

Consciousness and the New Math

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1. Introduction

Under the heading 'Consciousness' I mean to include the whole system: individual consciousness system, individual unconscious system, collective unconsciousness system, higher planes, and so on. We assume for the sake of discussion such a global supramental system, as proposed by Teilhard de Chardin for example, under the name *noosphere*, by Rupert Sheldrake as the *morphic field*, and in the Sanskrit literature as the *ākāśa* and by other names. Following Ervin Laszlo, who refers to this system as the *Akashic Field*, I will call this global system the *A-system*.

I became interested in this subject during my first visit to India, in 1972, when I stayed for seven months in the ambiance of Neem Karoli Baba, a local saint in the Himalayan foothills. During this time, and ever since, novel information seems to come to me in dreams and meditations. A key idea coming in this way is the metaphor of *vibration*. Well known in modern science in the context of physical systems — sound waves, radio waves, quantum waves, gravity waves, etc. — the vibration metaphor is equally well known in Hindu philosophy in the literature on the *ākāśa*. On returning to my post as professor of mathematics in the University of California in 1974, I initiated a new line of research on vibrations and forms, which continues to this day.

Complex dynamical systems is a new branch of mathematics dealing with large networks of systems changing in time according

to rules. And in this new subject a paradigm called *connectionism* has evolved, in which the intelligence of a system is thought to reside primarily in its network of connections, rather than within its collection of nodes. So as a mathematician interested in complex dynamical systems, my perspective on the A-system has been to focus on its linkages, rather than the nature of its subsystems or nodes. And it is in this perspective of the new math that I have studied the duality of vibrations and forms.

Thus a form in one level or subsystem of the global A-system emits a vibration in an interpolating medium, and this vibration crystalizes a form in another level of the A-system — that kind of link, from form to form. Under this paradigm I will now discuss three so-called paranormal phenomena. Here *paranormal* means that along-side normal science, that is, challenging modern science, and therefore, denied by modern science. It is this habit of denial that we seek to change with our mathematical models.

2. Telepathy

Telepathy, like telegraphy and telephony, refers to the transmission from one individual consciousness to another through intervening space, over long distances, and with great speed. Unlike its electrical siblings, telepathy is thought to proceed without a material basis. Although not dependent on the electromagnetic field, it is nonetheless somewhat similar to radio transmission, and thus has been called *mental radio* by Upton Sinclair. Rupert Sheldrake, one of the great scientists working in this area, has proposed a new nonphysical field called the *morphic field* to account for telepathy and other like communication functions of the natural world.

One of Sheldrake's many experiments aimed at breaking though the denial of the paranormal on the part of modern scientists concerns

the ability of many pets to predict when their owners are coming home. As reported in his book (Sheldrake, 1999), videos of dogs in empty houses clearly show this predictive power, as their owners are told to start home at a computer-selected random time.

In any case, considering the crucial role of mathematics in bringing understanding and thus acceptance to new scientific ideas in the past — like the electric and magnetic fields, universal gravitation, quantum probabilities and the like — I undertook a project with a colleague, Peter Broadwell, of mathematical modeling, computer simulation, and computer graphic animation of the setup of Sheldrake's experiment.

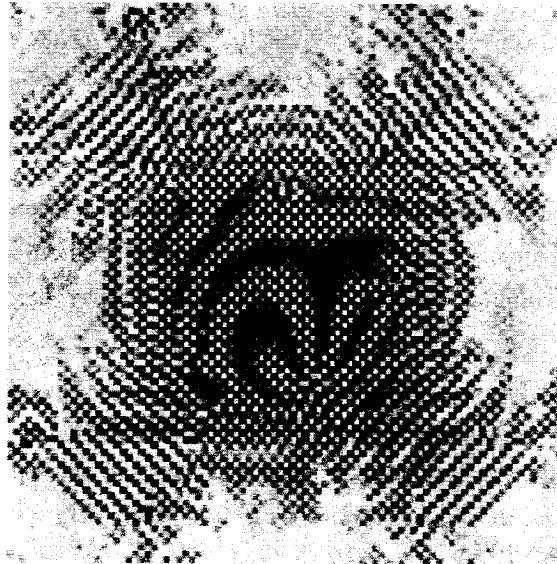


Figure One: Vibration in a two-dimensional field

In this model the d'Alembertian wave equation of mathematical physics is repurposed as a model for the vibration of the A-system linking two individual conscious systems. Initially vibrating, as shown in Figure One, where the multicoloured square may be regarded as an elastic membrane stretched over a horizontal

frame, and struck with a stick. The ensuing vibration is indicated by blue if deflected down by a wave, red if deflected up, black if not deflected at all, and intermediate spectral hues for intermediate deflections. This image is a single frozen frame from a rapidly ongoing animation.

