Mathematics is an extreme sport – watch out!

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This is a rough record of the talk I gave at ANPA 2012.

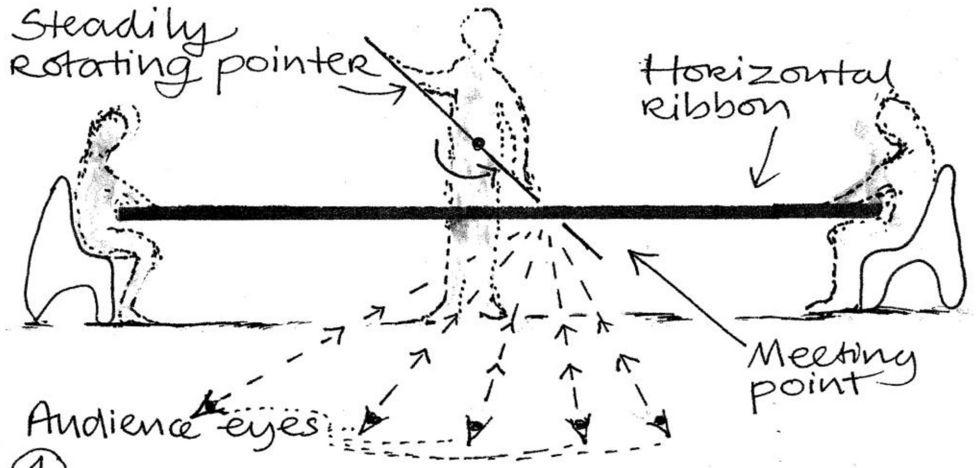
Mathematics is clearly not a spectator sport: it's a toss-up which is more exciting, watching mathematicians think or watching paint dry. It's also not a competitive sport. People do not study mathematics in order to win the Olympics, or even the Abel prize (“the what?”). They are mostly drawn into it from love, for the buzz, excitement, heightened awareness, which is also what extreme sports are about: going into an altered state of consciousness, a different kind of space. (I justify my use of the term 'sport' as a return to the Middle English meaning (OED), 'pastime' or 'entertainment'.)

In physical extreme sports people grapple with the elements, with Nature, with a world patently bigger than us. In mathematics we also grapple with a bigger world, but it's a world of consciousness. Mathematicians get a buzz from going into this world, and trying to work out what is real there. It's very different from consensus, physical reality, which we tend to forget as we've grown up in a world where we take mathematical rules for granted.

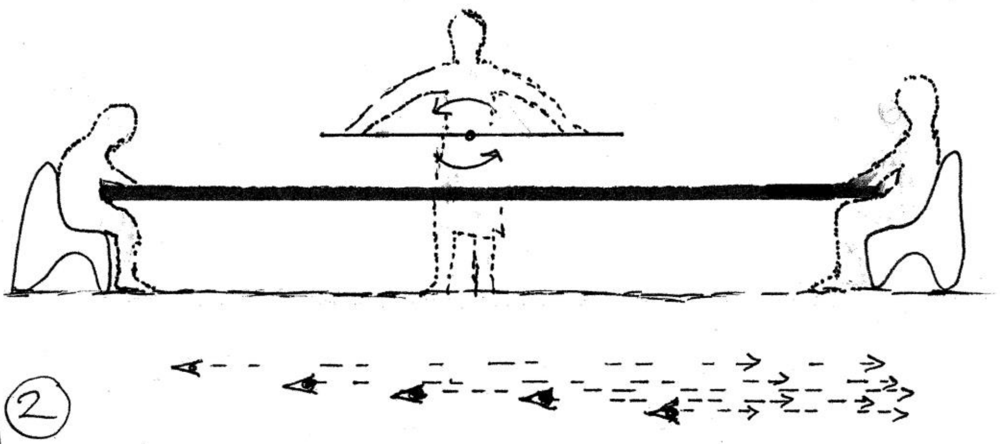
In order to begin to remember how strange mathematical reality is, we did a practical exercise as shown in sketches A1, A2 and A3. Two people sat about 5 yards apart, holding a ribbon horizontal between them. The audience were on one side and the demonstrator on the other, holding a dowel pointer about 6 feet long. She asked the audience to keep looking at the point where the 2 lines crossed and she steadily rotated the pointer (anticlockwise from their viewpoint). They moved their heads slowly to the right until – hey! - they had to flip suddenly to the left where the point of intersection had begun to move to the right again.

