Discursive Psychology and Mathematics Education: Possibilities and Challenges

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Abstract: This paper provides an overview of some of the key ideas of discursive psychology and its theoretical and methodological approach to the analysis of interaction. These ideas include a view of interaction as discursive practice, primarily structured by the social action it performs, rather than by its content. The relevance of this approach to research in mathematics education is demonstrated, drawing on extracts from transcripts of mathematics classroom talk. The paper concludes by considering how discursive psychology may be developed within research mathematics education.

Kurzreferat: Der Artikel gibt einen Überblick über einige zentrale Ideen der Diskursiven Psychologie und ihres theoretischen und methodologischen Ansatzes zur Analyse von Interaktionen. Diese Ideen beinhalten eine Sichtweise auf Interaktion als diskursive Praxis, stärker strukturiert durch die soziale Aktion, die ausgeführt wird als durch den zugrundeliegenden Inhalt. Die Relevanz des Ansatzes für die mathematikdidaktische Forschung wird unter Bezug auf Auszüge von Transkripten aus Gesprächen im Mathematik-unterricht aufgezeigt. Der Artikel schließt mit Überlegungen zur Weiterentwicklung der Diskursiven Psychologie in der mathematikdidaktischen Forschung.

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Introduction

There has been much recent interest in discursive and social perspectives in mathematics education. Such interest reflects a recognition of the complex nature of classroom environments and cultural aspects of learning and teaching (see, for example, Steinbring *et* al., 1998; Seeger *et* al., 1998; Kieran *et al.*, 2001). Given this interest, it is curious that the discursive psychology of Edwards (1997; Edwards & Potter, 1992) [1] and others has not been widely taken up by researchers in mathematics education. The purpose of this article, therefore, is to provide an outline of the perspective this form of discursive psychology proposes. I begin by discussing the theoretical roots of discursive psychology in ethnomethodology and conversation analysis, before looking at some key aspects of this approach. I will illustrate these ideas using extracts of mathematics classroom interaction. To conclude, I briefly suggest some areas in which this discursive psychology may be fruitfully taken up within mathematics education.

Background to discursive psychology: ethnomethodology and conversation analysis

The discursive psychology developed by Edwards and others (see, for example, Potter & Wetherell, 1987; Antaki, 1994; Wetherell & Potter, 1992) emerged in social psychology (which includes research on beliefs, attitudes, group dynamics etc.) as a challenge to prevailing cognitivist approaches in that field. Cognitivism, drawing on a scientific mode of inquiry, led to a social psychology that attempted to model the mental processes that cause human behaviour in social situations. Much of this research was conducted under laboratory conditions, so that the models developed were inadequate for describing or explaining human behaviour in the complex social world outside the laboratory. Much research in social psychology, moreover, did not appear to correspond to how 'ordinary folk' make sense of the social world in which they live (see Edwards, 1997; Edwards & Potter, 1992, for a fuller account). Social psychology, however, was not the first discipline in which such a critique emerged. A similar challenge was raised in sociology during the 1960s, leading to the development of the related approaches of ethnomethodology and conversation analysis. As these approaches form the base on which discursive psychology is constructed, let me outline some key points, focusing on the work of Garfinkel (1967) in ethnomethodology, and Sacks (1992) in conversation analysis.

Garfinkel (1967) argued for a move away from the then prevailing approach to sociological inquiry in which the researcher constructs a theory to explain the data they have available. The key issue here is that it is the researcher who constructs the theory, drawing on previously developed theoretical categories and concepts, such as power, identity or class, for example. Garfinkel contended that the outcome of such work was, in essence, the researcher's understanding of a situation and that the resulting theories and explanations had little to do with the understanding of the participants in that situation. Garfinkel observed that people do generally make sense of the social situations in which they participate. Furthermore, he argued that for social interaction to proceed in some kind of meaningful, orderly manner, the participants show, through their actions, how they make sense of relevant aspects of the situation as they go along. He therefore proposed that researchers could usefully focus on analysing the interpretations that participants display, rather than creating their own.

