VALERIE WALKERDINE

# The Mastery of Reason

## COGNITIVE DEVELOPMENT AND THE PRODUCTION OF RATIONALITY

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# The Mastery of Reason

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Valerie Walkerdine, 1988

'Modern man likes to pretend that his thinking is wide-awake. But this wide-awake thinking has led us into the mazes of a nightmare in which the torture chambers are endlessly repeated in the mirrors of reason. When we emerge, perhaps we will realize that we have been dreaming with our eyes open, and that the dreams of reason are intolerable. And then, perhaps, we will begin to dream once more with our eyes closed.'

(Paz 1985: 199)

# Contents

# 1 Introduction

In the last twelve years or so developmental psychologists have been concerned with 'the social' and its relation to the production in children of language and reasoning. The term 'context' has often been used to understand and explain the way in which children's thinking has a social dimension. In this book I shall be concerned with these issues. What I set out to demonstrate is a way in which we might approach the social production of language and thinking.

Perhaps the greatest body of work on the matter of children's thinking is the genetic epistemology of Jean Piaget. The task in the early to mid-1970s seemed to be how to graft 'context' onto the fundamental insights that Piaget offered. Empirically many hours were spent demonstrating that Piaget was wrong here or there, that children were faster, slower, cleverer, or whatever than he had suggested, that he neglected this, that, or the other. I shall not now rehearse the exhaustive list of such work. What I want to write about in this book is, rather, how a different account and theoretical framework might be possible to account for and interpret data on children's linguistic and cognitive development.

While British developmental psychology struggled with 'context' in the mid-1970s, European social theory was taking a different turn. In the wake of the events of May 1968 much work had gone into developing theories of ideology and subjectivity which extended and critiqued basic Marxist notions of ideology. Why should this be relevant for developmental psychology? Piaget's work is part of a 'realism' which treats the material world as knowable. Marx's classic theory of ideology, too, treated the material world as knowable, but as distorted, seen as in a 'camera obscura' because of the effects of ideology, or through a 'false consciousness'. Piaget, like Marx, built upon a scientific realism, linking back to the rise of science from the seventeenth century and to the nineteenth-century work of Darwin.

What later work began to question was the relation of the material to the social – was the latter simply a layer distorting, or was it productive,

in Louis Althusser's (1971) terms, 'relatively autonomous', it could be scrutinized as productive in its own right. Thus, complex and detailed analyses of 'representations', of cultural and ideological practices, of the media, of texts, began to be produced. This is important in several ways.

This work drew upon psychoanalysis, linguistics, and semiotics to examine how texts and cultural and ideological practices operated. Ultimately it depended on the formative linguistics of Saussure (1974) but with, as we shall see, many important modifications.

Saussure took for granted that people must engage in the production of signs. His interest was, of course, not to analyse this process, but theoretically to formulate the object of linguistics as part of an envisaged science of signs in general. Accordingly, he consigned investigation of the process to the province of the psychologist, even though many of his explanations of linguistic phenomena rely upon assertions about psychology. Saussure's work has left its mark on the whole of semiotics and much of linguistics. But the fundamental problems which might have been posed by his remarks on the psychological aspects of the sign have not been addressed directly, at least not by developmental psychology. Those in the field of language acquisition have tended to devote their interest to the investigation of the linguistic sign system: to the acquisition of grammar or semantics, while the semiologists for their purposes have taken for granted that a sign system can be 'read' and that people's facility to do this can be assumed. For Saussure the sign is constituted by the unifying of the signifier and the signified. This is commonly presented schematically as a 'fraction':

$$\frac{\text{signified}}{\text{signifier}}$$

Or more specifically, and in relation to phonological signifiers:

$$\frac{\text{concept}}{\text{sound image}}$$

Saussure is credited with recognizing the importance of the fact that the relationship between the signifier and the signified is arbitrary; that is to say, conventional rather than necessary. If this is so, what unites the signifier and the signified to produce the sign? And what guarantees that they will be united to produce the sign? And what guarantees that they will be united to produce signs in accordance with convention? To answer the last question Saussure invoked the 'collective mind'. For the

first he assumed that in the production of the sign the signifier and the signified were united by a simple association in the mind:

> Both terms involved in the linguistic sign are psychological and are united in the brain by an associative bond.
>
> (Saussure 1974:75)

Saussure was writing seventy years ago, but we may presume that in our time none of these questions has been satisfactorily answered. Yet the questions, in essence, remain and may be fruitful for developmental psychology. For example, how do children come to read the myriad of arbitrary signifiers – the words, gestures, objects, etc. – with which they are surrounded, such that their arbitrariness is banished and they appear to have that meaning which is conventional?

