

## DEBATE: ENTANGLEMENT AND HOMEOPATHY

# The sound of two hands clapping: *Could homeopathy work locally and non-locally?*

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**Homeopathy might require both local and non-local mechanisms to describe fully its mode of action. The increased prevalence of self-prescribing does not necessarily refute the possibility of non-local mechanisms.** *Homeopathy (2005) 94, 100–104.*

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### Introduction

Fisher's nicely balanced editorial in the October 2004 issue of this journal highlighted a possible developing controversy concerning how homeopathy might work.<sup>1</sup> Is it local or non-local? Paraphrasing Fisher, he rightly points out that while those who espouse non-local ideas, such as myself, might be heavy on the mind-boggling rhetoric (eg, 'backwards-in-time' healing), our lightness on empirical evidence so far is such as could lift a fleet of Zeppelins (although with Walach's paper in the previous issue of this journal, we could arguably be seeing the end of this trend).<sup>2</sup> Fisher also suggests that most of the non-local hypothesis do not account adequately for the effects of self-treatment.

Local hypotheses, on the other hand, would have homeopathic medicines behave pharmacologically or even pseudo-pharmacologically, possibly via some kind of electromagnetic information transfer to a physical substrate (ie, the memory of water).<sup>3</sup> Fisher ultimately finds in favour of this more traditional local approach, concluding that the lack of unequivocal data (as far as conventional science is concerned) to support the 'local' hypothesis<sup>4</sup> can be blamed on methodological issues (although Belon *et al* recently published a series of landmark papers, culminating in a demonstration of the *in vitro* effects of ultra-high dilutions on the immune response).<sup>5</sup>

I question such a rush to judgment, which could be premature. Why does it have to be 'either/or'? Why not

'and'? This might sound strange coming from a 'non-localista', for between local and non-local hypothesis, there really is no contest. But before the homeopathic community embroils itself in another round of infighting, let me make my position clear: there is no contest because there isn't any reason to make a choice. Could it be that the conflict Fisher observes between local and non-local hypothesis, unlike the Zen koan, is really the sound of *two* hands clapping? In other words, and in quantum theoretical terms, I suggest that local and non-local world views are complementary and both are necessary to arrive at a complete description of the homeopathic process. Part of the purpose of this response to Fisher's editorial, is to argue for a more ecumenical approach to these world-views.

### Non-locality: a lesson from history?

To be fair, non-local descriptions of homeopathy hardly register on anyone's radar. However, local descriptions, like the 'memory of water' are at least known and, because of their presumed electromagnetic origin, are thought easier to comprehend and test within the conventional scientific paradigm. Non-local descriptions are much more difficult to test or indeed understand.

There is a historical parallel here with the physics notion of entanglement. Known as Einstein–Rosen–Podolsky or EPR entanglement, after the scientists who, early in the last century tried to demonstrate the incompleteness of quantum mechanics as a theory. They concluded on the basis of a thought experiment, that measurements performed on one member of an

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entangled pair of particles would instantaneously provide information on its partner, regardless of their separation in space and time.<sup>6</sup> However, because nothing in the universe travels faster than light, they argued, two parts of an entangled quantum system could not possibly be instantaneously connected. Einstein famously called this 'spooky action at a distance' and dismissed it. Because there was then no way to decide experimentally, the subject didn't occupy the minds of physicists.

Thirty years later, the conditions for the parts of a system to be independent were discovered (known as Bell's inequality).<sup>7</sup> This made it possible to test experimentally whether the parts of a quantum system were entangled as predicted by quantum mechanics. If Bell's inequality is violated, then non-locality has to be accepted. As Fisher pointed out, non-locality has been verified experimentally many times, most famously by Aspect *et al.*<sup>8</sup> It is now the basis for theoretical advances in quantum computing and cryptography. Therefore, non-locality or EPR entanglement, at least at the nanoscopic level of sub-atomic particles, atoms and molecules, is a fact. Whether this is generalisable to everyday life is the current bone of contention, and is the subject of so-called Weak Quantum Theory.<sup>9</sup> The point is, it took around 50 years for scientists to acquire the intellectual wherewithal, then generate experimental evidence for EPR entanglement.