Sacks' perspective on talk complemented this position. His work concerned the social organisation of talk. Examples of the ordered nature of talk include that in general, only one person speaks at a time, and therefore that participants must take turns to speak. Consequently, talk is in some sense sequential in nature, in that, in taking turns, one turn must follow another. The task that Sacks set himself was not to identify this kind of order, which he acknowledged was apparent to anyone who took part in conversation and which appears to apply in any language (Silverman, 1998, pp. 51-52). Sacks instead set himself the task of explaining how this order comes about and how it makes talk possible. He devoted much thought, for example, to the issue of how turn-taking was organised and managed by participants in talk, and in particular, how turn-taking contributes to how talk makes sense (see Sacks, 1992, pp. 624-632; Sacks *et al.*, 1974). As a simple example, consider the way in which the asking of a question serves to construct what follows as some kind of answer:

"If I ask you a question, I should receive an answer; so anything you say will be taken to be either an answer, or a comment on the lack of an answer: there can be no escape from the expectation that you *will* orientate to what I say. If I say *have you done the washing up?*, your reply will be taken as some comment on the question, whether you like it or not. It might be *yes*, *no* or *not yet*; even if it is *what a rainy day it's been* it still stakes out a position on the matter" (Antaki 1994, p. 69, italics in original).

Thus, the asking of a question provides a context which frames the turns which come next in the sequence, and so contributes to the sense of subsequent turns. Similar arguments can be made for all aspects of talk, including social actions such as requesting, blaming, ordering or greeting.

Both Garfinkel and Sacks examined the social actions conducted in interaction as a basis for their investigation of the organisation of that interaction. Their approach entailed examining how such actions are brought about and treated by participants. Analysis is therefore based on the interpretations participants display through their participation, rather than on theoretical categories introduced by the researcher. The contributions of their respective work is concisely summarised by Antaki & Widdicome:

Garfinkel: "[the] notion that social life is a continuous display of people's local understandings of what is going on" (Antaki & Widdicombe, 1998, p. 1).

Sacks: "[the] insight that people accomplish such local understanding by elegantly exploiting the features of ordinary talk" (Antaki & Widdicombe, 1998, p. 1).

The ethnomethodological position briefly described above, provided a basis for the development of a new approach to social psychological inquiry. Ethnomethodology did not, of course, focus on the kinds of questions typically encountered in social psychology. It should not be seen, however, as a fixed set of rules on how to do sociological or any other kind of research. Rather, it offers a stance, an approach to research, which must be freshly developed and shaped according to each new area of inquiry (Sharrock & Anderson, 1986, p. 61; for an example of an ethnomethodological approach to research on the social organisation of mathematics classroom interaction, see Krummheuer, 1995). Discursive psychology, particularly as developed by Edwards can be seen as a response to this position, which seeks to develop the ethnomethodological stance, via the ideas of Sacks, in psychological directions. In the next section, I will outline the nature of this work. Before doing so, however, let me note some of the points of connection between the preceding discussion and issues in mathematics education.

Although discursive psychology emerged to deal with a critique of work in social psychology, it clearly has the potential to be relevant to work in mathematics education. As in sociology and social psychology, a critique has been put forward in mathematics education, which argues that much research in the field, particularly that derived from cognitive psychology, has an individualist perspective that fails to deal with the social context of teaching and learning. Research based, for example, on

clinical interviews or written test performances provides valuable insights into students' mathematical behaviour. The resulting theories, however, which attempt to model students' mental processes, do not necessarily reflect students' behaviour in classrooms, or in contexts outside of school. Nor do they necessarily reflect the way students and teachers themselves make sense of teaching, learning or mathematics. The increasing interest in what can broadly be called sociocultural approaches to research in mathematics education, such as those cited at the start of this paper, has arisen in response to this critique. Although this body of work includes research taking a discursive perspective, the emphasis has been on theorising discourse and its role in mediating teaching, learning, mathematics and classroom and mathematical cultures. Much of this work fails to provide a rigorous approach to discourse analysis, being largely based on a psychological (e.g. Vygotskian), rather than an interactional theory of interaction (but see Gellert, 2003). An exception may be work from a more semiotic perspective (e.g. Steinbring, 1998; Morgan, 1998), where the problem is more one of forging a link between the semiotic and the psychological. A further methodological issue, which sociocultural approaches have yet to satisfactorily address, arises from the increasingly multicultural nature of mathematics classrooms. Students' interpretations of mathematics classroom interaction relate in part to their different social, cultural and linguistic backgrounds. Analysis of classroom interaction needs to find some way of taking account of this diversity, or it risks imposing a single cultural perspective, that of the researcher. Discursive psychology has the potential to address some of the above issues. In the next section, I set out some of the main features of this approach.

