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## CULTURAL, DISCURSIVE PSYCHOLOGY: A SOCIOCULTURAL APPROACH TO STUDYING THE TEACHING AND LEARNING OF MATHEMATICS

**ABSTRACT.** From a sociocultural perspective an object of research on mathematics teaching and learning can be seen as a particular moment in the zoom of a lens. Researchers focus on a specific part of a complex process whilst taking account of the other views that would be obtained by pulling back or zooming in. Researching teaching and learning mathematics must be seen in the same way. Thus in zooming out researchers address the practices and meanings within which students become school-mathematical actors, whilst zooming in enables a study of mediation and of individual trajectories within the classroom. In each choice of object of research the range of other settings have to be incorporated into the analysis. Such analyses aim to embrace the complexity of the teaching-learning process. This article will present a cultural, discursive psychology for mathematics education that takes language and discursive practices as central in that meanings precede us and we are constituted within language and the associated practices, in the multiple settings within which we grow up and participate.

**KEY WORDS:** cultural discursive psychology, learning theories, research in mathematics education, social practice, Vygotsky

### INTRODUCTION

Researchers in mathematics teaching and learning draw on a range of intellectual resources for explanations, analyses and curriculum designs. The structures and meanings of mathematics (including historical and epistemological studies) and the methods and insights of psychology (especially constructivism) have provided rich theoretical fields for the mathematics education research community. They have not, however, enabled us to engage with schooling as reproduction, nor with culture or power, as they are manifest in the mathematics classroom. Sociology, anthropology and cultural studies provide intellectual resources to address these issues, and they have had their effect on psychology (e.g. Cole, 1996; Harré, 1995; Wells, 1999). In mathematics education, the last few years have seen a growing body of studies drawing on these resources (e.g. Dowling, 1998; Cooper and Dunne, 1999; de Abreu, 1998; Saxe, 1991; Nunes, Schliemann



and Carraher, 1993; Lerman and Tsatsaroni, 1998; Evans, 2000; Adler, 2001; Lerman, 1998a) (for a more developed analysis see Lerman, 2000b).

In this article I will first describe some of the theories underpinning the move in psychology over the last decade or so to one which is fully cultural and focused on the way in which consciousness is constituted through discourse. I will argue that social practices are discursively constituted, and that people become part of practices as practices become part of them (Lerman, 2000b). Although I will return to this several times in the article, I want to emphasise here that “discourse” is to be taken to include all forms of language, including gesture, signs, artefacts, mimicking, and so on. If one focuses on learning in social practices and the manner in which the physical and cultural tools mediate learning, through all these forms of language, we can speak of ‘discursive practices’.

In the second part I will focus on learning. Rather than seeing social factors as *causative* of learning, they can be seen as *constitutive* (Smith, 1993). Learning is about becoming, it is about participation in practices (Wenger, 1998). But people react differently in those practices, and perform their own trajectories through them. In arguing that people are discursively constituted the individual does not disappear; instead, the notion of individuality requires a reinterpretation. In this sense, I want to make it clear that there are a number of approaches to psychology as it relates to education. I find the perspective outlined in this article and well supported in the literature as the most persuasive and powerful, as well as fruitful for research, but other perspectives are also clearly well supported in the literature. The contrasts between sociocultural theories and individualistic ones have been well debated (e.g. Lerman, 1996; Steffe and Thompson, 2000; Lerman, 2000a) and have highlighted the contribution of each. Whilst a complementarity between some of these perspectives is sought by some (e.g. Sfard, 1998), I will take the view that many of these theories present their own world-view in terms of their understanding of human activity and consciousness and therefore notions that are familiar in one setting may need to be redefined in another. As I have argued elsewhere (Lerman, 1996, 2000a) incompatibilities lurk in incautious complementarities. I will, therefore, be advocating a particular view, that of a cultural, discursive psychology, towards which I have been working over a number of years (Lerman, 1998a, b), and not attempting to reach a complementarity with other theoretical frameworks, in particular individualistic psychologies, but I recognise that this is just one possible perspective.

Cobb and colleagues (e.g. Cobb, 2000) have developed what they see as an alternative approach, one that incorporates both psychological and sociocultural theories in a reflexive relationship. “. . . Each perspective con-

stitutes the background against which mathematical activity is interpreted from the other perspective” (p. 64). The distinction is described as being about ‘grain size’, which has some similarities to the zoom metaphor that is employed in this article. The danger of their perspective, from my point of view, is that the social context, in the way they see it, cannot account for the forms of behaviour and activity of the individual, except in the important but superficial layer of classroom social norms (and socio-mathematical norms). ‘Superficial’ here is to be taken to mean the upper surface or layer of positioning in the classroom. Class, gender, ethnicity, race and other dimensions of identity seem to disappear with an appropriate social environment in the classroom. In this article I am arguing that we need an integrated account, one that brings the macro and micro together, one that enables us to examine how social forces such as a liberal-progressive position, affect the development of particular forms of mathematical thinking. I suggest that neither complementary nor emergent views can achieve this integration. In section 1.4 below I discuss a unit of analysis, from a largely Vygotskian position, that attempts to integrate the macro and the micro, and in section 2 I discuss the work of Basil Bernstein who offers an integrated sociological analysis.

In the mathematics classroom, interactions should not be seen as windows on the mind but as discursive contributions that may pull others forward into their increasing participation in mathematical speaking/thinking, in their zones of proximal development. Vygotsky’s zone of proximal development is both a framework for the analysis of learning and a metaphor for the learning interaction. Elsewhere (Meira and Lerman, 2001) we have called it a symbolic space. I will outline a set of theoretical tools for the analysis of classroom interactions, drawing on this section. Readers can find initial attempts at such analyses in Lerman (2000c, 2001)

## 1. DISCURSIVE, CULTURAL PSYCHOLOGY

In the nineteenth century Durkheim and Marx challenged the image of the individual as the source of sense making and as the autonomous builder of her or his own subjectivity. Consciousness was to be seen as the result of social relations; in particular, relations to the means of production.

It is not the consciousness of men that determines their being but, on the contrary, their social being that determines their consciousness. (Marx, 1859, p. 328/9)

Vygotsky’s psychology was an application of Marx’s theories to learning, providing a framework whereby the sociocultural roots of thought become internalised in the individual.

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