follow only an authorized path. In this case, the simplicity-suggesting sense of the word relates to the meaning synonymous with *only*: don't think, only act (or watch/listen). In addition to making reflection seem redundant, *just* positions a reflective listener as incapable: "just/simply solve," suggests that a person who has to think about how to solve the equation is no expert. When it is not an imperative, and thus has a personal subject (e.g., "and then I just solve the equation"), it is less directive, but still significant. In such statements, it is *reflecting*, instead of directing, a monoglossic relationship structure. Such uses suggest that there is nothing to discuss: equation-solving is unremarkable.

When *just* replaces *only* it limits because *only* excludes all possibilities except the one mentioned. However, this is not necessarily a tool for the monoglossic because the speaker refers to distinctions being made, opening up the possibility for others to make a different kind of distinction. Similarly, when *just* can be replaced with *recently* it does not limit possibility. It merely points to a position in time.

Aijmer (2002) referred to the above uses of *just* as 'restrictive adverbs' because of their restrictive or prescriptive role in dialogue. Even though there are shades of meaning, she asserted that "*Just* is never semantically neutral but has an evaluative overlay" (p. 158). In our view, the strongest monoglossic shade of meaning of *just* is the directive: "Do it without asking why," which Aijmer called the emphatic *just*. She wrote, "The task of the emphatic *just* is to stop further discussion" (p. 171). As mentioned above, even the simplicity-suggesting form discourages reflection and personal agency, but 'do it without asking why' is explicit.

Suppressing dialogue, like any suppression, is an act of power. Thus we think educators should ask: Am I suppressing dialogue in my mathematics classrooms and, if I am, for what purposes? To begin to address this question using other educators' practice, we will turn in section 4.3 to distinctions in the form of the text in our corpus. It is important to acknowledge, however, that tools for the monoglossic need not suppress dialogue. Any of these tools can be 'retrospectively dialogic' (using White's term) because fighting against alternative positions can, in fact, draw attention to alternative positions and thus open up reflection and its potential to underpin acts of personal agency. For example, when a teacher said, "Okay, that's just kind of a personal preference. Some people like to solve them vertically...", he was pleading with his students to accept multiple approaches to solving this kind of equation. In cases such as these, the speaker used *just* to say how important an idea or approach was to him, he was begging for complicity, and thus positioned himself as a supplicant and his listeners with power.

4.3 *Participants' Agency in Suppression and Invitation*

Probably the most important distinction to make is between teachers and students as they use the monoglossic tool *just*. Recall the note the student wrote to himself: teachers shouldn't use *just* but students may. When we examined the shades of meaning for *just* in the corpus, we found significance in comparing teacher and student use. Who was closing down dialogue? In the analysed corpus, students and teachers used *just* with fairly equal frequency (students used it once for every 195 words and teachers once for every 196 words).

As in the extended excerpt above, in which the teacher mirrored the student's use of the word *just*, student language choices are also socialized by their teachers' constructions. As explained by Bakhtin (1953/1986), participants use each other's words in any discourse. Though there is much the same about the teacher and student uses of *just*, we begin to see important distinctions when we look at the words connected to *just*.

The Wordsmith software calculates collocations, which tell us which words sit with the word *just* most often. The most frequent L1 collocates (words that appear one position to the left of *just*) for both teachers and students were the personal pronouns, *I*, *you* and *we*. Table 1 displays the top of the collocation chart sorted on L1. 'You just' and 'I just' share the position of being the most common pairing, with 83 instances each. These numbers increase as we include derivatives of these pronouns (e.g., *I'm*) and L2 collocates which allow for forms such as "I am just," in which *I* is two positions to the left of the word *just*.

Word	L5	L4	L3	L2	L1	Total Left
YOU	17	13	16	41	83	170
I	8	7	16	16	83	130
WE	6	3	2	14	46	71
IT'S	2	7	3	2	36	50

Table 1: left-hand collocates of 'just'

The frequency of these personal pronouns was what prompted us to distinguish between teachers and students because these words draw attention to distinctions in role. Limiting to personal pronouns in the L1 position, 35% of teachers' subjects were second person (*you*, *you're*, *you'll*), 41% were first person singular (*I*, *I'll*, *I'd*, *I'm*) and 25% first person plural (*we*, *we're*, *we'll*).⁶ For students 40% were second person (*you*, *you're*, *you'll*), 44% were first person singular (*I*, *I'll*, *I'd*, *I'm*) and 17% were first person plural. In half of the classrooms considered, however, students did not use the first person plural with *just* at all.

