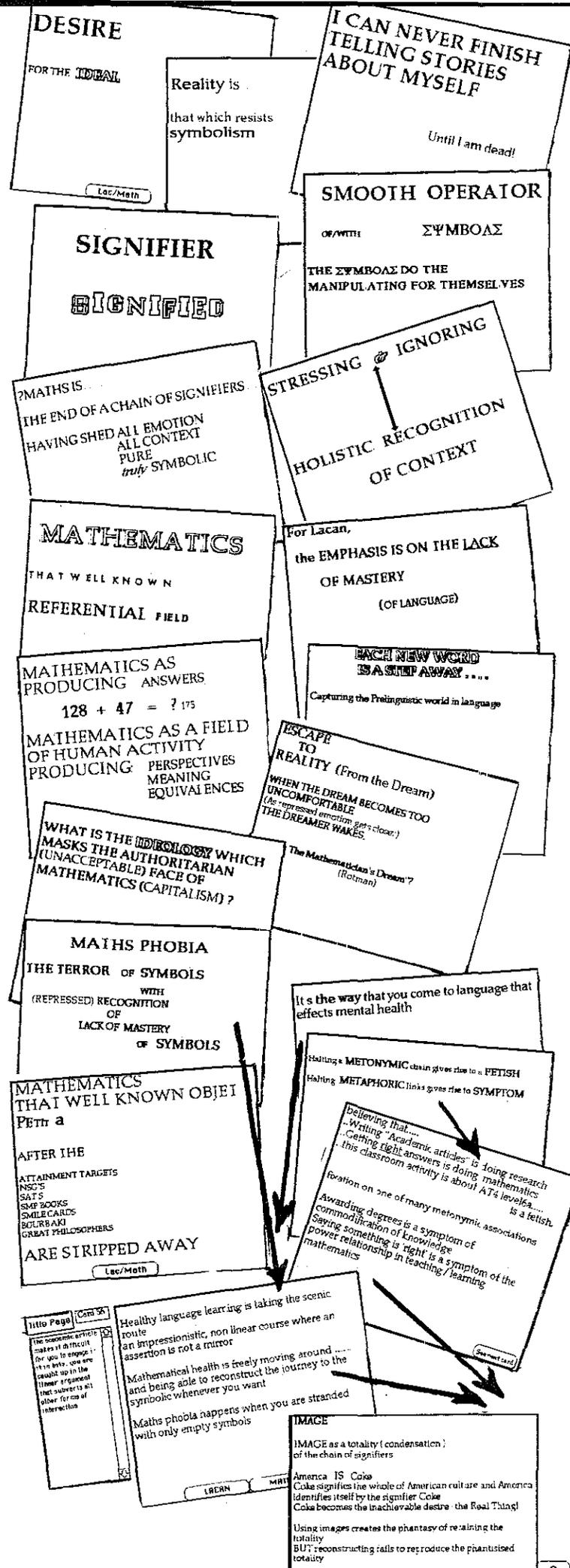


Reading Lacan is like attending a psychoanalytic session. It involves working with someone who appears to have all of the answers, but to find out what these might be you get drawn into a complex disorienting game, both revealing and concealing, that never delivers the hard conclusion forever promised in the future. This paper is an attempt to work with his ideas. Whilst Lacan may not be concerned with mathematics education, he is concerned with minds that address things like mathematics, teaching and learning.

We started with the creation of "soundbites" that captured for us certain Lacanian anecdotes. These were chosen almost randomly from ideas emerging from our personal reading and were recorded on a Hypercard stack. They offered nodal points of reference as we mapped out the field in our minds. Having collected a large number we free-associated possible connections. Of course the resulting stories were about us and became part of a bigger story about how we see Lacanian notions supporting out thinking about the broader spectrum of mathematics education.

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**On the "objet petit a(utre)" the whole is more than the sum of the parts**

The venue: Band on the Wall

A Thursday night Jazz concert with up and coming young saxophone player.

"He's a superb technician but he doesn't know any tunes."

"He's not playing from the heart."

"I don't like his tone!"

"The sound mix is bad. All I can hear is the drums. It would sound better from further back."

"He's not been playing with this backing group for very long You can tell!"

"It just doesn't swing."

"He says he only practices 3 hours a day. Parker used to practise about 12 hours a day."

Can you capture the making of jazz music in a set of descriptions?

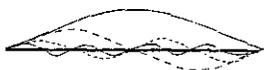
There is a model for a vibrating string (or vibrating column or air). A particular note is modelled by the fundamental



or an improved model is obtained by adding in the second harmonic



or better still the infinite sum of all the overtones.