Posing the question in this way potentially avoids the dichotomizing 'cognition' and the 'social context'. Rather than constituting cognition and context as two phenomena, the relations between which must be analysed, even if they are not conceived of, discretely, it becomes in principle possible to ask how what is described as 'thought' is constituted in terms of and in relation to a system of signs, which by definition are social.

Piaget's formative influence upon developmental psychology may have pre-empted the raising of this question in relation to intellectual development. His reading of Saussure – and Pierce – in his presentation of the semiotic function rules the question out of court. For Piaget the relationship of signifier to signified is one of representation; the semiotic function:

> consists in the ability to represent something (a signified something: object, event, conceptual scheme, etc.) by means of a signifier which is differentiated and which serves only a representative purpose.
>
> (Piaget, quoted in Gruber and Voneche 1977:489)

Although this view grants to the semiotic function a major role in raising thought to a representational level, it sees the signified as arising extra-discursively, from the general co-ordination of actions which form operational structures which themselves arise outside of any relationship to systems of signs. Within this view it must, for example, be the case that mathematical signifiers (e.g. 1, 2, 3 . . ., +, −, etc.) represent schemata (signifieds) whose origin lies *not* in the subject's relation to a system of signs as a social phenomenon, *but* ultimately in the coordination of actions whose function is successively to equilibrate the

subject (as a biological entity) and its environment. The picture is clouded by Piaget's idiosyncratic use of semiotic terms. For example, he gives the name 'sign' to what Saussure would call an unmotivated signifier:

> Broadly speaking, the semiotic function gives rise to two kinds of instruments: *symbols*, which are 'motivated' – that is, although they are differentiated signifiers, they do present some resemblance to the things signified; and signs, which are arbitrary or conventional.
>
> (Piaget, quoted in Gruber and Voneche 1977:492)

It is clear, at least, that although Piaget shares Saussure's terminology, he does not share his ideas.

The problematic relation of *signifier* and *signified* to produce a sign is central; that is, if sign systems are social phenomena, might their systematic nature be 'relatively autonomous' from the objects they are taken to represent? Within European Marxism this questioning led to a split in the kinds of work being undertaken – that analysing sign *systems* (texts, media, etc.) and that working on more classic approaches to the 'people's experience' (see, for example, Samuel 1983). Is everything after all ideology? Are we only in the realm of the signifier or is there a determining materiality? It has been amply asserted that the post-modern era is one in which 'reality' ever eludes us, in which 'real objects' which never exist can be created in all their perfect detail on the screen of a computer.

The French psychoanalyst, Jacques Lacan, asserted the primacy of the signifier over the signified, transposing Saussure's fraction. Others (for example Hirst 1976) argued that since we could not know the material world except through discourse then it was the arena of the discursive which was to be studied. All of this suggests important ways in which we might utilize such insights to go beyond the initial formulations of Piaget and the attempts to graft on context.

But there is more. This introduction glosses over a whole other body of work and developments from the 1970s. The aim here is simply to introduce the kinds of concepts which will be utilized in the analysis of the empirical work. This is not intended to be a theoretical presentation. The latter is contained elsewhere (for example, Adlam *et al.* 1977; Henriques *et al.* 1984). However, it is important to mention post-structuralism, particularly the work of Michel Foucault, as his insights are evident in the kind of analysis which I attempt.

