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ORIGINAL PAPER

Vitalism, complexity and the concept of spin

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Vital Force is a concept that has suffered at the hands of the current medical model. An attempt is made to show how it might be possible to explain Vital Force in terms of complexity theory. A metaphor is introduced for the operation of Vital Force in terms of gyroscopic motion. *Homeopathy* (2002) **91,** 26–31.

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Introduction

'Permanent revolution' is not just a political catch phrase. It is the constant condition of practically everything in the known Universe. Daily existence rarely brings us face to face with the fact that we are all—people, fellow creatures, houses, cities, continents, oceans, the air we breathe—spinning with the Earth at over 1600 km/h. But for gravity, we would all be flung off into space. Put another way, this is precisely what would happen should the Earth ever suddenly stop spinning.

However, this unconscious experience of revolution does not stop here. Going up in scale, as well as turning with the Earth on its axis, we are simultaneously revolving around the Sun at nearly 100 000 k/h, while the Solar System as a whole turns majestically with the rest of the Milky Way galaxy approximately once every 200 million years. This seemingly slow progress through the Void actually translates into a rotational velocity of almost 21.5 million km/h. Going down in scale, the classical view of atomic constituents—electrons, protons, and neutrons—is that they spin like tops on their axes. The point, probably now laboured, is this; we are all spinning in infinity in a multitude of simultaneously different ways.

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It might not seem entirely clear as to what any of this has to do with homeopathy. However, the thesis ultimately to be developed here is that the concept of spin could be a useful metaphor for that intangible entity we all try to address in attempting to heal our patients, i.e., the Vital Force.

In defence of vitalism

For the purpose of outlining a possible relationship between the concepts of spin and Vital Force, it is first necessary to attempt to place vitalism in a modern scientific context. By the standards of the now centuries-old dominant materialistic paradigm, this might appear intellectually atavistic. There are increasing signs, however, that a purely materialistic view of the universe has its limitations. While such a notion is now relatively commonplace in the physical sciences, it has yet to have any serious impact on biology and medicine.

At several conferences recently, it was made abundantly clear that amongst the more conventional medically oriented followers of homeopathy and other complementary therapies, there is antagonism towards vitalist concepts. To illustrate this point, here is a quote from Dr Anthony Campbell, a serious and respected medical thinker with more than a passing interest in complementary medicine: 'The energy that practitioners of alternative medicine often speak about is closely related to vitalism. Like the vital force, it doesn't have any identifiable source, it doesn't obey any kind of law, it can't be defined it is simply postulated *ad hoc*, to explain whatever effects or

alleged effects need explaining. It can't be pinned down or put to the question; its function is to provide the illusion of meaning without substance. It is a little like the æther which was postulated in earlier times to explain transmission of light through space, or like phlogiston, which was used at one time to explain the phenomenon of heat... However, phlogiston and the æther could be, and were, disproved by experiment...; ''energy'' in alternative medicine can't be disproved because it is too amorphous and vague a concept.'[1] I do not deny that there has been imprecise thinking by some CAM practitioners on the subject of Vital Force, so it is perfectly legitimate to ask what is meant when it is discussed. But it is not sufficient to merely dismiss those who hold vitalist views as quacks and 'spin doctors' just because they are unable to articulate their thoughts on the subject and do not kowtow to the current materialistic medical paradigm. Equally, it is reasonable to ask if homeopathy (or any other CAM that espouses vitalism) can be 'understood' within a scientific framework.

Quantity *vs* quality

As a scientist and a homeopath, I find this an exquisite problem. The difference between science and homeopathy could be that of quantity and quality. Modern rational science is about acquiring and measuring quantifiable data. On this basis, hypotheses are erected to be confirmed or denied by further five-sense-based experimentation. In this manner, ideally a body of 'objective' knowledge is assembled that is accessible and susceptible to addition, confirmation or refutation. Homeopaths and many other CAM practitioners, while attempting to be rational in their approach (homeopaths would have no materia medicas or repertories if they were not), depend perhaps to a greater extent on their subjective feelings to sense and discriminate more subtle qualities in their patients than can be accessed by conventional medical testing procedures. To put it crudely, many machines can tell you that someone is dead, but it may be possible for differences in quality between the living and the dead to be subjectively sensed immediately.[2]

Homeopathy might well be defined as a science of qualities. And as this fine quality-sensing ability varies from practitioner to practitioner (and indeed within the same practitioner over time), it is far more difficult to pin-down, prove or disprove. The Vital Force might be one of those qualities that we sense more or less directly depending on the rapid moment-to-moment flux in our own subjective inner states. The more we are grounded within ourselves, the better the quality of sensing. This, of course, assumes the reality in each of us of an active subjective inner world, and makes little or no impression on those who demand objective, proof for something that requires a finely honed subjectivity to sense. Without regurgitating arguments over the objective evidence (e.g., Kirlian photography, bio-photon emission, etc.),[3] could there be a scientific rationale for Vital Force? Even if one believes there might be, the problem is where to begin.