Does this model capture the tone or feel of a note...or its relation to other notes in the music? Does this model capture the making of jazz music?

The elements of the set labelled "listening to sax playing at Band on the Wall" not covered by this description seem critical.

I'll add in a series of descriptions for the missing elements...

*embouchure, mouth piece, relation of body, tonguing the reed, the make of instrument, practising low notes, or arpeggios or with play along albums, training your ear, learning some licks, keeping time, finger dexterity, playing with others, emptying your mind, being in the present, practice.*

So how to describe the journey of learning to make jazz music? And how do you make that journey so that you are enabled to "play from the heart"?

IMAGE, as the totalisation of the chain of signifiers

The next morning...An image is offered to give access to key mathematical idea. This reflects the belief that the image acts as a condensation of the symbolisations, abstrac-

tions, connections, illustrations, equivalences brought together within that key idea and that from the image the journey through that mathematical activity can be evoked.

But, the symbols themselves do not capture the elements of the experience that lie outside Gattegno's geometric <-----> algebraic continuum.

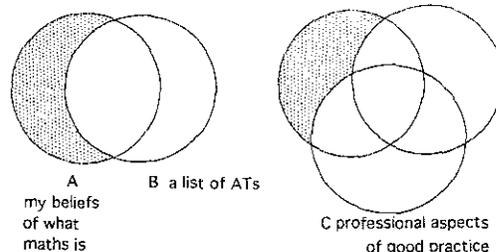
Mathematical health is *being able to re-cognise the journey to the symbolic whenever you want.*

Maths phobia happens when you are stranded with only empty symbols.

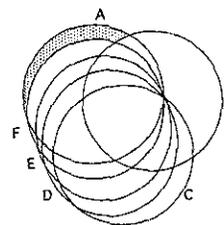
Concern to illustrate how to gain "Mathematical health", or how to create healthy mathematics learning in others can lead to a description of Mathematics being given.

For example: a mathematical activity is designed to work on a key idea, important in learning Maths, and is then validated by listing the Attainment Targets it covers. This is symptomatic of the ideology that you can capture the human activity of learning in a list of statements. It empowers the ideology and enables control to be gained over the education process.

There is a discrepancy for me between my description of my belief that lead me to choose that activity (A) and describing the activity as being about ATs (B).



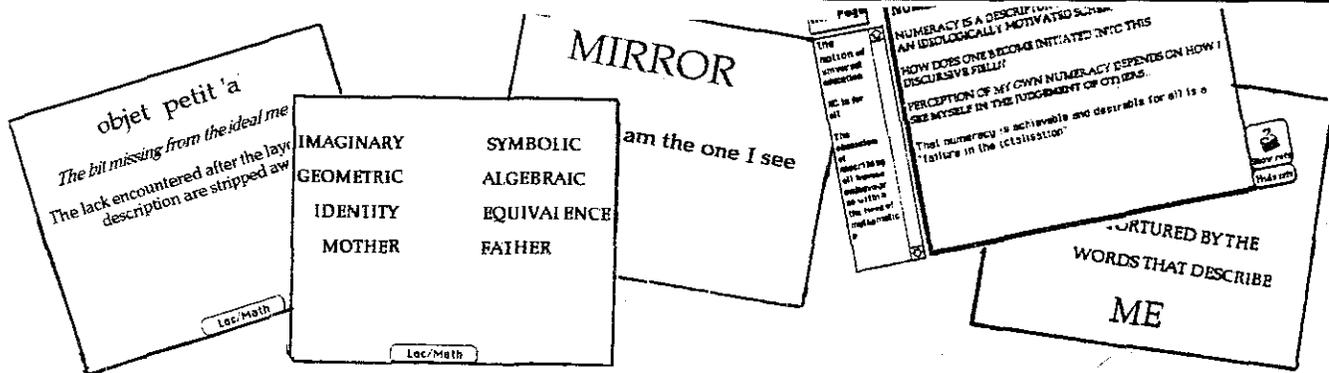
The discrepancy seems all too evident here. So I add some professional beliefs about good practice in Maths education to my description. But there is still a discrepancy: so I add more descriptions (showing the depth of my perception and reflective approach!) but there is still a lack in sum of my descriptions...



something that cannot be expressed in language or symbols or mathematical images. The elusive reality of mathematics!

Reconstructing from a list of Attainment Targets or any other descriptions fails to reproduce the fantasised totality, but the teachers and learners are left with a fetish that these descriptions are what mathematics is all about!

