ISSN 1362 - 1211 | No 94 | **Summer 2007**

Review network

JOURNAL OF THE SCIENTIFIC
AND MEDICAL NETWORK

Hypersphere Wonderings or the Scientific, Cosmological and Mystical Significance of Perelman's solution of Poincaré's Conjecture

From: Dr Roger McMaster-Fay, rfay@optushome.com.au

My good Christmas reading started when I stumbled over *Science* Magazine's "Breakthrough of the Year" award to Russian mathematician Grigori Perelman proof of the Poincaré conjecture.[1] As a non-mathematician, I read with interest how Perelman's 2002 mathematical solution to the conjecture involved describing an entity or quantity he called *entropy*.

This all starts a century ago when the French mathematician Henri Poincaré was developing topology mathematics. Topology mathematics has been called "rubber sheet geometry" because it describes how dimensional surfaces can undergo arbitrary amounts of stretching and folding. Poincaré theorised that as two-dimensional plains fold to produce three dimensional form, so three-dimensional space and matter (the universe) is at the boundary / surface of a four-dimensional ball: a *Hypersphere*.[1] So to my mind it could also be interpreted that the folding of two-dimensional (2D) planes to produce three-dimensional (3D) form can alternatively be seen as an unfolding of 3D to form 2D. Likewise 3D can be seen as an unfolding of 4D. Grigori Perelman mathematically described how this flow of unfolding / folding at the surface of the 'hypersphere' does not become stagnant or isolated because it is accompanied by a Quantity, that increases during flow, which gives that flow direction. He called this quantity *entropy*.[2] This work of Perelman's and his subsequent two papers posted on the internet,[3,4] are proposed to have solved the Poincaré conjecture of how the Hypersphere maintains it unity despite the folding/unfolding at its surface. His mathematical solution has earned him the 2006 Fields Medal for mathematics, nomination for the $1 million prize from the Clay Mathematics Institute and the Breakthrough of the Year award 2006 from *Science* magazine.

I see similarities here with both David Bohm's *Implicate Order* and its associated *holomovement* [5] and also dynamical systems 'strange attractors'. Interestingly Poincaré was a founder of dynamical systems mathematics. He even saw topology and dynamical systems as two sides of the one coin.[6] In Bohm's quantum mechanical theory of the Implicate Order,[5] everything manifest in our world and the universe of three-dimensional time, space and form is the *Explicate Order* and everything in this Explicate Order is an *unfolded* aspect of the Implicate Order. Also everything in the Explicate eventuately *enfolds* back into the Implicate. Bohm calls this process of unfolding and enfolding holomovement.

So, to me, Poincarés 'Hypersphere' can be seen as analogous to the Implicate Order and holomovement as analogous to entropy. Chaos theory came out of the study of the flow of fluids in the third dimension. It describes/produces the most amazing, complex and beautiful patterns that come out of what appears to be chaotic movement. In the Chaos theory, flow is given direction by (strange) attractors. These attractors can be seen as analogous to Perelman's entropy. So we appear to be one step further ahead in describing a force from another dimension that gives direction and, dare I say, meaning, to three-dimensional existence – all very exciting and mysterious / mystical.

References:

1. Mackenzie D. Breakthrough of the year: the Poincaré conjecture – proved. *Science* 2006; 314(5807):1848-9.
2. Perelman G. The entropy formula for the Ricci flow and its geometric applications. preprint 2002; math.DG/0211159.
3. Perelman G. Ricci flow with surgery on three-manifolds. preprint 2003; math.DG/0303109.
4. Perelman G. Finite extinction time for the solutions to the Ricci flow on certain three-manifolds. Preprint 2003; math.DG/0307245.
5. Bohm D. *Wholeness and the Implicate Order.* Routledge & Kegan Paul, London; 1980.
6. Gleick J. *Chaos: making of a new science.* Penguin Books, London; 1987: 46.