The proportional similarity between 'I just,' and 'you just,' for teachers and students may be an indicator of complicity within the discourse. We assume that the teacher exercises more power in this relationship, and that students, who are positioned as novice in the discourse, mimic the form (and content) of their teachers' utterances, but it is important to remember that students carry some power in the structuring of classroom discourse norms. As noted by Tagliamonte (2005), evolution of language practice usually begins with youth.

The strong distinction between teachers and students saying 'we just,' may support the assumption that teachers carry more authority in structural formation of the discourse. Teachers

⁶ Where the percents add to 101%, it is because of rounding.

feel justified speaking on behalf of the local classroom community, but students do not share this sense of authority. Our corpus shows that mathematics teachers use *we* when it is alongside *just* to indicate their role as representatives of the mathematics community, as described by Pimm (1987) and Rowland (2000). The students in our corpus often used *we* too but not in this normalizing way. Rather, they typically used it to refer to themselves as a body of students (juxtaposed from the teacher) or as a group working together.

4.4 Positioning the Classroom Participants

The frequency of personal pronouns preceding *just* also prompted us to attend to the verbs modified by the adverb *just*. In mathematics, processes have significance. What actions and processes are being represented as non-problematic, simple and not requiring reflection? To address this question we looked at right hand collocates. The most common verbs to follow *just* in the R1 position were *go* (12%), *do* (8%), *say* (7%), *have* (7%), *want* (6%), *make* (5%), *write* (4%), *put* (4%), *take* (4%) and *think* (4%).⁷

The most common of these processes are extremely vague. What does it mean when the teacher said, “Just do it one step at a time”? The verb *do* describes action but it could describe any action. His meaning implied that everyone should know what he expected without explanation. Aijmer (2002) would call this an attempt to create common ground, to suggest ‘we all want/understand the same thing.’ This usage could *represent* common ground, or, more likely, it could be used to *establish* or *control* the common ground, which is a much more monoglossic use. The verb *go* was similar, as in “you just go straight across.” *Have* was similar to *do* and *go* as it too seemed to obscure particular processes, but differed from *go* and *do* because it was retrospective, as in “And then we just have three.”⁸ The ‘three’ seemed to have been churned out of some process that was not described.

Many of these *just* + verb combinations condense meaning and make assumptions about what the listener knows or can do. To examine these, we located instances of *just* in the context of talk about mathematics rather than other, nonmathematical topics (e.g., “just wait until the bell rings to go to the washroom”). Table 2 gives a sampling, which demonstrates how the teachers (probably unknowingly) used *just* as a tool for vagueness regarding their processes.

just do	“just do it one step at a time”
just plug	“once we get to multiplication, we just kind of plug straight through”
just progress	“If it’s multiplication, just progress straight across. Don’t mix up the rules”
just remove	“Just completely remove those and not think about them right now”
just use	“If it goes into ten, then we can just use ten”

Table 2: selected right-hand collocates of ‘just’

We asked ourselves whether the adverb *just* along with the verbs it tended to modify was an example of Schlepppegrell’s (2004) description of density as characteristic of academic discourse.

⁷ To compile this list, we grouped verbs in their multiple forms. For example we included with *go* other forms of the word, including *going*, *gonna*, *goes* and *went*.

⁸ The verb *have* can also be a modal auxiliary verb, as in “you just have to look.” In such cases, *just* intensifies restriction and *have* intensifies even further.

Certainly expressions like the ones in the chart above are meaning-laden. A simple, vague expression—“just go”—carried with it many meanings that seemed to be different from the kind of condensation that is sometimes called conciseness.

The less vague common right hand collocates of *just* can be considered in terms of Rotman's (1988) classification of imperatives described in section 3 above. Considering our observations of the monoglossic effect of the adverb *just* we would expect the actions it modifies to be exclusive rather than inclusive. “Exclusive” action does not require the inclusion of other participants and thus supports speech that is not contingent on other participants. Other than the relatively vague verbs *do*, *go* and *have* mentioned above, most, if not all of the verbs commonly modified by *just* were exclusive and thus monoglossic. Because a student can *want*, *make*, *write*, *put* or *take* something independent from relationship, these verbs were ‘exclusive.’ For example when someone says he or she is writing something, there is no call for response or different points of view.