Discursive psychology

Reflecting the conversation analysis perspective, discursive psychology sees discourse as social practice (Edwards & Potter, 1992, p. 15). Thus, interaction can be seen as patterns of activity which take place in and constitute particular social situations. The discourse of school mathematics, for example, is part of the social activity of doing mathematics in school. For discursive psychology, it is discourse which becomes the focus of inquiry (*ibid.*, pp. 16-17), not in order to delineate an abstracted version of one discourse or another, but, in an ethnomethodological move, to explore how discourses bring about the activities they are part of. So, rather than attempting to describe the discourse of school mathematics, the task is to explore how discourse constitutes school mathematics for participants. As with Garfinkel's (1967) move in sociology to examining the interpretations of social situations publicly displayed by participants, discursive psychology aims to explore how participants publicly interpret and construct *psychological* aspects of social situations:

"What we find in everyday talk is...a rich seam of concern about truth and error, mind and reality, memory and perception, knowledge and inference...people casually and routinely construct formulations of such things (perception, knowledge,

inference and so on) as part of everyday discursive practices...” (Edwards & Potter, 1992, p. 17).

Hence, issues of interest to mathematics educators, such as, for example, *knowing*, can be examined from the perspective of participants in interaction, rather than as underlying cognitive processes which can be used to explain what people do and say (Edwards, 1997, p. 60). As Edwards & Potter (1992, p. 17) acknowledge, this is not to say that people explicitly talk about these things. At some level analysts (including Edwards and Potter) must introduce some level of external categorising or labelling, such as, for example, ‘turn’, ‘account’ or ‘question’. It is not possible to remove analysts entirely from their analysis. By focusing on discursive, rather than mental activity, however, interpretation is at the level of public interaction, rather than the private realm of the mind. Thus, rather than attempting to make sense of what people know (in their heads), discursive psychology focuses on how issues like knowing are dealt with by the participants *themselves*. How, for example, do participants discursively construct what they know in particular moments? How do they discursively *reconstruct* what they know as circumstances change, moment by moment?

Before continuing this discussion, let me illustrate some of the ideas I have mentioned so far, for which purpose I will use an extract from data collected as part of my recent research, conducted in the UK (Barwell, 2003). The extract features two students, Cynthia and Helena, aged about 10 years. I have asked the two students jointly to write a word problem or story problem ‘about’ addition and left them to work. Cynthia is a recent immigrant to the UK and has been learning English for about 18 months at the time of this recording. After I left the two students to work, the following exchange took place (for transcription conventions, see [2]):

H   d’you remember it?
C   no
H   it’s/ a word problem is when you know miss writes on/ maths/ when she writes/ a paragraph on the board/ or/ you copy the sentence on the board/ and and and it says/ um/ Mike had something or (Jane) had something you know like that?
C   no
H   well that means/ right say like/ Natalie had/ Natalie went and bought something/ and then/ you know? when miss says that?
C   I can’t remember/
H   for instance// Natalie went to the shops/ she bought three things/ for fifty p.
C   (*very animated*) oh I know now I remember/ the l-/ um/ the/ we=like/ th-the um um som’ing/ som’ing// um// I know what d’you mean but I can’t explain
H   yeah?
C   yeah yeah yeah

