

CHAPTER 2

THE PRODUCTION OF MATHEMATICAL MEANING: A POST-STRUCTURALIST PERSPECTIVE

Where therefore is truth? A mobile army of metaphors, metonymies, anthromorphisms ... truths are illusions of which one has forgotten that they are illusions (Nietzsche, quoted by Spivak in her translator's introduction to Derrida, 1976, p. xxii)

As we have seen, in recent work in the study of language there have been moves away from seeing words within a language as being a labelling device to denote preexisting phenomena. Rather, language and phenomena bring each other into existence through time, a process through which meaning is produced. I have shown, within an hermeneutic analysis, how language comes to the fore in mediating mathematical experience. Indeed, it becomes difficult to locate mathematics outside of a linguistic frame. Mathematics is accessed through accounts humans offer about it. Any attempt to locate the underlying truth of mathematics results in us encountering what Lacan calls the "lack"; the emptiness which emerges after the final layers of description ("stories") are peeled away (Brown, Hardy and Wilson, 1993). Whilst hermeneuticians might hold onto notions of truth anchoring our thoughts, post-structuralist accounts resist the notion of such centring and instead occupy the "play" of accounts offered through history. Rather, we enter what Foucault calls "regimes of truth", or discourses governed by their own internal structures, consequential to society's view of itself. Such a view results in educational discourses which emphasise the individual constructions of the student, less constrained by concerns for the teacher's intention, or by any notion of universal "truth" (Gallagher, 1992).

In this chapter, following an introduction to post-structuralism and its implications for education, I will set out the structuralist roots of post-structuralism through outlining Saussure's linguistic model. In particular, I introduce Saussure's notion of the "sign"; an association between a mental concept and a mental image of a word or symbol. I consider the implications of Lacan's assertion that the linguistic signifier is more stable than the concept with which it is associated. An example is given of a particular mathematical expression being used by students where the meaning of the expression evolves as the students' work progresses. I also outline the importance of Saussure's distinction between language

as a system and the performance of language. After drawing an analogy with mathematics I conclude with a discussion of how learning mathematics is always associated with performance in mathematical activity, where individuals reveal how they see things and so introduce their own perspectives into the ideas they tackle. Finally, I suggest that this results in a self-reflexive dimension to learning mathematics which further compromises any presumed anchorage in universal truth. Most of the more abstract general theoretical discussion is confined to the first short section.

POST-STRUCTURALISM: A RADICAL FORM OF HERMENEUTICS

Although Derrida and Foucault might themselves question the description, they are generally described as post-structuralist writers. Certain writers (for example, Caputo, 1987, pp. 117-150; Gallagher, 1992 b, pp. 278-284) may well be adding insult to injury by arguing that post-structuralism can be seen as a radical form of hermeneutics. Many others would argue that hermeneutics and post-structuralism are incommensurable traditions. Eagleton (1983) provides an introduction, Spivak (1996, pp. 74-104) a more sophisticated analysis of this question. Nevertheless, whilst I would agree that we are examining here another case of “irreducible perspectives”, post-structuralism does, I would argue, display many important similarities with the hermeneutics of Gadamer and Ricoeur as described in the last chapter, which makes it difficult to draw strict boundaries. The universality of language and linguisticity of interpretation are central in both camps. The principal distinction of interest here is Derrida’s and Foucault’s fairly extreme stand in not seeing interpretation as being governed by the motivation of locating the ultimate “truth”. To them, writers like Ricoeur and Gadamer, with their theological leanings, are conservative because of their reluctance to abandon their supposed points of anchorage. Whilst Ricoeur, for example, acknowledges that it is possible to make many interpretations, he asserts that some will be better than others - some are closer to the “truth”. Ricoeur and Gadamer attempt to hold on to some notion of underlying reality, albeit obscured by the media through which we attempt to access it. In post-structuralism, however, this quest is abandoned, the meaning is to be found in the text itself. Nevertheless, Foucault’s early work (for example, “*Madness and*

Civilisation”) pursued a largely hermeneutic quest, but he later rejected the “promise” of such enquiry. He came to feel that no matter how deeply one penetrates below the surface of the text one could not encounter reality outside the discourse itself. For example, in his book *The Birth of the Clinic* he no longer sought “madness itself behind the discourse about madness” (Habermas, 1985, p. 241). Foucault’s work went through a number of other radical transformations before his early death.

Other writers, such as Barthes (e.g. 1976, 1977, pp. 79-124), Lacan and Levi-Strauss commenced with a more overtly structuralist enterprise, where they attempted to develop the linguistic model offered by Saussure into a “science of signs which goes beneath the surface events of language (parole) to investigate a variety of concealed signifying systems (langue)” (Urmson and Ree, 1989, p. 311). In Levi-Strauss’s work on structural anthropology, for example, there was some belief in a structure (say of a particular society) that could be observed from the outside with some fixed relation between its outward manifestations and its inner workings. The task here was to translate the disorder of empirical experience into the order of systematic structures. The post-structuralists, meanwhile:

rejected the binary oppositions between surface and depth, event and structure, inner and outer, conscious and unconscious ..(and) renounced the structuralist quest for a science of signs, celebrating instead the irreducible excesses of language as a multiple play of meaning (ibid.).