It was more complex to consider the remaining common verbs, *say*, and *think*. *Say* implied audience and may thus suggest inclusivity, but mathematics textbooks construct a model student who ‘says’ things to no one, with their tasks that ask students to ‘say’ how they know something. And what does it mean to *just think*? We have suggested that *just* implied a rejection of reflective thought. An example from the corpus was instructive: “Don’t answer, just think about it.” Here *just* meant *only*, and the instruction was to avoid thoughtless action and to dwell on reflection. Though we might categorize thought as exclusive action because it can be done alone, prompting students to think is certainly not monoglossic.

5. Reflection

This data raises many questions. We see significant potential for further research that investigates particular classroom episodes in greater depth, to identify the use of the word *just* and other tools for monoglossic and heteroglossic purposes in both English-speaking classrooms and others, and also to examine how these language moves relate to the development of mathematical meaning and understanding. However, we caution that such investigation will be necessarily challenging. As we have shown, the power of *just* as a monoglossic tool is in its subtlety. If we, for example, look in depth at the longer excerpt we gave at the beginning of section 4 and the context of this excerpt, we could not possibly say that the students would have expressed more agency if the teacher had not used *just*. The effects of any individual utterance is related to a complex series of classroom (and other) interactions. These complexities underscore the value of the corpus analysis: it exposes prevalent practices to open up possibilities for reflection.

A less significant possibility for further investigation would be to make further distinctions within the corpus—for example, to distinguish between particular teachers’ ways of positioning themselves in relation to their students with the word *just*. We notice that the more questions we ask, the more questions about how the word is used are raised. This draws attention to our intentions. Describing the practice is less important for us than it is for corpus linguists. Our aim is to describe the state of mathematical discourse only to the extent necessary to prompt reflective awareness. We encourage our readers to note the questions our data and interpretation raise, to ask these questions of their own practice and to apply them to classroom research contexts. We are relatively uninterested in saying, “This is how mathematics classroom discourse

is.” Rather, we want mathematics educators to ask, “What is my discourse like?” and “How might I change it to reflect my intentions?”

It is probably evident that we lean toward promoting heteroglossic discourse as opposed to monoglossic discourse. We recognize, however, that particular discourse moves that can be characterized as monoglossic have their place. As we have noted, utterances can be retrospectively heteroglossic, opening up the possibility for dialogue by highlighting one person’s wish to resist other points of view. This can draw attention to the possibility of other points of view and other courses of action.

Furthermore, one of the teacher’s primary roles is to direct attention appropriately. Closing down dialogue in one area opens the possibility for focused dialogue in another. Gattegno (1984, p. 34) noted that such stressing and ignoring is commonplace and he often asserted and demonstrated that these processes are especially important in mathematics. He claimed that stressing and ignoring is in fact the process of abstraction.

There are various alternatives available to a teacher who wants to direct attention to a certain area and away from other concerns. One can say explicitly, “Don’t think about [some thing],” rendering it quite impossible to avoid thinking about the thing. Alternatively, one can employ subtle tools of the monoglossic, like the word *just*, to direct attention away from some processes and thus invite attention to other processes. This kind of subtlety is powerful, as it invites general dialogue focused in a particular way and also because of its potential for structuring a monologic environment in which student agency is suppressed. The power is in the subtlety.

Tools for the monoglossic are especially powerful in environments structured with significant positioning distinctions. Mathematics classrooms are just such places.

Acknowledgment: We thank Lee Gatens for her assistance with the ‘just’ analysis, Michelle Cirillo and Kathryn Skowronski for their assistance in data collection, the participant teachers for allowing us to work in their classrooms, and Sandra Crespo and the anonymous reviewers for their feedback on our earlier drafts.

References

- Aijmer, K.: 2002, *English discourse particles: evidence from a corpus*, Philadelphia: John Benjamins.
- Bakhtin, M.: 1975/1981, *The Dialogic Imagination*, University of Texas Press, Austin.
- Bakhtin, M.: (1953/1986), ‘The problem of speech genres’, in C. Emerson and M. Holquist (eds.), *Speech Genres and Other Late Essays*, University of Texas Press, Austin, pp. 60-102.
- Chouliaraki, L. and Fairclough, N.: 1999, *Discourse in Late Modernity: Rethinking Critical Discourse Analysis*, Edinburgh University Press, Edinburgh, UK.
- Christie, F.: 1995, ‘Pedagogic discourse in the primary school’, *Linguistics and Education* 7, 221-242.
- Cobb, P., Wood, T., Yackel, E., and McNeal, B.: 1992, ‘Characteristics of classroom mathematics traditions: An interactional analysis’, *American Educational Research Journal* 29, 573-604.