This extract exemplifies the ‘rich seam’ (Edwards & Potter, 1992, p. 17) of concern with matters psychological. At stake are issues of remembering, knowing and explaining (what a word problem is) and recounting and interpreting events (in previous mathematics lessons). Running throughout the extract is a concern with meaning, of words, of accounts and of explanations. In analysing this extract, my concern *could* be with what each student ‘knows’ about word problems or ‘means’ by what they say, about what they are ‘thinking’. I could then use these ideas to explain what Cynthia or Helena think a word problem is, and how Helena explains this to Cynthia. This analysis might suggest that Cynthia does not know what a word problem is, or that she does know, but cannot remember. Given that Cynthia is learning English, however, such an interpretation is problematic. Cynthia may very well be familiar with word problems, but not recognise the term. From the perspective of discursive psychology, however, this kind of approach is not admissible. I cannot say what Cynthia thinks a word problem is or whether, for example, she does or does not remember. Indeed, Edwards (1993) suggests that “it is not clear that they [students] ‘really think’ anything, at least not in the sense of carrying around in their heads ready-made explanations that merely await discursive opportunities to be revealed” (p. 219). Instead, I can examine how the two students do the activity of ‘joint remembering’ (Edwards & Middleton, 1986) through talk, how they deal with issues of knowing, remembering or sense-making by constructing thoughts or memories or accounts for particular occasions. Discursive psychology includes two key ideas which provide a basis for such an examination: the foregrounding of social action rather than cognition, and the role of rhetoric in interaction. These two ideas are discussed and illustrated below, and are followed by further illustration drawing on a second extract of mathematics classroom interaction.

Social action
Although the discussion between Cynthia and Helena concerns issues such as remembering and knowing, much, perhaps the greater part, of the patterning of their interaction is not directly related to these concerns. Their discussion is shaped by the systematic social organisation of talk investigated by Sacks (1987, 1992; Sacks *et al.*, 1974) and others. The two students take turns to speak, in this case through a sequence of question-answer pairs which leads to a negotiated expression of agreement. As Sacks showed, these patterns of interaction arise through the social actions of the participants, actions which bring about the on-going organisation of their talk (see Sacks, 1987; Sacks *et al.*, 1974). For discursive psychology, the social action through which interaction is organised takes precedence over other aspects of interaction, so that:

“...the psychological structures and functions of language have been shaped by language’s primary social functions” (Edwards, 1997, p. 84).

This assumption is based on the idea that since human language has evolved as a medium for social interaction, it is this function which shapes the patterns of language use [3]. Hence, although Cynthia and Helena’s discussion clearly concerns psychological matters, we must see their interaction as primarily organised through the social actions their words perform. Edwards & Potter (1992) suggest that such actions might include “describing and reporting interesting events, making plans and arrangements, coordinating actions, accounting for errors

and absences, accusing, excusing and blaming, refusing invitations" (p. 17). In mathematics classrooms, such actions might also include describing, explaining, justifying, conjecturing, refuting or 'having an idea'. In the extract above, we see (amongst other actions) a description of a classroom situation, a giving of an example of a word problem and an account from Cynthia of why she cannot demonstrate the knowledge she claims for herself, "I know what d'you mean but I can't explain". Indeed, the whole exchange can be seen as an act of remembering, where remembering is reconceived as a discursive activity.

To show that interaction in which psychological concerns are at stake is patterned by the social nature of talk is a first step. Emphasising the social, however, leads to certain consequences. In particular, talk is about more than its surface 'content'. Every utterance, for example, also constructs the identity and reflects the interests of the speaker, who may present themselves as, loud or polite, knowledgeable or uncertain, biased or neutral. Each utterance, therefore, reflects the partiality or interest of the speaker (Antaki, 1994, p. 39). These ideas are incorporated into discursive psychology through the notion of rhetoric.

Rhetoric

As a field of study, rhetoric has its origins in ancient Greece, where it concerned 'persuasive argument', particularly in politics or law (Antaki, 1994, p. 152; Billig, 1987). In English, the term continues to be associated with politics, though often in a negative sense, implying more concern with persuasion than argument. In discursive psychology, however, rhetoric may be characterised as the idea that by saying things in different ways, different things are achieved. Rhetoric, therefore, concerns how utterances are put together to suit the social circumstances in which they occur. Claims may be strengthened and alternative claims may be pre-empted and undermined (Edwards & Potter, 1992, p. 154; Edwards, 1997, p. 78). When Helena asks Cynthia 'd'you remember it?', for example, she avoids various other ways of accounting for Cynthia's familiarity with word problems. Alternative accounts might be that Cynthia does not know what a word problem is, that Cynthia is stupid, or that Cynthia is lazy and does not pay attention in class. These accounts are potentially more problematic. Remembering is more conciliatory, since it allows for the possibility that Cynthia does 'know' and merely needs to be reminded. By using 'remembering', therefore, both Cynthia and Helena accomplish a discussion of a particular amicable tenor. In examining how rhetoric works, the key question is 'what does this do?' What does a particular selection achieve that an alternative would not have achieved? What does a particular way of saying something achieve that another way would not?