Given the focus of this book I should perhaps add “internalist” and “externalist”, “individual” and “social” to this list of rejected binary oppositions. Derrida (1978, p. 287) pinpoints a significant shift in the work of Levi-Strauss which moved structuralist concerns in to more complex territory:

The study of myths raises a methodological problem, in that it cannot be carried out according to the Cartesian principle of breaking down the difficulty into as many parts as may be necessary for finding the solution. There is no real end to the methodological analysis, no hidden unity to be grasped once the breaking down process has been completed. Themes can be split up *ad finitum*. Just when you think you have disentangled and separated them, you realise that they were knitting together again in response to the operation of unexpected affinities. Consequently the unity of the myth is a never more than tendential and projective and cannot reflect a state or a particular moment of the myth. It is a phenomenon of the imagination, resulting from the

attempt at interpretation; and its function is to endow the myth with synthetic form and to prevent its disintegration into a confusion of opposites. ... it follows that this book on myths is itself a kind of myth. (Levi-Strauss, 1970, pp. 5-6)

Derrida sees this observation by Levi-Strauss as a challenge to any notion of a “centre” orienting structural analysis. Such moves, which characterised the shifts, in the late sixties, in to what became known as post-structuralism, resulted in the whole idea of a systematic structure being undermined since there could be no agreed relationship, as any such view presupposed a particular individual perspective. Indeed, any supposed meaning itself becomes forever elusive. More importantly however, each individual can only describe the world of which they are part and so there is necessarily, a reflexive dimension to any such description. The observer is not so much describing a structure but rather their view of it, and by implication they are describing a bit of themselves. Foucault’s (1972) book *“The Archaeology of Knowledge”* emphasises that forms of knowing occur in a multiply interpretable historical context. The very language we use is rife with conventional ways of classifying things, concealing existing power relations. This view echoes Habermas, although the two writers often found themselves in debate (e.g. Habermas, 1985).

POST-STRUCTURALISM, EDUCATION AND MATHEMATICS

Post-structuralism resists the supposed anchorages of tradition in describing social situations. Rather, meaning is to be found in the way in which different accounts interact with each other. For example, Barthes’ notion of teaching is akin to the Gadamerian concept of a conversation; a dialogue where the “correcting and improving movement of speech is the wavering of a flow of words” (Barthes, 1977, p. 191). Barthes however does not see this process heading towards foreseeable outcomes. There are definite constraints on this apparent free play. Post-structuralist accounts of education tend to be rooted in the Marxist notion of society forming consciousness, where individuals are absorbed in social norms. For Althusser, (human) individuals are understood as “bearers” of a system of social relations which exist prior to and independently of their consciousness and activity (Urmson et al., p. 7). For an individual seen in this way, knowing, and its evolution,

is closely associated with action, since the social practices which host specific actions are imbued with the society's preferred ways of doing things. Whereas critical hermeneutics sees education as risking the reproduction of the institutional power relations through its content, post-structuralism identifies a more all-embracing reproduction, namely the metaphysical framework which conditions all understanding.

For what can be oppressive in our teaching is not, finally, the knowledge or the culture it conveys, but the discursive forms through which we propose them (Barthes, quoted by Gallagher 1992 b, p. 300).

For example, Walkerdine (1988) describes categories such as "child", "teacher", "learning", etc. as constructions situated within historically and culturally specific discourses - the very fabric of the language we use presupposes manifold assumptions about our classification of the world (see also, Evans and Tsatsaroni, 1994). The reflexivity inherent in the language we use positions us in relation to the world we see our selves in. Foucault (1979, pp. 170-194) describes the regulation implicit in the classifications in every aspect of schools from the architectural design to the administrative structures, for example, examinations categorising students according to ability, dress codes and separate facilities according to sex, as strict codes regulating behaviour. Similarly, Althusser (1971) sees schools as an essential part of the "ideological state apparatus", asserting particular forms of "hegemony", that is, power relations held in place by common assent.

Conventional mathematical ideas are all culturally derived but have become so embedded within the fabric of our culture that it is hard for us to see them as anything other than givens. These historical choices can never be eradicated and will forever condition and mediate our experiences of mathematics. Derrida (1978, p. 281) has spoken of the difficulty of analysing linguistic structures since there is always a need to use the elements of the structures themselves in dismantling these very structures. Similarly, we can never analyse mathematics without using the culturally derived components of this very mathematics. Any "new" mathematical construction is always made within an inherited language which means that it is always already partially constructed. The culture provides the building blocks and the final building is a function of these. This applies to both the "objective" components of mathematics for example, symbols like "cos", "+", " Σ " or " \geq "

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