To introduce this, let me return to Piaget. His work developed in the context of evolutionary biology and a concept of nature which presents an object world as an environment to which the organism successively adapts itself. Piaget was deeply politically committed to the eradication of war and, like many of his contemporaries, found in the popularization of Darwinism a determinism about the inevitability of war, of competition, which he abhorred. His project concerned the possibility of the triumph of reason over emotion through stressing the naturally adaptive processes of organisms; Piaget felt that the animal passions would be left behind to found a better world in reason. This view was shared by many liberal and progressive thinkers who envisaged the possibility of a rational and democratic society, operating upon free will and reason. The stress on natural reasoning and its importance today must be understood in those terms.

Piaget founded his work on the idea of a set of universal, basic structures. Others, like Saussure and Lévi-Strauss, also used structural notions. The 1970s work on ideology, particularly that utilizing the work of Althusser and Lacan, was structuralist too. The post-structuralist work of Foucault allows us to engage with the production of sign systems, but not as universal, trans-historical systems, but as specific historically generated bodies of knowledge. Not only that, but modern scientific accounts, like Piaget's, can be understood as implicated in the production of our modern form of government – the democratic government of reason. Foucault goes beyond the idea of ideologies as relatively autonomous, as sign systems, to discourses which produce a truth, which claim to be an account of 'the real'. Thus the remnants of the idea of a potentially truthful science and a distorting ideology, still present in Althusser, are moved beyond in Foucault. For me, the importance of this work lies in the way in which actual social practices may be discursively regulated by the production of 'truths', 'knowledges' about children, for example, which claim to tell the truth about child development. These produce the possibility of certain behaviours and then read them back as 'true', creating a normalizing vision of the 'natural child'. Here, the sense of materiality is vital, but it is never comprehensible outside bodies of knowledge, which claim to tell a truth. For Foucault this 'truth' is powerful because it is precisely what regulates citizens in the democratic order. The scientific truth about children's reasoning has become a very powerful tool indeed in pedagogic practices,

especially in early education. By producing 'natural reason', it is felt that the government by reason, of reasonable people, is assured. But if the 'natural reasoning' is itself a 'reading', a 'truth' produced in the regulation of actual children, the place of Piaget's vision, his work, and the take-up of his ideas, take on a quite different complexion (Walkerdine 1984, 1986a; Walkerdine and Lucey, in press).

In calling this book *The Mastery of Reason*, I am questioning the confident assurance of mastery over the physical world, the idea of independent autonomy, of rational government, and all that goes with it. I have chosen to examine children's reasoning by focusing upon the production of pre-school and early school mathematics. For Piaget, and for many in early education, mathematics *is* reasoning. Logico-mathematical structures are the structures of rational thought. To develop 'mathematical concepts' in children carries the supreme task of creating reasoners and all that that entails. By focusing on mathematics, then, I am able to prise apart both the current psychological and pedagogic 'truths' about children's learning and to suggest other possible 'readings'. I will argue that mastery is a fiction shakily and scarcely achieved, and then only at great cost. The easy assertion of the government of reason covers over both its sociality and the unconscious lurking beneath.

**Mathematics as reason**

> Professor Whitehead said 'Every child should experience the joy of discovery'. We can say, with complete assurance, every teacher who embarks on a programme which will enable children to make their own discoveries will share to the utmost their children's enjoyment of mathematics and their increasing confidence in their powers.
>
> (Schools Council 1965:124)

Joy in discovery, pleasure in order; not pleasure in other less rational matters, but love and pleasure in ideas. The rational dream sought to produce children who would become adults without perverse pleasures. These are the hopes invested in the power of reason and in mathematics teaching.

Current practices of mathematics education depend heavily on their inscription in the wider body of discursive practices which can be described as child-centred. I began the basis of a genealogy of child-centred practices in an earlier publication (Walkerdine 1984),

to which the reader is referred for more detail. Central to my analysis was the examination of a shift in practices from an overt form of regulation of the population to a covert form. That is, at the end of the nineteenth century it was overt and obvious surveillance which was felt important to produce correct 'habits' and thus a population freed from criminality and pauperism, the twin problems in the social body. These became surmounted by a new set of practices which counterposed covert to overt regulation. The new practices were premised upon a set of discourses concerning the 'nature of children'. Although the centrepoint of such discourses was the production of a 'freedom' premised upon enabling the possibility of a natural sequence of development, I attempted to demonstrate that such practices themselves produced the regulation of what natural child development meant, that is, they created a regime of truth within which readings were made and therefore what counted as correct was both made possible and validated. This took place within a specific set of historical conditions when the concern about producing a self-regulated citizen was paramount within the technologies and apparatuses which made up the practices of government and administration (Walkerdine 1986a; Foucault 1979b). I shall not elaborate on that here. Rather, I want to examine child-centredness as it was established within mathematics education and the regulative practices which were therefore established, and how certain figures, namely 'the child', and certain steps, such as 'stages of cognitive development', figured as signs within the relations of the regulation of the practices themselves.