The selection of what to talk about relates to another concern of rhetoric, that of *accountability*. Accountability concerns how things are constructed as having happened and who is constructed as being responsible (Edwards & Potter, 1992, pp. 165-166). Speakers design what they say to account for why things happened and why people acted in the way that they did, so 'giving sense' to what is happening (Sharrock & Anderson, 1986, p. 56). Much of the time, this entails accounting for their own actions, motivations or intentions (Edwards & Potter, pp. 166-167).

The rhetorical management of accountability is a feature of the discussion between Cynthia and Helena. Consider, for example, how Helena manages the accountability of her efforts to sort out what a word problem is. Helena could have dealt with Cynthia's apparent unfamiliarity with the term 'word problem' in several possible ways. She could have given an example or a definition of a word problem. She could have, in short, behaved more didactically. Such behaviour is often met with resistance, however, unless it is displayed by someone who is qualified in some sense to do so. Teachers can be didactic; students, generally, cannot. The pattern of discussion between Helena and Cynthia is of an almost Socratic question-answer form, with Helena 'revealing' what Cynthia already 'knew'. It appears that Helena is being didactic after all, though without any resistance from Cynthia. This accomplishment is related to the way Helena manages the accountability of what she is saying. Firstly, she constructs the task as one of Cynthia remembering, rather than one of Helena explaining; the agency lies with Cynthia, with Helena supporting her, rather than lying with Helena while Cynthia frustrates. To achieve this, Helena makes a selection of what to say: she talks about the task as remembering rather than anything else. She also comes up with a particular way of saying: she uses a question, as opposed to, say, telling Cynthia that she must remember, or stating that she (Helena) can remember. The use of a question puts the onus on Cynthia to respond (Sacks, 1992, vol. 1, p. 49), thus setting up the question-answer format, with Helena asking the questions.

Accountability is also managed over the three turns in which Helena constructs an explanation of what a word problem is as something *their teacher* does in class. From Cynthia's point of view, this device makes it hard to challenge or undermine what Helena is saying, since it is presented as something their teacher does, and therefore, since the business of teaching is to know about such things as word problems, something correct. Again, the agency of the explanation is shifted, this time from Helena to the teacher. By managing agency in this way, Helena's words also manage the responsibility for both the task of 'remembering' and for the veracity of her explanation. It is Cynthia's responsibility to remember, rather than Helena's to explain, and it is the teacher who is responsible for the description of word problems, not Helena. Hence, accountability is carefully managed through the design of what Helena says. This accountability is organised through accounts of classroom happenings, rather than in terms of a definition or explanation. One observation, therefore, is that the two students make sense of word problems by constructing them as a kind of classroom activity, rather than as an abstract form of mathematical exercise.

A further example

By way of further illustration of the preceding ideas, I will draw on a short extract from a lesson on word

problems. The extract involves the teacher of the class of 9-10-year-olds in which Cynthia and Helena study. The teacher has asked the class to solve a word problem which she has written on a flip chart. The word problem was written by some of the students on a previous occasion. The students' word problem is:

If Malik goes to the shop with £10 and spends his money on a drink 89p, some sweets (10 sweets costing 5p each) crisps (5 packets at 35p each) and pint of milk: 30p How much change will he have?

The extract involves the teacher working on the problem with the whole class and comes from near the beginning of the discussion.

