The Silence of the Body

DAVID PIMM

She was cremated on Friday November 13th. The plaque on the coffin simply read:

Rita Beryl Nolder
Died November 6th, 1992
Aged 41

Tumbling thoughts. Names and who or what is named. I am confronted with the empty signifier instead of the sign – no sign of life. Numbers counting things that count. What sense can be made of subtracting one year from another – the result seems meaningless; worse, wrong. A drastic wrong. How can this be? Her time was up, her number was up. Unlucky thirteen and last suppers, wakes and sleep Rituals, rites of passage, rita.

> *Death counting, continually counting, continually counting, does not count me.* [1]

For me, mathematics is fundamentally about language. Michael Halliday changed a small part of the English language solely by means of the title of his book *Learning How to Mean*. Up until then, 'to mean' had been used primarily as a transitive verb, one had to mean *something*, and now it was suddenly being used intransitively. Part of learning mathematics is learning to use language like a mathematician, and more subtly learning how to *mean* like one. But the demands of mathematical expression place some severe pressures on natural language.

René Thom has articulated his belief that mathematical meaning rather than the question of rigour is mathematics education's central problem, of how mathematical objects may be brought into existence. Meaning is about reference on occasion, but is also much more. Meaning is also about associations of all sorts (including verbal similarities). In particular, meaning is about unaware associations, about subterranean roots that are no longer visible to me, but are nonetheless active and functioning. How are we implicated in making ourselves (and others) unaware of certain connections? Caleb Gattegno writes of the functioning of "the process of stressing and ignoring, without which nothing is noticed". And the novelist Margaret Atwood reminds us of the active nature of ignoring: "We lived, as usual, by ignoring. Ignoring isn't the same as ignorance, you have to work at it."

It is precisely this ability to suppress or selectively "not see" that is rightly valued in mathematics – it is one of the human qualities that makes mathematics possible. Yet there are also costs involved in becoming skilled at it. For instance, there is a videotape available for use in the teaching of mechanics, one section of which is on impacts. One sequence of images showed billiard balls moving toward and colliding with one another. A second consisted of film of a high-speed car crash, in slow motion, that was repeated over and over again. Where was the invitation for the viewer to place their attention, and what to stress and what ignore?

A second example was cited by Richard Noss [2], from a school where the class referred to it as the Falklands Question. It comes from a national examination in mathematics for academic pupils.

> A pilot flying an aeroplane on a straight line at a constant speed of 190m/s and at a constant height of 2000m drops a bomb on a stationary ship in the vertical plane through the line of flight of the aeroplane. Assuming that the bomb falls freely under gravity, calculate (a) the time which elapses after release before the bomb hits the ship, (b) the horizontal distance between the aeroplane and the ship at the time of release of the bomb, and (c) the speed of the bomb just before it hits the ship. (15 marks)

This is not a "practical" problem. Even in the event of any pupil being about to bomb a ship, I doubt whether having worked on this question will assist them. The precise ignorings necessary in order to render the problem mathematically tractable removes the most salient features of the actual situation (the excitement and fear from the fact that I am trying to destroy human beings and they me, a non-stationary boat and a non-constant speed to try to avoid destruction, ...). But pupils are being encouraged to ignore the 'context', i.e. the ostensible content of what they are invited to work on, and to stress only certain abstract relational qualities. Teaching is in substantial part about directing attention.

We all have particular connotations for those numbers which play or have played an important part in our lives. Such particularities are important: in the South African film *A World Apart*, teenager Molly Roth's mother is imprisoned for ninety days. We see Molly with the numbers from 1 to 90 written in an exercise book, drawing a line through them one by one as the days pass. However, such particularities can get in the way of seeing general arithmetic relations. It can be hard to see pattern among small numbers because of this particular luggage we all acquire – and some of it is unwanted baggage. So what is the cost of acquiring arithmetic fluency? What memories, what meanings must we suppress?

