

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.¹ 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).² 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).³ 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' hypothesis⁴ 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).⁵

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.⁶ 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).⁷ 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.*⁸ 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.⁹ 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,¹⁰ 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*⁵ 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,¹¹ 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.⁴ 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.¹² 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 demonstrated¹³ 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

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