T	so let's see/ if we can just work through this/ and decide what we've got to do/ to get the answer/ so we've got ten pounds/ what does he buy S12? (*Writes £10*)
S12	um/ (he buys) a drink
T	which but hang on what does the drink cost/ S12
S12	um/ eighty nine p.
T	right/ stop there/ what else did he buy Joanne?
Jo	um/ some (sweets)
T	and how much did they cost
Jo	five pence
T	right five pence each/ and how many did he buy/ Vicky?/ so what's the first thing we've got to do with that information/ Cynthia?
Cyn	five times ten
T	five times ten/ find out what the total cost of those sweets is/ five times ten is what S13
S13	forty p.
T	(*rolls eyes*) S13/ five times ten is
S13	Fifty
T	so already (...)/ then what did he buy Cynthia
Cyn	um/ (*stands and reads*) he buy five packs of chips/ thirty five each/(*the questions says 'crisps'*)
T	right/ what do we do with **that** information S14/ you buy five packets of crisps/ and they cost thirty five pence each/ what do you need to do with that information/

In this extract, the teacher uses a variety of rhetorical strategies or discursive practices (see Edwards & Potter, 1992, pp. 160-170) to construct what she and the students know and to manage the accountability of that knowledge.

One strategy that emerges, for example, is the construction of a narrative based around the word problem. This narrative is built around questions asked by the teacher, which draw on the implicit scenario of the problem "what else did he buy", "how much did they cost". What does this accomplish? This use of narrative discursive practices turns the abstract words of the problem into an event which the class can discuss and can potentially construct between them. The point here is that, although word problems feature a basic scenario, they rarely contain any kind of explicit extended narrative. The teacher and students construct a narrative which 'gives' sense to their word problem. The text of the word problem is therefore treated as interpretable.

A second strategy treats the word problem text in a different way. The 'facts' on which the participants' narrative is based are derived from the word problem. These facts are treated as objective. The teacher invites the students to locate specific facts in the text and report them to her. One of the effects of this objectification is to transform a problem written by students in the class into a generic word problem. Although the information given in the problem was made up by some of the participants in the discussion, the agency of the authors is masked. There is no possibility, for example, of these students changing any aspects of their word problem. By objectifying their problem, the teacher freezes their ideas into something that can be solved but not altered. Treating word problems in this way is a recognisable aspect of the discourse of word problems (see Gerofsky, 1996).

As well as the narrative constructed from the word problem scenario, the participants also create a narrative of solving the problem. This narrative becomes explicit when the teacher asks "so what's the first thing we've got to do with that information", and continues, "find out what the total cost of those sweets is". This narrative serves to present an explicit thought process on the part of the teacher. Making thought processes explicit in this way, often makes them accountable. Other participants can hear the moves proposed and can accept or challenge them and offer alternatives. In this case, however, the situation is more complex. Within the discourse of this mathematics classroom, different roles point to different entitlements (see, for example, Antaki & Widdicombe, 1998; Edwards & Potter, 1992, p. 160). The teacher, for example, guides the construction of the solution through the questions she asks. These questions and the resulting solution narrative are accepted by the students; as a teacher she is entitled to work in this way. Thus although making reasoning explicit makes it *potentially* accountable, the students cannot easily challenge the reasoning that the teacher is offering. They can only respond to the questions she asks. This asymmetry of entitlement is apparent in an exchange later in the sequence when the teacher invites a student to explain how she worked out a solution to the same problem:

S18	okay/ first of all I did eighty nine (add fifty) that equals
T	(*using calculator*) um a hundred and thirty nine
S18	yeah/ a hundred and thirty nine/ then I added/ then I added/ one pound seventy five to it/ then
T	three hundred and fourteen
S18	(...)//
T	can I just stop you there
S18	I done it all wrong

The teacher is able to interrupt the student, which the student takes to be prefacing a criticism of her explanation (not actually the case). The student's response suggests that when a teacher interrupts a student, it is challenge or criticism which may be expected to follow, at least in this class. Such challenges are much harder for students to do to the teacher.

My brief discussion of the preceding extracts of

mathematics classroom interaction illustrates the application of some of the ideas of discursive psychology. I highlighted three rhetorical strategies apparent in the interaction, drawing on narrative practices, objectification and entitlement. These different strategies manage the accountability of the various participants as they work towards solving the word problem. The students contribute ideas to the word problem narrative, but can only base their ideas on facts extracted from the word problem text. The teacher draws on facts extracted by the students to begin to construct a solution to the problem. She makes her reasoning explicit, and so apparently accountable. This accountability is undermined, however, by the different entitlements of teacher and students with regard to challenging the reasoning of others. It is easier, even expectable, for the teacher to challenge the students; more difficult for students to challenge the teacher.