The trouble with science

To start with, science is not a homogeneous endeavour. The theory and practice of one branch of science does not necessarily overlap with and inform other disciplines. Thus the theoretical and predictive refinements of physics, embodied in relativity theory and quantum mechanics (QM), for example, currently have very little bearing on conventional biomedicine. Given the dominance of the current deterministic medical model, one could argue that there is no reason why they should. But one of the great lessons of QM (via Heisenberg's Uncertainty Principle and quantum entanglement) concerns the connectedness of everything in the Universe. Thus, when science attempts to understand the universe's fundamental building blocks, it realises a unity and non-deterministic connectedness that is a far cry from the largely empirical determinism of the biomedical sciences.

This theoretical heterogeneity across the sciences can lead to some stark contradictions. Thus physicists, for example, are quite at home with the idea that objects can interact with each other 'at a distance' via intervening and intertwining fields—gravitational, electromagnetic, etc. To a biochemist, however, molecules are generally understood as interacting only when they come into direct physical contact; the notion of action at a distance is considered akin to witchcraft. There is little room in biochemistry for the idea that molecules might interact with each other via intervening fields, before they come into direct physical contact. On the basis of this understanding it is becoming increasingly difficult to rationalise how, for example, enzymes specifically recognise and turn over millions of substrate molecules per second, simply by fortuitously colliding with each other. It seems increasingly likely that the meeting of enzyme with substrate molecules begins with, and is facilitated by some prior long-range interaction that 'locks' them into each other.[4]

Avoiding Benvenisteristion

This is precisely how Jacques Benveniste rationalised his (much maligned by the scientific community) experiments on ultra-high dilutions.[5] Consideration of such long-range interactions could explain, for example, how water might retain a 'memory' of solutes that have been succussed and diluted beyond Avogadro's constant (interestingly, a recent pan-European study involving four different laboratories,

suggests that Benveniste might have been right all along).[6] In the last 10 years or so, quantum mechanical calculations have predicted that given a large enough number of water molecules (somewhere of the order of 10^{17}, representing a body of water with dimensions of several hundred micrometres), the sum total of all the interactions leads to a state where all the molecules spontaneously self-organise, resonating together to form a so-called 'coherent domain'.[7,8] This phenomenon is called superradiance; dilution and succussion as in homeopathy could conceivably trigger the formation of such coherent domains. The point is, a coherent domain is recognisably liquid water, but its emergence cannot be predicted from the behaviour of just a few water molecules. In the language of complexity theory, the formation of a coherent domain is an emergent property of the collective and spontaneous self-organising behaviour of all the water molecules.[9]

Complexity in a system is behaviour midway between chaos and predictable order. Complexity theory is now being used to understand the real behaviour of all sorts of different systems, ranging from, e.g., cells to hearts, brains, economies, evolution and the weather, and latterly, patterns of chronic disease.[9,10] Its notion of emergent properties arising out of the collective behaviour of large numbers of building blocks, could unify a vast, and currently disparate, body of scientific knowledge. Complex systems are characterised by self-organisation, openness (i.e., the ability to perceive, respond to, and accommodate to changes in the universe around them), and a wholeness that cannot be attributed to or found in any particular part of the whole.

In this view, therefore, the Vital Force could be understood as an emergent property of billions of living cells. The totality would generate a 'field' that, by feedback, organises the elements of that totality, thus reinforcing itself. By its very nature (and to address one of the points in the quote by Dr Campbell earlier), this 'field' does not originate in any one cell or organ or body-part: it is the resultant of the whole organism. Any dissipative influence (e.g., entropy) from outside will be resisted by the field, unless that dissipation is so strong and irreversible that the field is compromised: the 'whole' then disintegrates—or dies.