At a certain time in the simulation, a black square appears in the lower left of the image, as the dog's owner gets the call to start homeward, and the shape is considered to encode that thought. The entire vibratory pattern is greatly transformed by this event, as the black indicates that the membrane has been momentarily forced to its neutral position, in the plane of the bounding square frame. And then, soon after, a smaller black triangle appears in the upper right corner of the image. This is the dog's mental radio antenna, coming up to test for good news. This perturbation also disturbs the vibratory pattern. Then as the waves made by the owner's thought progresses through the A-field, changing patterns on a line segment, called the *retina*, adjacent to the dog's antenna are registered by the dog as a *memory engram*, or space-time pattern in two dimensions—one spatial and one temporal. The engram pattern corresponding to the the owners homecoming signal is recognized by the dog, and she goes to the door in anticipation.

More detailed descriptions of this work may be found in references MS#86 and NS#86b below.

3. Mind/Body Connection

It seems that modern science denies the existence of telepathy, possibly as it has no explanation or mechanism for it. However, the situation is rather opposite for the mind/body problem. How can the thought of a departed loved one beget tears? Even though

modern science knows no mechanism at present, the phenomenon cannot be denied. For a certain sector of the scientific community, a thought is a physical state of the biological neural network including the brain and central nervous system — for them there is no mind/body problem, as the mind is assumed to be part of the body. For those of us unable to hold to this hypothesis, mind/body connection remains a conundrum.

In joint work with Sisir Roy, professor of quantum physics at the Indian Statistical Institute (Kolkata), we have proposed models for the mind and the body that admit a simple connection mechanism. While the connection we propose is simple, the models themselves require quite a stretch. Unless, of course, you are a quantum physicist! For our models are adaptations of a recent model for the quantum vacuum, due to Professor Roy and his German colleague, Manfred Requardt (2001). This whole line of thought partakes of the *digital philosophy* of Ed Fredkin, Steven Wolfram, and others, according to which ordinary reality is a fuzzy perception of quantum reality, which consists of an astronomically large yet finite set of points arranged in a gigantic cellular automaton! Thus, Roy and I have adapted and simplified the Requardt and Roy model for the quantum vacuum as a model for the body, taken a similar model for the mind, and connected up the two cellular automata-like objects by adding links between them. Computer graphic simulation of this model makes the complicated verbal/symbolic description easy to grasp, and the details are given in our joint papers, MS#119 and MS#122. Again, the new math is exploited to model an aspect of consciousness, and NetLogo, an agent-based modeling language, makes the computer simulation quite easy. These NetLogo models are posted on the website (see references below) along with the articles.

4. Precognition

We now take up our third and final application of the new math to aspects of consciousness, and its ambient A-system. But

this one is conceptually more difficult: precognition. Even if the mind were a part of the body, modern science would still be challenged to accept telegrams from months in the future! One way many people have experienced such precognition is through their dreams,. So let us assume this happens, for the sake of discussion. The reason this is a challenge to our thinking, I conjecture, is that our entire planetary culture, for ages, contains an assumption so pervasive and taken for granted as to not even have a name! This assumption concerns the separation of the past from the future, which is a universally considered to be a sharp knife, cutting very thin slices of the future, compressing an enormous living spectrum of possibility into a single dead fact of history. Slice by slice, eating away at the future, increasing the length of the past, each slice taking a turn at being the infinitesimal *now*. I call this view of time, *step-time*, after the Heavyside step function well known to mathematicians.

Now that we have identified and named this hidden assumption of everyday life and thought, it is not so difficult to replace it with a variation, *slope-time*. In this view of time, the present moment, *now*, is expanded into a finite interval, its width measured in milliseconds, or perhaps months or years, as we wish. The infinite living possibilities of the future are still compressed into a single dead fact of history in the past. However, the flattening process now takes a finite interval of time.

During this interval, the spectrum of future possibilities is gradually reduced — perhaps nonlinearly in time — and during this compression process we may perceive some possibilities of relatively large probability. Having made a new model of reality based on slope-time rather than step-time, we have to admit that still, our perception is based on step-time, this is a sort of physiological or mental limitation, so it is convenient to maintain

both models in side-by-side parallel universes, slope-time *and* step-time. This idea is explained in more detail in MS#106. The flattening process has been modeled using the quantum vacuum, digital philosophy paradigm described above, in further joint work with Sisir Roy. See MS#122.

5. Conclusion

Having seen three examples of the new math applied to aspects of consciousness, or the A-field, we may just end with the hope that more theoretical models of this sort might assist the scientific community to break through denial, and engage the subtle realms of mind as an aspect of Nature to be explored with the usual, superb scientific apparatus. After all, mathematical physics did evolve in a giant step forward after the new math of Newton, and a new Enlightenment might serve us well at the present time.

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References

All articles referred above may be found, listed by MS#, at the web page; www.ralph-abraham.org/articles/full-list.html or in the bibliographies within those articles. In addition, MS#118 and MS#122 have been published as:

Abraham, Ralph (2006), Vibrations and Forms. In: *Consciousness: A Deeper Scientific Search*, J. Shear and S. P. Mukherjee, eds. Kolkata, India: Ramakrishna Mission Institute of Culture, pp. 192-212

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