This was a physical experience of the strangeness of the notion of the point at infinity, found at <u>opposite</u> ends of a straight line. But then the notion of a point itself is impossible physically: that which has a precise location but no size! In fact all the basic, mathematical objects, point, line, plane, number etc do not exist in consensus, phyical reality. Because we forget this, we don't recognise the depth of some of these ideas. By investigating things that seem totally obvious, we begin to step 'out of the box', and new ideas can come in. Mathematicians enjoy this world of weird ideas.

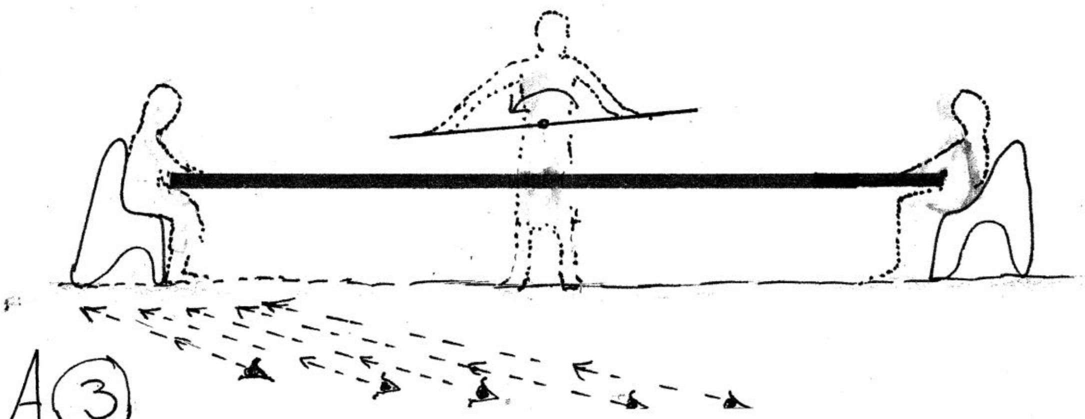
So, in the experience of the participants, mathematics is similar to physical, extreme sports. But the locus of the thrill and hence the danger, is different. In physical, extreme sports people put their bodies on the line and risk life and limb. The biopic 'A Beautiful Mind', showed the rare but real danger of losing one's mind in mathematical worlds.


Steadily rotating pointer
Horizontal ribbon
Meeting point
Audience eyes

A1



A2



A3

The most important difference between the two extreme pastimes is their respective spheres of influence. Mountaineers, white water rafters and such like, may or may not, according to chaos theory, have made a big difference to the world, just like a butterfly flapping its wings. But it is obvious that 21st century sophisiticated technology is unthinkable without the mathematical developments of previous centuries.

The disjunct between the intentions of many mathematicians who (like G.H.Hardy) regard their subject as totally pure, and some of the results of their discoveries (or creations) such as drone strikes and hedge funds, gives cause for concern.

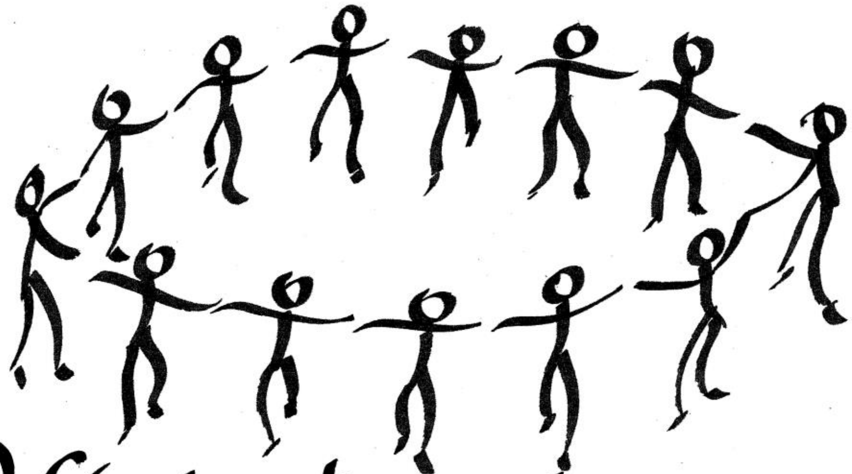
I want to consider some of the far-reaching, unforeseen results of the work of an important 16th century mathematical, extreme sportsman, namely Galileo, whose physical life was also in danger since he lived during the time of the Inquisition. He was an applied mathematician, one of those who are drawn into the strange world of mathematics and find treasure there that has both validity and value in physical reality.