## Non-locality and locality in homeopathy

Walach *et al* have apparently obtained 'the first piece of empirical evidence directly supporting non-local causes for the effects of homeopathy'. This is not the 'killer', Aspect-style experiment we all want to see, but time is needed to develop and refine the necessary experimental protocols, just as for the local approach.

But let us assume for a moment that Walach *et al*'s results really do demonstrate that verum and placebo groups are entangled. How can this be rationalised by a local pharmacological explanation? On the other hand, a non-local approach to this data can be formulated,<sup>10</sup> based on the metaphorical description of individuals' Vital Forces as quantised gyroscopic 'wave functions'. Under the right energetic circumstances, these wave functions could overlap and interfere with one another (in a manner similar to the wave functions of sub-atomic particles), leading to a new non-factorisable complex wave function that represents a verum and placebo group entangled state. 'Localistas' might argue that this is putting the theoretical cart before the experimental horse. Especially as the *in vitro* results of Belon *et al*<sup>5</sup> seem to suggest that homeopathic effects are due to the medicine itself. And if Walach *et al*'s results can be laid at the door of electromagnetic cross-contamination of verum and placebo during storage,<sup>11</sup> then surely non-local hypothesis of the therapeutic process

are dead in the water - a question crying out for the definitive 'yes/no' experiment.

One possibility is to repeat Walach *et al*'s experiment (with a larger sample), split into two groups. In one group, the preparation, prescription, and taking of verum (or placebo) would be done entirely in an earthed Faraday cage. In this way, it should be possible to screen out electromagnetic cross-contamination between verum and placebo.

It may be, however, that as with complementary wave-particle duality and (Heisenberg) uncertainty observed in orthodox quantum theory, what we are witnessing here is an irreducible dualism with its own laws of uncertainty: a kind of Heisenberg's Uncertainty Principle of healing. Just as a quantum entity only ever exhibits either its wave or particle nature separately and depending on the type of experiment that is performed, so the Belon and Walach experiments could each be demonstrating complementary sides of the remedy's action. If that is the case, then whether a test of homeopathy delivers a local or non-local result, could very much depend on the kind of experiment that is performed. In other words the answer one gets depends on how the question that is asked, and would be typically quantum mechanical.

Certainly, this could go some way to explaining the equivocal results of double-blind placebo-controlled trials of homeopathy.<sup>4</sup> Such uncertainty could arise in controlled trials because, the remedy is usually presented as the sole 'active agent' at the expense of the practitioner and the patient. This would effectively remove the remedy from its therapeutic context, ie, an entangled relationship with the patient and the practitioner, and may be considered the therapeutic equivalent of quantum decoherence.<sup>12</sup> Thus, by positing a mutually exclusivity between local and non-local explanations of homeopathy I believe we could be in danger of missing the whole picture. It could be that local and non-local explanations are complementary, that both are necessary to provide a complete description of the homeopathic process, and that it might prove impossible to separate the two.

Thus, it is worth re-considering the nature of the remedy in the local hypothesis. The process of sequential dilution and succession effectively removes all molecular trace of the remedy at high dilutions. Quantum theoretical calculations have demonstrated<sup>13</sup> that such a process could lead to the superimposition of a domain-like ordering on the dynamic long-range intermolecular structure of a staggeringly large number of water molecules (between  $10^{15}$  and  $10^{17}$ —about the size of a small drop just visible to the naked eye). The 'memory of water', therefore, is a modulating effect of the overall electromagnetic field binding all these molecules together, so that each domain behaves as a unified holistic structure, with all molecules moving and reacting to external influences in step. In other words, orthodox quantum theory at the molecular level seems to predict, that the homeopathic

preparation of remedies encodes information into the substrate via entanglement between the electromagnetically-bound molecules of the remedy's physical substrate. Consequently, even the so-called pseudo-pharmacological local explanations for the action of homeopathic remedies are 'tarded with the brush' of non-locality, albeit at a completely different level. The tantalising possibility arises of completely describing the homeopathic process in terms of an entanglement between various self-similar levels of entanglement, from the molecular right up to the whole being.