This modern non-deterministic theoretical interpretation of the ancient ideas embodied in vitalism withstands critical comparison with the mechanistic determinism embodied in the current medical model.

A critique of the biomedical model

The currently dominant model, often termed the biomedical model, of which the double-blind placebo-controlled trial is the gold standard, is rooted in a deterministic philosophy that goes back to the enlightenment of the 17th and 18th centuries and the ideas of Descartes, Newton and others. Determinism can be summarised as the belief that the future behaviour of any system can be entirely known or accurately calculated, simply from complete knowledge of its present conditions. In other words, any system can be imagined as a mechanical contrivance made up of separate but interacting parts. Take the machine apart and put it back together again correctly and it will function as it did before. Dr Frankenstein would have been an unreconstructed determinist. Clearly, living organisms do not function by such rules.

Because of the nature of the scientific paradigm in which it is rooted, the biomedical model espouses causality: effects are held to be the results of causes not the reverse. Specifically, an effect can be attributed to a particular cause, more or less on a one-to-one basis. From this follows the traditional methodology of scientific experiments (of which the double-blind placebo-controlled trial is a type). The system under investigation is viewed as a collection of simply interacting variables. The idea is, as far as possible, to hold all but one of the variables constant, while systematically changing the variable under investigation.

There are, of course, assumptions implicit in this approach; notably that the relationship between all the variables is uncomplicated. This permits ready analysis of the results of experiments according to solvable, usually linear, mathematical equations which generate experimentally verifiable predictions about the system. Although historically successful in investigating the world, in truth, this version of the scientific method is severely limited. For while deterministic and causal assumptions are powerful analytical tools to understand the behaviour of well-behaved inanimate systems, such as the movements of planets or pendulums, they have been found to be seriously flawed when they attempt to deal with anything living and complicated (where the variables mentioned above interact in a mathematically complex, non-linear manner). The method also breaks down at the atomic and molecular scale and even for seemingly simple systems approaching or actually in chaos (a wildly swinging pendulum, for example).

Over the last century, developments in the physical sciences (especially fast, affordable computing) have permitted mathematics to progress rapidly so that even complex non-deterministic systems are now amenable to understanding. What gives cause for concern about the biomedical model is that it seems incapable of incorporating these advances in quantum mechanics, relativity theory, chaos and complexity theories. Even a cursory glance at the nervous system shows us that the 'simple' firing of just one neurone; an event that can be the single cause of a multitude of simultaneous, complex results; can itself have any number of synchronistic, interlocking and equally complex

causes. A simplistic, linear, deterministic analysis of such a situation is clearly naive, although from the way some neurobiologists speak, one would not think so! Complexity theory has begun successfully to take a non-linear approach to how the nervous system might function.

Science is not a homogeneous enterprise, and the theoretical underpinnings of its various disciplines varies in modernity. So that while physicists and other physical scientists have the latest 'top-of-the-range' theories to attempt understanding of the universe, medical scientists are saddled with arguably outdated empirical notions that have improved little over the last few centuries. It is doubtful that the biomedical model can encompass, let alone comprehend homoeopathy and other CAMs, when it cannot even get close to providing a valid description of a vibrant living organism. Homeopaths and other CAM practitioners should reflect on the wisdom of entrusting their hard-won art and science to this out-dated and out-moded paradigm, for the sake of greater acceptability by the conventional medical profession.

Unfortunately, at the moment there seems to be little alternative. This is partly due to the lack of perception of an overwhelming need for a new paradigm amongst conventional medical practitioners. Scientific revolutions rarely begin in or with the dominant paradigm, especially where that paradigm is deemed to be successful. The adherents of a dominant paradigm are usually the last to perceive the poverty of their ideas in the face of new facts, mainly because from neglect or active suppression, those facts remain hidden from them. As long as the evidence base for the Vital Force is ignored by conventional science, it is unlikely that great strides in theory will be made. Those theoretical strides, however, will eventually come and they are most likely to originate from physics and complexity theory, not the biomedical sciences. Quantum- and complexity theoretical notions of non-locality and the fundamental interconnectedness of everything in the universe (quantum entanglement) will eventually trickle down into the biomedical sciences and influence the way we understand, for example, the practitioner–patient interaction and the role of medicines in this (for some readable accounts of quantum effects, such as non-locality, etc. see reference 11). Perhaps then, homeopaths and other CAM practitioners will feel empowered enough to resist the deterministic dictates of the medical model (and its 'grand inquisitor', the double-blind, placebo-controlled trial) that is forcing them to experiment in the way that it and it alone prescribes.