> Tom Kieren tells of a child responding to a request to write about her favourite fraction. "My favourite fraction is 4/5. This is my favourite fraction because it gives me a lot of things to remember. Because there are five people in my family and only four of them are living in my house. My mom is the fifth person. She's the one that is gone." (Over half of the twenty-seven pupils in the class referred to the family in choosing their favorite fraction, and five were almost as poignant as the one given above.)

In psychotherapy, a woman first recounts her "irrational" fear of a particular number, but does not know why. Later, she is enabled to remember a house, a house with this number, going to a house as a young teenager, to connect with going to *this* house for an abortion as a young teenager, going to this house for an abortion impregnated by her father. What is above ground is the fear triggered by the number; the connection with the rest is initially inaccessible.

Rites and rituals

> Aboriginal Creation myths tell of the legendary totemic beings who had wandered over the continent in the Dreamtime, singing out the name of everything that crossed their path - birds, animals, plants, rocks, waterholes - and so singing the world into existence.[3, p2]

I want to allude to how mathematical language can be and is used to "sing" mathematical objects into existence, and how the "songs" change over time and the objects with them. Certain old songs are no longer sung: they become forgotten, and the awarenesses they engender diminish and die back - or return into the Dreamtime if you prefer. What are ways in which language can be used to *generate* rather than merely *describe* the objects under discussion.

Mathematics has much in common with other ritual activities: the mystique, the incantations, the initiates and the masters. Religious rites, "rite words in rote order" according to James Joyce, can be used to summon or conjure presence - "the word made flesh". Counting is such a calling-into-being - and Seidenberg has offered the exciting possibility of a ritual origin for counting in terms of the need to get the rite words and particular people on-stage in the right order.

As with songs, novels and pictures, poems and plays, and other art forms, there is always the question "What is the song about?", which immediately imposes an order that can mislead. It pulls attention in the direction of songs coming after the "things" that they are about, that they are merely *representations* of something else, rather than the primary thing in itself. If the songs bring the referents into existence, what then of traditional accounts of reference and meaning?

If particular mathematics is to survive into deep time - perhaps the time required for it to seep into the collective unconscious - it will need to be consistently recreated. For posterity. From *a priori* to *a posteriori*.

> His religious life had a single aim: to keep the land the way it was and should be. The man who went "Walkabout" was making a ritual journey. He trod in the footsteps of his Ancestor. He sang the Ancestor's stanzas without changing a word or note - and so recreated the Creation.[3, p16]

> The song and the land are one.[3, p31]

For me, this raises the question of time in mathematics and the traces thereof in mathematical language - time and timelessness, time everafter, the implied chronology of "if ..., then" as well as causality (and the notions are hopelessly entwined) - axioms as permissions in perpetuity, theorems as predictions - and that can only be about the future, about what would happen if..., about what *must* happen. About what can *never* happen, no matter how long or how hard we all work. Will it *always* work? Wittgenstein interpretets the meaning and import of impossibility theorems as telling us not to waste our time here.

Old songs never die?

> And its origin [that of psychoanalysis], untranscendable and constitutive, scandalously permanent for anyone who dreams of scientific progress, is the constantly repeated observation that the neurotic is suffering from memories and discourses that have been buried, and that speech alone has the power to regenerate him.[4]

Is it helpful to think of mathematics teachers and students in this light and can we observe "neuroses" being set up in the classroom? Why are remedial teachers not trained in methods to disinterr these suppressed but interfering discourses? Is mathematics in the same state as Vergote's neurotic, namely afflicted with long-forgotten and suppressed ways of speaking and thinking, which nonetheless (inappropriately perhaps) influence the present?

With the case of mathematics itself, its history is one place to be explored for changing discourse. One example might be varying use of the term 'infinitesimal' - why did Cauchy choose to use this in his definition of limit? Why did Dieudonné choose to call his famous textbook *Infinitesimal Calculus*, when the word doesn't appear again? The perennial difficulties of the "calculus to analysis" transition in the U.K. has been much written about and can be seen as an attempt to suppress a functioning discourse, one that has been both productive and enjoyable for many up until then.