Discursive psychology, then, offers both a theoretical perspective in interaction and an approach to the analysis of classroom discourse. I have outlined two key features of this approach, the foregrounding of social action and the role of rhetoric in interaction. I have illustrated these ideas using two short extracts of mathematics classroom interaction. In the next section, I conclude by briefly considering how discursive psychology might be taken further in mathematics education.

Discursive psychology and mathematics education: possibilities and challenges

I have argued that, although mathematics education has responded to critiques of cognitivist research through the development of sociocultural approaches to research, this approach still has a number of weaknesses. These include a need for a more thorough approach to the analysis of classroom interaction, as well as a need to address the challenges presented by the multicultural nature of contemporary mathematics classrooms. Discursive psychology offers an approach to the investigation of psychological topics, such as those concerning mathematical thinking, understanding, attitudes or beliefs, through an analysis of interaction that is grounded in the discursive practices of participants, rather than models of individual cognition constructed by the analyst. Thus, rather than moving from an analysis of interaction to a model of what and how students think mathematically, analysis examines how mathematical 'thoughts' are constructed in interaction, and what these 'thoughts' in turn bring about. This approach begins to deal with the challenge presented by multicultural classrooms, since its analyses are grounded in what participants do, rather than in what their words and behaviour might tell us about what they mean or think. I can see, for example, that Cynthia accounts for not being able to tell Helena what a word problem is, by claiming that she *knows* what a word problem is, but is unable to explain, so that she presents her difficulty as one of linguistic proficiency. As 'knowing' is usually associated with being able to give some explanation or example, Cynthia's account manages to avoid positioning her as ignorant. This kind of analysis does not rely in me needing to say whether either Cynthia or Helena *really*

knows what a word problem is, and therefore avoids the need for problematic interpretations of Cynthia's contributions, situated as they are in a cultural experience very different from my own.

The discursive psychology approach is perhaps particularly well suited to the investigation of issues related to its home field of social psychology. The mathematics education literature contains, for example, many studies of teachers' or students' attitudes or beliefs about mathematics, teaching and learning. Much of this work attempts to relate models of belief structures to classroom behaviour (see, for example, studies in Pehkonen & Torner, 1996). Tackling this relationship is precisely the issue which proved problematic in social psychology, and for which discursive psychology was developed to investigate. The approach, in this case, would entail examining how attitudes or beliefs are constructed in classroom interaction, say, as discursive practices rhetorically designed for specific situations (mathematics lessons, family talk, research interviews etc.). The focus of analysis would, therefore, shift to the kinds of things attitudes and beliefs about mathematics, for example, are used to do in mathematics classrooms or elsewhere (see Gellert, 2001).

The application of discursive psychology to research in mathematics education is not without its challenges. One, in particular, strikes me as crucial. Discursive psychology is based on an explicitly relativist epistemological position (Edwards *et al.*, 1995). Relativism is likely to make mathematicians uncomfortable. There is, however, already a tension in discursive approaches to research in mathematics education, centred around the nature of mathematical discourse and mathematics itself (see, for example, Moschkovich, 2003). The development of discursive psychology in mathematics education can only be possible if it is accompanied by a relativist conceptualisation of mathematical knowledge. Indeed, the same shift in focus that I have described above would apply. Rather than investigating what mathematical knowledge is, or what mathematics students or teachers know, the task becomes one of examining how mathematics and mathematical knowledge both constitute and are constituted by the discursive practices of participants. Addressing this challenge is likely to provide an important new perspective on the nature of mathematics in a wide range of situations.

Notes

1. The term 'discursive psychology' has been used to refer in a general way to discursive approaches to investigating psychological questions in mathematics education, particularly those derived from socio-cultural frameworks. See, for example, Lerman, 2001.
2. Transcription conventions: / is a pause < 2 secs. // is a pause > 2 secs. (...) indicates untranscribable. ? is for question intonation. ( ) for where transcription is uncertain. T is the teacher, Sx, where x is an integer, is an unnamed student.
3. The idea that the social organisation of talk takes precedence over the organisation of its content is supported by studies of the social origins in infants of various aspects of language use, such as those by Bruner (1983), Halliday (1975) and Wertsch (1985).

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