The politics of spin

We are now in a position to examine as to how the concept of spin could be used as a metaphor for understanding the operation of Vital Force. This analogy arose out of work we reported recently on the use of low-field nuclear magnetic resonance (NMR) to investigate differences in a parameter called the spin–spin relaxation time (T2) of water between homeopathically prepared (i.e., diluted and succussed) and non-homeopathically prepared (i.e., diluted only) solutions.[12] These experiments concluded that no such differences in T2 were observable, and that previous experiments by Dr Roland Conte *et al.* along these lines that had reported differences in T2, were explicable in terms of an experimental artefact arising from the glassware used.[13] Even though our experiments did not confirm differences between succussed and unsuccussed solutions, in order to understand the significance of our work it was necessary to consider the behaviour of real gyroscopes. From these deliberations, the spin metaphor for Vital Force arose.

NMR is possible because each of the positively charged nuclei of hydrogen atoms in a sample of water (a water molecule consists of an oxygen atom bound to two hydrogen atoms) may be thought of as spinning and so possesses a small magnetic moment (with a value of $\pm\frac{1}{2}$) with an associated magnetic field. The direction of this magnetic moment is at right angles to the spin direction. When a collection of protons is placed in a strong magnetic field, some will orientate themselves so that their individual magnetic moments are aligned with the external field, while others will line up in the opposite direction. The point is that each individual hydrogen nucleus behaves in the external magnetic field as if it were a tiny atomic gyroscope, and this is where the analogy with a gyroscope begins.

Once its flywheel is set spinning fast enough, a real gyroscope will stand upright against the Earth's gravitational field, balancing even on a point and seemingly defying gravity. Any attempt to push it over is resisted. This can be experienced more directly by actually holding a spinning gyroscope and trying to turn it. The feeling of its resistance to being turned makes it subjectively appear as if the gyroscope is alive.

As the flywheel of the standing gyroscope inevitably slows down, its spin axis begins to wobble and then tilts over, ceasing to point directly upward. The tilting axis then slowly starts to rotate. This slow rotation of the gyroscope's tilted axis of spin is called precession which is not an unfamiliar idea. If we consider the Earth as a massive spinning top, then its tilted axis of spin is doing precisely this. But whereas our toy gyroscope's tilted spin axis takes a second or so to precess once, the Earth takes around 26 000 years, a period known as a Great Year.[14] The continued slowing of the gyroscope's flywheel causes the spin axis to tilt further so that its precession becomes faster and more eccentric. The gyroscope is now less resistant to being pushed over and has more difficulty recovering after such an impulse. Eventually, as the flywheel slows even more, the downward gravitational pull

on the gyroscope's mass overcomes the weakening gravity-defying forces generated by the flywheel's angular momentum. The gyroscope falls over and stops.

A gyroscope differs from an ordinary spinning top in one all-important respect. Because the flywheel is set within a frame (that also contains the bearings), the gyroscope can be picked up and examined without disturbing the flywheel's rotation. This cannot be done with an ordinary spinning top: picking it up simply stops it spinning. So, a gyroscope can, in principle, interface with the universe around it without destroying its motion. In other words, while being open to the outside world, it maintains its 'gyroscopeness', an idea fully realised in the sophisticated gyroscopes used as compasses and in inertial guidance systems: external energy is supplied to ensure that the flywheel does not slow down. In this respect, a gyroscope can be imagined as one of those complex systems referred to in the previous sections. Frame and flywheel are the constituent elements. Generate spin (in the flywheel) and the whole—its 'gyroscopeness'—is an emergent property of the complex system: the whole is now greater than the sum of its separate parts. Without spin, a gyroscope is just a collection of inert lumps of material.