In earlier times, beneath the sphere of the moon was considered the realm of change and decay, of the four elements; beyond it was the realm of permanence, of unchange, of quintessence. No wonder Renaissance astronomers identifying comets as phenomena beyond this transition region caused such consternation.

Mathematics exemplifies a wish for permanence, an expression of a longing. What are two of mathematicians' prime concerns? Invariance and infinity. One of the current ritual utterances of mathematics education is asking "What changes and what stays the same?". That which does not change, does not die.

Brian Rotman, writing of the desire of the mathematician, claims

> The desire's object is a pure, timeless, unchanging discourse, where assertions stay proved forever (and must somehow always have been true), where all the questions are determinate, and all the answers totally certain.[5]

How is this sense of timelessness engineered? One means is by the removal of many temporal markers from the language of mathematics, though traces remain. There are many other features of language in mathematics that are deserving of attention and consideration, including the prevalence of the passive voice and imperative mood, with their consequent massive deletion of elements such as the person carrying out the action, resulting in a depersonalisation of the discourse.

So a second particular means involves the removal of active human agents. But at what cost? Bettelheim, writing of Freud's use in German of the terms *Das Ich* and *Das Es,* claims:

> No word has greater and more intimate connotations that the pronoun 'I'. It is one of the most frequently used words in spoken language - and, more important, it is the most *personal* word. To mistranslate *Ich* as 'ego' is to transform it into jargon that no longer conveys the personal commitment we make when we say 'I' or 'me' - not to mention our subconscious memories of the deep emotional experience we had when, in infancy, we discovered ourselves as we learned to say 'I' [6]

And recall that the *origin* in the sense of both source and starting point is involved in any reference system and that Herman Weyl once referred to this mathematical point as "the necessary residue of the extinction of the ego".

> *Emptiness counting, continually counting, continually counting, does not count me* [1]

Contradictory language

> Contradiction. Why just this one bogy? That is surely very suspicious.[7]

One can understand this fear of contradiction, of being gainsaid (in the more anglo-saxon term), in terms of being wrong. Hilbert once asked: "If certainty is not to be found in mathematics, then where is it to be found?"

Here is an example of just one of the peculiarities involved in contradiction. The philosopher J.L. Austin wrote about performative utterances (which he glossed as: "To issue such an utterance *is* to perform the action") such as "I promise ...", or "I pronounce thee man and wife". Mathematical examples of performatives include imperative sentences beginning: Let, Suppose, Define.

Austin gives different examples of ways in which performatives can fail to get by (it makes no sense for them to be labelled true or untrue) - "unhappinesses" or "infelicities" as he terms them, where violence is done to language. An interesting question is what it would mean for a statement beginning "I define" to be an unhappy one. Such utterances Austin initially contrasts with statements or declarative (constative) utterances. But he also documents certain similar unhappinesses that can occur with statements (quite apart from them being untrue).

> Someone says "The cat is on the mat, but I don't believe it is", or perhaps he says "The cat is on the mat", when, as a matter of fact, he does not believe it is. ... one experiences a feeling of outrage, and it's possible each time for us to try to express it in terms of the same word - "implication", or perhaps that word we always find so handy "contradiction". We can quite well say "It could be the case both that the cat is on the mat and that I do not believe it is". That is to say, those two propositions are not in the least incompatible: both can be true together. What is impossible is to state both at the same time: his *stating* that the cat is on the mat is what implies that the speaker believes it is.[8]

It will not have escaped your notice that this precise linguistic form of violence is one mathematicians use regularly in the context of "proof by contradiction", where the opening sentence is an overt assertion of the form: P, but I don't believe P. Yet, according to Austin, an assertion implies a belief. *Reductio ad absurdum* should perhaps be renamed *reductio ab absurdo*

There is also a possible link between proof by contradiction and the psychological process of negation. Both produce negative statements with the intent of the opposite. Freud writes:

> The subject matter of a repressed image or thought can make its way into consciousness on condition that it is *denied*. Negation is a way of taking account of what is repressed; indeed it is actually a removal of the repression, though not, of course, an acceptance of what is repressed. It is to be seen how the intellectual function is here distinct from the affective process. The result is a kind of intellectual acceptance of what is repressed, though in all essentials the repression persists.[9]