An overview of changes in mathematics education since the late 1950s, of the aims of the changes and how far these aims have been realized, has been provided by Howson (1978). Like most commentators, Howson sees the Mathematical Association's Report, *The Teaching of Mathematics in Primary Schools*, published in 1956, as a catalyst in initiating far-reaching changes in early mathematics education. He says:

> It was a remarkable forward-looking document which expressed very clearly the point of view which was to dominate national thinking on primary education during the next twenty years.
>
> (1956:24)

This point of view is encapsulated in this often quoted extract from the Report:

> Children, developing at their own individual rates learn through their active response to the experiences that come to them; through constructive play, experiment and discussion children become aware of relationships and develop mental structures which are mathematical in form and are in fact the only sound basis of mathematical techniques. The aim of primary teaching, it is argued, is the laying of this foundation of mathematical thinking about the numerical and spatial aspects of the objects and activities which children of this age encounter.
>
> (1956:v, vi)

As a guiding principle in mathematics education this view was quite new. Indeed, it represented a complete change of emphasis from the original intentions of a committee which would have produced a report in the 1940s had not the Second World War intervened. That committee would have drawn up a curriculum and specified which mathematics should be taught to children of different ages. Instead, the Report which finally emerged advocated treating children as individuals, guiding their responses to everyday experiences and constructive play, and fostering the development of appropriate mental structures.

In primary education as a whole, however, this view was not entirely novel. Many of the ideas it expresses, particularly the notion that children learn best through activity and experience, had been developed and put into practice in the so-called 'progressive' schools which had been established, mainly in the private sector of education, between the two World Wars. Other areas of the curriculum were already treated as 'activities' and the Mathematical Association's Report should be seen in the context of a more general incorporation into the state educational sector of many of the ideas which had been developed earlier by the 'progressive' movement.

The Report evoked a good deal of national interest and, following its publication, considerable efforts were made to ensure that its message was heard. Various methods were used and had the effect of disseminating the Report's recommendations and encouraging the teaching profession to put them into practice. A most notable advocate was Miss Edith Biggs, an HMI who directed numerous courses for teachers, and produced the first Schools Council Curriculum Bulletin, *Mathematics in Primary Schools* (1965). The provision of new materials and in-service training for teachers on a large scale was

undertaken by the Nuffield Mathematics Project, through the production of a multitude of teachers' guides, and the setting up of courses at what have now become local authority teachers' centres. The Nuffield project limited itself to the provision of ideas for practice which the teacher developed and modified for her own classroom use. The curriculum scheme, *Mathematics for Schools*, later developed by Harold Fletcher and produced on a commercial basis, provided not only teachers' guides but also a series of graded workbooks for classroom use. These are only two of numerous books published directed at teachers of young children. Not all these schemes, projects, and publications were formally tied to the Mathematical Association's Report, but they followed from it historically and all embodied its spirit: they shared what Howson called its 'forward-looking point of view'.

I shall argue that the 'truth' about children's 'mathematical development' is produced in classrooms, and that all learning can be understood as taking place within social practices in which the relation between signifier and signified is constantly problematic.