*The Lacanian motif of symbolization as a process which mortifies, drains, empties, craves the fullness of the real of the living body. But the Real is at the same time the product, remainder, left over, scraps of this process of symbolization, the remnants, the excess which escapessymbolization and is as such produced by the symbolization itself. (Zizek)*



### On Numeracy

Numeracy is a descriptor assigned according to an ideological motivated schema. To say that I am numerate depends on how I see myself in the judgement of others. But how do we actually use the term? it conjures up notions of a facility with numbers, or rather, the ability to engage in activities with others.

Numeracy presupposes a system of exchange. Mathematical activity however, can be both personal and social. The move into the social is always rooted in an attempt to label the personal. Gattegno says, 'only awareness is educable', but how do I articulate my awareness, my shifting from unconscious to conscious, into something usable in the educative field?

Lacan speaks of the unconscious being structured like a language - a play of differences where meaning is only derived from the interplay of successive terms. Such a play of differences underlies mathematical cognizing, whether or not it be manifested in a stream of spoken or written symbols. For example, for Gattegno, geometry is of the imagination, prior to any description that moves cognizing towards the world of algebra where categories are built. He suggests that Geometry has been down played in mathematical learning. (School geometry is strictly algebraic with its insistence on naming everything!) Numeracy seems post-Geometric in the sense that it is concerned with algebraicisations, and conventional ones at that! Indeed it might be seen as a denial of Geometry.

There seems to be issues here of how we separate mathematical activity from the product of mathematical activity, that which can be algebraicised and recorded on paper for the scrutiny of others, what distinguishes the two? There always remains a part of Geometric activity that cannot be captured in symbolisation, no matter how refined the register. There is a suggestion here of the Lacanian "objet petit a", the lack encountered after all the layers of description are peeled away, the unsharable.

Two alternatives emerge:

1. The product of mathematical activity = Mathematics where the human is dumped.

Mathematics is a referred-to world where there are no humans, but organised as if there are. This however, is referred to from a world where there are humans.

2. Mathematical activity = Mathematics where the human is retained

Mathematics is an interplay of mental signs where closure is only ever for the time being, and never quite perfect. The referred-to material world of mathematical texts is only ever addressed within such activity.

Numeracy, as a state, forces the reduction of mathematical activity into communicable or accountable commodities. This commodification simultaneously creates and

denies visions of a world where everyone is numerate, as in descriptions of a National Curriculum for all - a false totalisation

### On Symbolism

He threw a stone at the window. Yes, quite a big stone.

He threw it quite hard to reach the window.

The window was about 30 yards away.

The stone went high before it smashed the pane.

But it started going down again before it got there.

I saw it from the side, it followed a sort of curved path.

It reached to about ten feet before it started coming down.

The curve was fairly flat at the top.

Repeatability... Generalisability... Quadratics...???

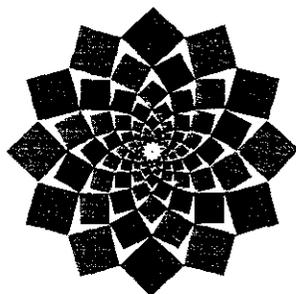
The world I see becomes captured in language and as I seek to be ever more refined in my describing the story of a stone being thrown becomes constrained within the form of a quadratic equation. Thus I enter the world of mathematics.

*"Each new word is a step away from Mother"*

Mathematics, the fantasy of maximising distance from the Mother, is the story that suppresses the Mother. But Mother is not so easily dismissed! I experience the world through my senses, those I had before I learnt to speak. In making sense I describe this world through retroactive naming. To talk mathematics I need to use the language of the tribe if I am to communicate, in a quest to be accepted by the Father. Mother, whilst still there is never quite the same as I capture more of her in the language of the Father. The Mother becomes the dumping ground, the other not captured within the structuring, the ignored left over after the stressing. Rumbling away under the surface of a regulated and described vision, the unseen and the unsayable. the subconscious biological murmurings.

Not so much then "I think therefore I am" but rather "I speak therefore I construct". The "unified cartesian subject" has become the main casualty of post-modernism being replaced by a subject analysable as a process, inextricably linked to a context which is itself a process. This subject, held in the successive stories told about him, can never be fully constituted since closure is always in the future; any descriptor is part of a chain that is never finished, the subject himself, acting as if he is the one in the mirror is forever disappointed by the world resisting his actions in a slightly unexpected way. Nevertheless, the stories he tells give structure to that which he describes and reflexively give structure and position to he who speaks, bringing self and world into union in a common inherited language, that of the Father.