The gyroscope as a metaphor

That one's vitality could be thought of as having the property of spin is not an entirely new idea. Indeed, the Hindu concept of 'chakras', and other ancient systems of therapeutics intrinsically have built into them the notion of energy in rotation. It is a short step to imagine such rotational energy in the form of a gyroscope.[15]

Consider a strong Vital Force. It resists the 'morbific influences' (in today's language, stressors) that lead it to express disease. Either they do not affect it or it reacts strongly to them. In terms of our analogy, this is equivalent to a gyroscope whose flywheel has such a high rate of spin that it stands upright. In terms of the metaphor, 'resists morbific influences' means, that the upright gyroscope strongly resists being pushed over by outside forces applied to it, or it wobbles before settling back into its original upright posture. This wobbling phase would be equivalent to an expression of an acute disease. Clearly, if the wobble is too great, the Vital Force falls over, dead. Now imagine a sticky object on the gyroscope's flywheel. Set spinning, the flywheel attempts to throw it outward and off (by centrifugal force), and the faster the rate of spin the more likely the object is outwardly ejected. So, resistance to being pushed over is the result of the gyroscope flywheel's high rate of spin. This is how the Vital Force is imagined as resisting stressors—by throwing them outward towards the organism's extremities.

Remedial gyroscopes

Now consider a weaker Vital Force. It has more difficulty resisting stressors. This is represented in our analogy by the flywheel having already slowed down, leading to the gyroscope's axis being less stable in an upright position. In this situation, it is less able to resist being pushed over by applied outside forces, so that its recovery is incomplete. It settles into a motion where its axis precesses. This would be the equivalent of a chronic disease; the larger the precession, the more chronic the disease. Also, because of the slower flywheel spin rate, sticky objects (stressors) are less easily thrown off.

The action of a similar medicine can now be understood. In terms of gyroscopic motion, it is equivalent to speeding up the flywheel's spin rate. If this happens too quickly, the gyroscope wobbles violently before settling into its new higher rate of spin. The wobbling phase here would be the gyroscopic equivalent of a homeopathic aggravation.

It is even possible to describe a miasm using the gyroscopic analogy. This could be likened to the flywheel's susceptibility to being slowed down, i.e., friction on the flywheel. Friction can be supplied both by inheritance (the quality of the materials out of which flywheel and bearings are made; ideally, for a real gyroscope polished titanium steel for the former and diamonds for the latter) or by the environment (the medium in which the flywheel moves and contaminants adhering to it and the bearings, e.g., poor diet, housing, air-quality, dysfunctional family, physical and emotional traumas, etc.). The miasmatic medicine is then equivalent to lubricating the gyroscope's bearings.

Finally, the gyroscope analogy could be used to help illuminate some of the more disturbing health aspects of early 21st century life, such as the increasing incidence of autoimmune disease, allergy and problems associated with antibiotic abuse. To function properly, the immune system (effectively part of the Vital Force) needs to be able to differentiate between 'self and non-self' influences, 'morbific' or otherwise. Childhood illnesses could partly serve the purpose of priming and 'educating' the Vital Force in these differences. This is not a rapid process. In gyroscopic terms, it would be equivalent to the flywheel taking time to reach maximum 'healthy' speed. A vitality underexposed to the educational (flywheel-speeding) effects of childhood illnesses, or over-exposed to the suppressive (flywheel-braking) effects of too-early vaccination and/or abuse by conventional medication, cannot work at its optimum efficiency (maximum angular momentum). The result would be that the gyroscope/Vital Force has little intrinsic stability and wobbles chaotically from the gentlest of (morbific) nudges. Finally, within the metaphor developed here, the action of the endocrine and other body systems could each be considered as separate 'gyroscopes' whose individual spinning

'flywheels' are coupled to each other through positive and negative feedback processes. Any positive or adverse 'spin' effects in one gyroscope will immediately be transmitted to and resisted by the others.

Conclusion

I have tried to show that there is heterogeneity of theoretical approach between scientific disciplines. The physical sciences have, for sometime, been informed by non-deterministic theories including quantum mechanics, complexity and chaos. The biomedical sciences, on the other hand, are still saddled with rationalist thought patterns incompatible with approaches to the understanding of living organisms by anything other than theories rooted in a centuries-old determinism. Thus vitalist notions, which are the philosophical basis of many CAMs, appear discredited by the current medical model, especially if they do not comply with its experimental procedures, e.g., the double-blind placebo-controlled trial. Homeopaths and other CAM practitioners would do well to reflect on this as they seek greater acceptability within a deterministically dominated medical profession.

However, that the ancient idea of Vital Force might be amenable to a modern interpretation based in complexity theory, raises the possibility of a new understanding of life processes which could underpin a unification of conventional biomedical science with CAMs. In this spirit, the gyroscope metaphor developed here might be a useful way of beginning to think about Vital Force.

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