### Taking it to another level

This echoes the trend in my previous papers towards greater unification of entanglement ideas using quantum theory as a basis. Some strange ideas have been thrown up in the process. Fisher highlighted one of them: the notion of 'backwards-in-time' healing.<sup>14</sup> The problem here is what we mean by time. Our brains are wired to perceive reality within a separate 3-D space and linear 1-D time, so that notions of higher dimensions of space or going backwards in time are usually considered the province of Hollywood.

But from a modern (ie, relativistic and quantum mechanics) physics perspective, the separate space and time of classical physics are limiting concepts. In fact, modern physics would not be possible but for the concepts of space and time developed by mathematicians during the 19th century. In classical physics, the universe consists of inert material things and random energetic events occurring between them, all contained within a separate space extending to infinity in all directions, and a 1-D constantly flowing time. In modern physics, however, space and time are conflated into a fluid 4-D space time continuum that is part of, shaped and shifted by, all extant entities (relativity). But these entities are not the solid 'billiard balls' assumed by thinkers for most of the last 2500 years. They are best described in terms of constantly fluctuating energy fields in space time and the ever-changing interactions between them (quantum field theories), giving the illusion of solidity. Physicists have sometimes referred to matter as 'frozen energy'.<sup>15</sup> The point is, in this view, the particulate nature of matter is not a fundamental phenomenon: it arises out of the different types of quantum field interactions that instantaneously connect and are all the various entities in existence. This means that entanglement is the fundamental ontology of the universe, whether we know it or not, and whether we like it or not.

These ideas seem alien to us because we are so used to experiencing the world in terms of separate 3-D space and 1-D time, that the illusion of isolated unconnected entities persists. Consequently, even those who have a thorough grounding in quantum weirdness still expect (viscerally, at any rate) answers in terms of everyday concepts of space and time. Thus, in a 1-D

orderly and externally flowing time, causality has a precise meaning: it is a linked chain of events, each caused by its predecessor and, in turn, causing its successor; this train of cause and effect flows in one direction only. In this scenario, effects appearing before or simultaneously with their causes, is ludicrous. Perhaps an analogy might help: in the days of British Rail, the passenger compartments of its rolling stock were isolated from each other: one boarded the carriage and sat in a compartment on benches that faced forwards or backwards. Imagine sitting in one of these compartments. One's visual experience is limited to the world flashing past outside as seen (now—the present) through a small window. So telegraph post follows telegraph post in an orderly linear sequence, but with no knowledge of what is coming next (future) and only a more or less dim recollection of what went before (past). Such is the perceived experience of ordinary 1-D serial time.

Now imagine yourself suddenly on the roof of the carriage and with 20-20 all-round 360° vision. You would see what is coming, what is, and what has gone, as a single whole; the present, the future, and the past conflated into one 3-D landscaped now. The connectedness between objects in our all-round multi-dimensional vision would be much richer and more immediate than their linear 1-D progression as seen from inside the carriage. For inside the compartment, read classical physics and our ordinarily experienced world-view; up on the roof is the quantum world-view. It is when we attempt to comprehend the view from the roof in terms of the view from inside the carriage that we end up with quantum weirdness. In other words, trying to express quantum theory within the limitations of classical physics is what produces apparent paradoxes, like the non-local instantaneous, (ie, acausal: defying the usual rules of causality) connectivity between quantum objects we call entanglement. It would be rather like 2-D beings trying to comprehend a 3-D cube suddenly appearing in their universe. They would see a point growing into a square that decreases to a point again. The really huge step for these 2-D beings would be to visualise all these points and squares together, at once.<sup>16</sup> For a brain used to only perceiving the world in 2-D, this would be quite literally, mind-boggling.