## On DESIRE



Look at the Leapfrogs poster *Square Spirals*. Do you see it forever spreading outward? Do you see it forever spiralling inwards? I invited a group of student teachers to look at the poster quietly for a minute. Then I covered it up. They talked about the poster for 40 minutes before being asked to draw it for themselves. They talked about:

*squares, angles, chevrons, spirals, blue, orange, galaxy, whirlpool, tunnel, suitable for meditating to, it being disturbing, being sucked down.*

Some of the language is that of geometry, some of it is everyday language. Some evokes other associations and emotions. There are potential (repressed) metaphorical associations to creation, birth, the womb, the anus, death, ..., which might be evoked either by the poster itself or by the words used.

From the perspective of mathematics education in describing how the group worked I might use terms like:

*engagement, intensity, energy, motivation, interest, sustainment.*

And then ask what it was about the task which enabled such engagement.

From a Lacanian perspective I can conjecture that we are in the presence of desire. And ask what it was which mobilised desire.

Gattegno has written "that concepts become explicitly mathematical when their infinitude is stressed. And infinity has great power of inspiration." For Gattegno, infinity promotes engagement. The presence of infinity is motivating.

For Lacan there is an '*objet-petit-a*', which signifies and unchains desire. In the field of human sexuality an *objet-petit-a* may be the lips, the tip of the penis, the rim of an anus...

*This point of Real in the very heart of the subject which cannot be symbolized, which is produced as a residue, a remnant, a leftover of every signifying operation, a hard core embodying horrifying jouissance, enjoyment, and as such an object which simultaneously attracts and repels us – which divides our desire and thus provokes shame. (Zizek)*

In mathematics such an object may be the spiral, the sequence,  $1, 1/2, 1/4, \dots$

We can conceive of mathematics as a way of structuring our experience. The structuration inevitably stresses some aspects and ignores others. There is a gap between experience and articulation. Becoming aware of the gap produces a tension. One reaction to this tension is to continue to work on refining and making more sophisticated and complex this articulation, this symbolisation, this mathematisa-

tion. Another reaction might be to reject doing this work. To retreat to reality, to wake up from the dream "of perfect control over a perfectly rational and ordered universe" (Walkerline). From the fantasy of obtaining control over the experience by controlling it symbolically.

*The dreamer 'constructs' a dream, a story which enables him to prolong his sleep, to avoid awakening into reality. But the thing he encounters in the dream, the reality of his desire, the Lacanian Real-... is more terrifying than so-called external reality itself, and this is why he awakens: to escape the Real of his desire. ...He escapes into so-called reality to be able to continue to sleep...to elude awakening into the real of his desire. (Zizek)*

To maintain the fantasy of control, mathematicians, and hence mathematics educators, construct an ideology. An ideology which asserts that there is a natural way of looking at certain experiences and structuring it. Which asserts that there are concepts associated with the activity of mathematising which can be learnt, or discovered by, or taught to learners. Which asserts that there are questions with right and wrong answers. Which asserts that whether a learner understands a concept can be tested. Which asserts that mathematical experiences can be constructed, ordered for others. And that this testing is an essential, a natural part of coming to know. An ideology which conceals the underlying structural necessity for this conception.

*The supreme lure of ideology is to procure the illusion of 'openness' by rendering invisible the underlying structural necessity (the catastrophic ending of the traditional 'realist' novel... 'works' only if it is 'experienced' as the outcome of a series of unfortunate contingencies). This differs from the crude version that ideology confers the 'form of unavoidable necessity upon what is actually dependent on a contingent set of concrete circumstances. (Zizek)*

If stimulated by the recognition of an '*objet-petit-a*', by desire, I give meaning to that experience by working with the symbols, then I am creating demands which can be met. The drawing can be constructed. The scale factor relating the squares can be worked out. Answers are produced. But desire has not been satisfied.

What if I find that my symbolic control is inadequate? That I do not resolve my questions and those of my teacher? What if I cannot even control my symbolisation? The resultant tension could be dissolved by my being parented by my teachers. By being shown (the) method. By being protected from situations where this might arise by a carefully constructed teaching scheme.

Mathematics is not enjoyable.

Mathematics is shot through with desire.

Mathematising produces jouissance, pleasure-pain.

*Jouissance is the basis upon which symbolization works, the basis emptied, disembodied, structured by the symbolization...In psychoanalysis, knowledge is marked with a lethal dimension: the subject must pay the approach to it with his own being. ...access to knowledge is then paid with the loss of enjoyment [jouissance] – enjoyment, in its stupidity, is possible only on the basis of certain non-knowledge, ignorance. (Zizek)*