His mathematical interpretation of physical reality was so powerful that he reversed the values: he introduced the idea that our incarnate, sensory experiences of being in this world are secondary qualites and the primary qualities are mathematical: what we can measure defines reality.

This is a cornerstone of the materialist ideology that we have grown up with. What he failed to acknowledge was that the measurement he prized, was a visual one, i.e. it depended on the visual sense. Thus he was not really downgrading all sensory experience, rather he was making the visual sense the arbiter of what is real – all other senses and realities, emotions, feelings, principles etc were subordinated to visual measure.

It's clear that Galileo's radical ideas depended on the prior invention of mechanical clocks which imposed visual, spatial measure on time, whereas human, experienced, time is closer to the sense of hearing and to music. In my ANPA 2011 Proceedings paper, 'Human Mathematics: New Beginnings from the Pythagoras Theano Impulse', I outlined some of the many unforeseen results of the dominance of the visual sense over hearing and the other senses, and of quantitatively measurable reality over qualitative, experienced reality.

I recommended a return to Pythagoras' original definition of mathematics, '*ta mathemata*', 'those things which have been learned', where the learning is both inner development and investigation of physical reality. These are not separate as Pythagoras followed the Hermetic principle of 'as above, so below: as without, so within'.

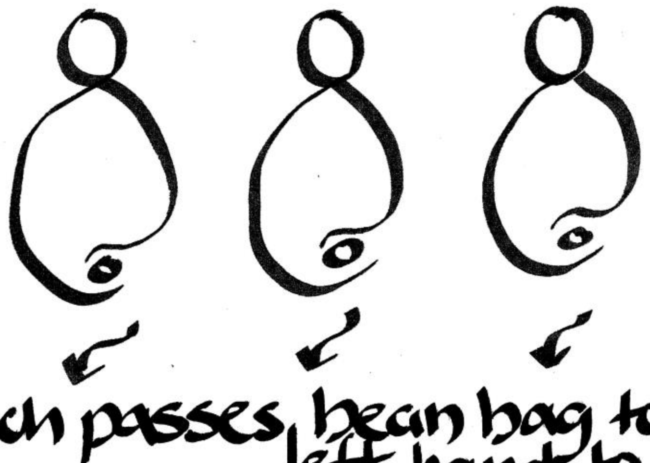


B

(1) Circle of people

B

(2) A passes bean bag to B,
Right hand to left; similarly B to C ...



B

(3) Each passes bean bag to self
left hand to right.

Following Euclid's example, in that paper I explicated my guiding beliefs, my *koina*. I then outlined the implications for development of what I called 'human mathematics' (it could be called 'neo-neopythagorean mathematics').

These include explicit emphasis on mathematical experience (complementing the current emphasis on results): developing self-awareness in the act of doing mathematics, witness awareness, awareness of our being part of the wholeness of life: also, explicit acknowledgement of mathematical responsibility: ongoing clarification of the telos of human mathematics, including refining our senses and revisiting Platonic values.

Development of more qualitative mathematics includes mathematics from senses other than vision, for example mathematics of gesture, and from different areas of the external world, for example, ethnomathematics, the arts and crafts etc: also investigating mathematical symbols and language for human meaning.

Much work has been done and continues to be done in various of these areas, but mathematics is still predominantly seen, by the general public and most mathematicians, as an abstract discipline, disconnected from human life.

In order to experience oneness in manyness, which is a fundamental reality of incarnate life, we did a circle exercise, shown in sketches B1, B2 and B3. We stood around in a circle (B1), each holding one bean bag in the right hand. We then crossed our right arm over our left and passed the bean bag to our neighbour on our left, whilst receiving in our left hand a bean bag from the neighbour on our right (B2). We then passed the bean bag from our left hand to our right (B3). We repeated this process for a while, attempting to create a smooth flow. We did not succeed.

Wonderfully, when oneness unfolds into manyness, the seed into the plant, the embryo into the human form, the implicate into the explicate order, the oneness remains. But to create oneness from manyness, as we discovered, is not so easy. We live in a time of fragmented knowledge. Mathematicians have a responsibility to humanity and to the future of this planet to embrace wholeness, whilst experiencing the excitement of the extreme sport of mathematics.