Consequently, 'backwards-in-time' healing is really a misnomer: if the past, the present, and the future, are just one 'now', then healing done now would appear, from a 1-D temporal perspective to effect the past, the present, and the future simultaneously. Of course, designing an experiment to unequivocally prove such an assertion will not be easy, and Fisher is right to highlight this issue. For it will not be a 'Back to the Future' scenario where past medical records are miraculously changed or erased. On the other hand, it is felt by many CAM practitioners that the body somehow 'stores' the memories of past injuries and diseases. Perhaps 'backwards-in-time' healing means

that it is these stored memories which are erased, so that susceptibility in the future is also removed.

## Phoning a friend: the question of self-prescribing

Fisher also raises the interesting point that entanglement models of homeopathy have trouble dealing with the issue of self-treatment. This is thought to rule out the need for a practitioner as an essential component of the three-way PPR entangled state. In my view, there are several ways to approach this question. First, one could posit a simpler two-way entanglement between the patient and the remedy. This is more in line with Walach's earlier semiotic approach.<sup>17</sup> Entanglement in orthodox quantum theory predicts that the greater the number of entangled entities, the stronger the non-local interaction. Thus, by analogy one could suggest that a simpler two-way entanglement between patient and remedy might be weaker than three-way PPR entanglement. Experimentally testing this hypothesis would be difficult but possible.

However, my feeling is that this whole question rests on what we mean by self-treatment. Does it not imply that the person has decided on a medicine alone? It is more likely that the patient has been influenced in some way. I am indebted to Sue Crump of The Society of Homeopaths for providing the germ of this idea.<sup>18</sup> Thus, the individual may have read a book, or spoken to friends interested in homeopathy, or to a pharmacist while buying over-the-counter remedies, or perhaps is 'self-prescribing' on the basis of a memory of a previous visit to a homeopath, etc. The point is, the so-called self-treating consumer is actually influenced by a third party. What does this mean in terms of entanglement?

Remember that, according to quantum field theories, entanglement is the basic ontology of the universe. Consequently the classical idea of separate entities, completely isolated from the rest of the universe, is not tenable as a starting point. From the human point of view, entanglement is perhaps best expressed by John Donne's immortal poem, which begins, 'No man is an island, entire of itself...'.<sup>19</sup> So, from this perspective, there can be no such thing as self-treatment because human beings rarely do things in complete isolation from the rest of humanity.<sup>20</sup> There must always be some form of at least three-way entangled influence, even if the third part of the triad is a book, a friend, a telephone call, or even a memory of a previous healing encounter. This could mean we need to consider the relative strengths of three-way entanglement. Thus, full-blown three-way entanglement, involving a patient, practitioner, and remedy, might perhaps be a special case of a much more general, weaker three-way entanglement along the lines described above.

## Conclusion

It is not necessary, nor desirable, to consider local and non-local explanations of homeopathy as mutually exclusive. It is probable that they are complementary and that both are necessary in order to give a complete description of the homeopathic process.

Unequivocal demonstration of pure locality or non-locality in the therapeutic domain may not be easy (although some steps in this direction have been taken), as the one might be 'contaminated' by the other. There is also the considerable intellectual problem of understanding what non-locality and entanglement imply in practical terms at the human level of existence (eg, backwards-in-time healing). A more sophisticated appreciation of the concept of time could lead to a reevaluation of human experience in terms of entanglement, for example, transference and counter-transference phenomena as described by psychoanalysts.<sup>9</sup>

Certainly, the concept of entanglement will need deepening and broadening far beyond its explicit and relatively simplistic formulation by orthodox quantum theory before it can be of practical value to health practitioners.

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