The analysis opens, in Chapter 2, with an examination of the production of certain 'mathematical' relational terms in spontaneous speech data, recorded in the homes of young children. It attempts to move away from the idea of 'universals' of semantic development, towards a view of meanings generated in the regulation of practices. Chapter 3 goes on to explore the production of 'size' and 'family' terms in classrooms and in an experiment, analysing both in relation to discursive practices. Chapter 4 explores these issues further by examining their production in home practices. Chapter 5 examines out-of-school practices in which so-called 'mathematical signifiers' are produced, but argues that these are not the same signs as those in school mathematics. The analysis is extended in Chapter 6, where the transformation of non-mathematical into mathematical discourse is explored. In Chapter 7 more home and classroom examples are analysed to demonstrate the problems with notions of 'experience' and simple transfer from one context to another. The achievement of reasoned mastery is explored in Chapter 8. Chapter 9 explores further the idea of that mastery as both pleasurable and as suppressive, while some further, concluding points are drawn together in Chapter 10.

# 2 Relational terms in everyday social practices: more or less reconsidered

## Introduction

Terms such as 'same' and 'different', 'more' and 'less', are considered a central part of children's acquisition of a 'mathematical' lexicon. Classically, from the 1970s, studies of semantic development in children utilized notions of universals, derived from the work of Bierwisch (1970) who argued that 'all semantic structures might finally be reduced to components representing the basic dispositions of the cognitive and perceptual structure of the human organism' (181–2). Bierswisch's version of structuralism owes more to Chomsky than Piaget, but his work was extremely influential in the approach to semantic development. Based on a notion of 'primitives', the theory proposed a feature-approach, which understood the lexicon as composed of a tree-branching structure, such that words containing fewer features were considered more 'primitive' and therefore acquired first by children. This led to a rigid hierarchy of acquisition when it came to the 'mathematical' terms, so it was assumed that the perceptual and semantic primitives of a pair would be acquired first, for example 'more' before 'less', 'same' before 'different'. Furthermore, Eve Clark (1973) proposed that children would 'over-extend' the meaning 'less' as though it meant 'more'. Clearly the implications of this work for mathematics learning were, taken together with work on cognition, that children would have trouble with some mathematical concepts and not others, and that the acquisition of word meanings was a universal phenomenon, ultimately relying upon perception.

From that time much of the work, including my own (Walkerdine 1975), used the idea of 'context' to demonstrate the specificity of children's comprehension and production of word-meanings. But, as I have remarked in Chapter 1, this move, important as it was, was not enough to counter the universalism of the theory which underlay the work, because it maintained the individual/social dualism. In this chapter I shall examine more recent empirical work on the 'mathe-

matical' signifiers and go on to argue for an understanding of the production of meaning in discursive practices, based on an analysis of two sets of recordings of spontaneous speech.

The discussion will relate to more recent contributions to that debate around the terms *same/different* and *more/less* (Estes 1976; Glucksberg, Hay, and Danks 1976; Grieve, Hoogenrad, and Murray 1977; Holland and Palermo 1975; Karmiloff-Smith 1977; Kavanaugh 1976; Trehub and Abramovitch 1978). I shall also consider Sinha and Carabine's (1980) study which replicated and extended work on the mastery of conservation of discontinuous quantities and the interpretation of the terms *lot* and *little* begun by Sinha and Walkerdine (1978) and Walkerdine (1975). In their discussion of the results of their experiments on variants of the lot/little test (Sinha and Walkerdine) and the more/less experiments (Donaldson and Wales 1970), Sinha and Carabine remark:

> The child's perception of the task demands is determined by extremely complex and sensitive rules for relating words to particular aspects of the situation within an overall social and communicative context: the rules for governing reference in this context are not *specific* to particular lexical items, but the likelihood of one complex of rules being selected or activated rather than another is modulated by lexical choice, and that some lexical items are more strongly associated with or integrated into particular rule complexes than others.
>
> (Sinha and Carabine 1980:125–6)

I want to explore further the notion of 'rules for relating words to particular aspects of the situation'. The argument to be developed is that reference is not a universal, but rather an aspect of the regulation of social practices which form the daily life of young children.

It is now well known that the phenomenon loosely described as 'context' is important to the comprehension and production of lexical items and to children's solution of cognitive tasks. Many experimental studies have shown that minimal changes in procedure can make huge changes in performance. However, experimental studies, while they are an important source of data on the controlled study of shifts in task-demand, reveal relatively little about how non-experimental contexts operate.

That context is not simply a 'given', background feature, but is actually constructed and created is well documented by studies of