Anika Lemaire glosses this as: "The repressed signifier is always present in the negation, but, in another sense, it retains the repression through the 'not'."[10]

In proof by contradiction, the same structure holds. The assertion is made that not-P is true, but the underlying reading that is required is that P is to be believed

Warmth and cold

> *Fire counting, continually counting, continually counting, does not count me* [1]

According to Sherry Turkle, "theories [of psychology] that use mathematical formulation are seen as 'cold', 'impersonal'. Definitionally, something that is cold leaves out the warmth of the body."[11]

Coldness and life. Stiff and awkward, formal dress. Rigidity of triangles, of people. A stiff drink (lots of alcohol), a stiff (a corpse), a stiffie (an erection). Rigo(u)r and *rigor mortis*.[12]

The overlapping terminology of the moral and the mathematical I find fascinating. *Correct* (or *proper* or *good*) definitions, the *right* way to proceed or behave, can also be heard to speak of bourgeois concerns of moral respectability. It is also possible to view many discussions about proof, certainty and rigour in a similar light. Words and phrases such as rigour and rigid, mathematics is hard, the power of mathematics, "Mathematics is a stiff discipline"[13], can be heard as arising from a male sexuality, and the concern with loss of rigour arising from its accompanying fears. At times when I listen to discussions about the urgent need for proof and rigour in mathematics education, thoughts like these run subliminally through my mind.

Postscript: in the beginning wasn't the word

In another time, one in which Rita was still alive, I was intending to write a piece on Lacan for this special issue, entitled 'Reading Writings *and Arithmetic'. That piece may never be written. Lacan can wait – for he is not newly dead.*

- *We all were born babies once, when one became two*
- *We all symbolise when something we want is absent, missing or otherwise unavailable, and we work with the symbol* as if *it were the thing we desired. Because one has become two, we are no longer as one with our mothers. "We need to find ways of controlling the lack."*
- *We all paid our personal price for acquiring our language, which Lacan associates with two becoming three and Tahta identifies as when mathematics begins, despite Brouwer's contention that "[intuitionist] mathematics is an essentially languageless activity of the mind having its origin in the perception of a move in time".*
- *We all have mastered some aspects of mathematics – what do we truthfully know of the processes and the psychic costs involved?*
- *We all forget.*
- *We all die.*

References

[1] Adapted from a Yoruba prayer, quoted in Leapfrogs, *Infinity*. Stradbroke: Tarquin, 1992, p39 (see below)

[2] R. Noss, "Revealing messages", *Mathematics teaching*, no.112, 1985, p.38

[3] B. Chatwin, *The songlines*, London: Pan Books, 1988

[4] A. Vergote, "Foreword" in [10] p.xvii

[5] B. Rotman, cited in V. Walkerdine, *The mastery of reason*, London: Routledge, 1988, p.185

[6] B. Bettelheim, *Freud and man's soul*, Harmondsworth: Penguin, 1989, pp.53-4

[7] L. Wittgenstein, *Remarks on the foundations of mathematics*, Oxford: Blackwell, 1956, p.130

[8] J.L. Austin, "Performative-constative", in J. Searle (ed.), *The philosophy of language*, Oxford University Press, 1971, p.17

[9] S. Freud, *Complete works of Sigmund Freud*, Standard Edition, London: Hogarth Press, vol. 19, 1955, p.235

[10] A. Lemaire, *Jacques Lacan*, London: Routledge & Kegan Paul, 1977, p.75

[11] S. Turkle, *Psychoanalytic politics*, London: Burnett, 1979, p.247

[12] "Men are born soft and supple; / dead they are stiff and hard/ ... The hard and stiff will be broken./ The soft and supple will prevail." (*Tao Tê Ching*, verse 76)

[13] D. Whittaker, *Will Gulliver's suit fit? Mathematical problem solving with children*. Cambridge: Cambridge University Press, 1986, p.5

Acknowledgement

The desert photograph reproduced below is by Simon Pettiter