- Ellsworth, E.: 1997, *Teaching positions: Difference, pedagogy, and the power of address*, New York: Teachers College Press.
- Fairclough, N.: 1995, *Critical Discourse Analysis: The Critical Study of Language*. Pearson, Harlow, UK.
- Fassnacht, C. and Woods, D.: 2005, *Transana v2.12x.*, The Board of Regents of the University of Wisconsin System, Madison, Wisconsin.
- Gattegno, C.: 1984, 'Curriculum and epistemology', *For the Learning of Mathematics* 4(2), 33-38.
- Grice, H.: 1975, Logic and conversation, In P. Cole and J. Morgan (eds). *Syntax and Semantics 3: Speech Acts* (pp. 41–58). New York: Academic Press.
- Hannula, M., Evans, J., Philippou, G. and Zan, R.: 2004, Affect in mathematics education – exploring theoretical frameworks, In M. Johnsen Høines and A. Berit Fuglestad (Eds.), *Proceedings of the 28th Conference of the International Group for the Psychology of Mathematics Education*, Bergen, Norway, vol. 1, 107-136.
- Kress, G.: 1990, 'Critical discourse analysis', *Annual Review of Applied Linguistics* 11, 84-99.
- Monaghan, F.: 1999, Judging a word by the company it keeps: the use of concordancing software to explore aspects of the mathematics register, *Language and Education* 13 (1), 59-70.
- Morgan, C.: 1998, *Writing Mathematically: The Discourse of Investigation*, Falmer, London.
- Morgan, C.: 2006, 'What does social semiotics have to offer mathematics education research?', *Educational Studies in Mathematics* 61, 219-245.
- Mühlhäusler, P. and Harré, R.: 1990, *Pronouns and People: The Linguistic Construction of Social and Personal Identity*, Basil Blackwell, Oxford.
- NCTM: (2000), *Principles and Standards for School Mathematics*, Reston, VA, National Council of Teachers of Mathematics.
- Pimm, D.: 1987, *Speaking Mathematically*, Routledge and Kegan Paul, New York.
- Rotman, B.: 1988, 'Towards a semiotics of mathematics', *Semiotica* 72(1/2), 1-35.
- Rowland, T.: 1992, 'Pointing with pronouns', *For the Learning of Mathematics* 12(2), 44-48.
- Rowland, T.: 1995, 'Hedges in mathematics talk: Linguistic pointers to uncertainty', *Educational Studies in Mathematics* 29(4), 327-353.
- Rowland, T.: 1999, 'Pronouns in mathematical talk: Power, vagueness, and generalisation', *For the Learning of Mathematics* 19(2), 19-26.
- Rowland, T.: 2000, *The Pragmatics of Mathematics Education: Vagueness in Mathematical Discourse*, Falmer Press, New York.
- Schleppegrell, M. J.: 2004, *The Language of Schooling: A Functional Linguistics Approach*, Lawrence Erlbaum, Mahwah, NJ.
- Spruiell, V.: 1993, The word 'just': an essay on resistance, words, and multiple meanings, *Psychoanalytic Quarterly*, 62, 437-453.

- Stubbs, M.: 1996, *Text and Corpus Analysis: Computer-Assisted Studies of Language and Culture*, Blackwell, Cambridge, Massachusetts.
- Stubbs, M.: 1997, 'Whorf's children: Critical comments on critical discourse analysis (CDA)', *Evolving Models of Language* 7(3), 100-116.
- Tagliamonte, S.: 2005, So who? Like how? Just what? Discourse markers in the conversations of young Canadians. *Journal of Pragmatics* 37, 1896–1915.
- Harré, R. and van Lagenhove, L.: (1999), *Positioning Theory: Moral Contexts of Intentional Action*, Blackwell, Oxford.
- Wagner, D.: in press, "Just go": Mathematics students' critical awareness of routine procedure. *Canadian Journal of Science, Mathematics and Technology Education*.
- Weltman, D.: 2003, The pragmatics of peremptory assertion: an ideological analysis of the use of the word 'just' in local politicians' denials of politics, *Discourse & Society* 14 (3), 349–373.
- White, P.: 2003, 'Beyond modality and hedging: A dialogic view of the language of intersubjective stance', *Text* 23(2), 259-284.
- Yackel, E. and Cobb, P.: 1996, Sociomathematical norms, argumentation, and autonomy in mathematics, *Journal for Research in Mathematics Education* 27 (4), 458-477.