

Evidence and simplicity: Why we should reject homeopathy

Scott Sehon PhD¹ and Donald Stanley MD²

¹Professor of Philosophy, Bowdoin College, Brunswick, ME, USA

²Associates in Pathology, Nobleboro, ME, USA

Section 1. Introduction

Homeopathy is intensely controversial. While millions of consumers and practitioners subscribe to it, [1,2] homeopathy is held in considerable disrepute by much of the mainstream medical and scientific community. The differences of opinion run deep; each side is inclined to think that the other is closed-minded, irrational, or both.[3-5]

As with any medical intervention, there are two sorts of questions one can ask about homeopathy, one fairly theoretical and one more empirical:

(A) Is there a plausible theory that explains how homeopathy *could* work? Is it the sort of intervention that we would *expect* to be effective, given what we know about the world?

(B) Is there empirical evidence that homeopathy is effective?

Critics of homeopathy have alleged that the answers to both questions are negative. Regarding (B), there is, at best, patchy and low quality evidence for the effectiveness of homeopathy. And regarding (A), critics say that we have no idea how homeopathy could possibly work, and that it doesn't seem to make sense at all given our current theories of chemistry and physiology. Critics argue that we should reject homeopathy because of this situation.

Defenders of homeopathy can take one of three lines of reply. First, they might claim that we do have an explanation (or at least the beginning of an explanation) for how homeopathy can be effective. Second, some homeopaths deny that we *need* a theory to explain how homeopathy works, for they think that the evidence of its effectiveness is so strong that it is only blind stubbornness to deny it. Third, they might deny the need for a scientific explanation on the grounds that homeopathy is a different paradigm and cannot be judged by the standards of western science.

We aim to shed some light on this debate by making explicit a philosophical principle that constrains both common sense and scientific reasoning. This constraint, which we will call the simplicity principle, has ancient roots that go back at least to Ockham. In light of the simplicity principle, we will be able to see more clearly how questions (A) and (B) relate to one another and, in particular, why each of the three homeopathic lines of reply is inadequate. If nothing else, we hope that defenders of homeopathy will gain a greater understanding of why many within the medical and scientific community are so deeply reluctant to accept the efficacy of homeopathic

interventions and why this reluctance is not mere blind stubbornness or some sort of artificial allegiance to a parochially western concept of medicine.

The paper is structured as follows. Following the introductory questions, in section 2, we introduce and explain the simplicity principle. In section 3, we explore question (A). We explain, from the vantage point of the simplicity principle, why it seems so implausible that homeopathy could be effective. In section 4, we look at the first line of reply from homeopathy, namely their efforts to show that they *do* have a plausible explanatory theory for homeopathy. In section 5, we explore their second line of reply, the claim that they need no answer to question (A) because the clinical evidence of effectiveness is so strong. In section 6, we investigate the third line of reply, according to which there is no need for a scientific explanation of homeopathy because homeopathy is somehow beyond the realm of what can be judged by modern science. We conclude in section 7.

Section 2. The Simplicity Principle (S)

William of Ockham famously proposed that *entia non sunt multiplicanda praeter necessitatem*—i.e., entities ought not to be multiplied beyond necessity. [6] We propose that a somewhat more general version of Ockham’s principle underlies much of scientific and common sense reasoning:

- (S) Given two theories, it is unreasonable to believe the one that leaves significantly more unexplained mysteries.

Neither Ockham’s original principle nor our variation counsels one to accept *theories* that are themselves simple rather than complex. Rather, Ockham suggests that, to the extent possible, one ought to posit a theory according to which the *world* itself is simpler, in the sense that the world has fewer distinct entities in it. Similarly, ours is a simplicity principle in the sense that it counsels against accepting a theory on which the world is more complex, in the sense of having more brute, unexplained facts, if there is an alternative theory that makes the world less mysterious. The idea is meant to be fairly

left unexplained by Aristotelian physics. This increase in explanatory power is a strong reason for rejecting Aristotelian theory.

The case for (S) goes beyond examples of purely scientific practice. In fact, it is our commitment to the simplicity principle, or something very like it, that keeps us from believing all manner of absurd things. Consider a theory introduced by Bertrand Russell [7]: the world is but five minutes old. Of course, we seem to remember many events that happened longer ago than that, and books are full of accounts of more distant times, but, according to the five minute theory, our memories and those books simply popped into existence five minutes ago. According to standard physics, the sunlight we see left the sun about eight minutes ago. The five minute theory accepts the same laws of nature, but says instead that the photons came into existence five minutes ago part of the way between the sun and the earth.

Of course the five minute theory is patently absurd, and no rational person would take it seriously. But why not, exactly? Since the five minute theory postulates the same laws of nature, the five minute theory is also just as successful at prediction as the standard picture. So, in terms of empirical adequacy, the five minute theory and the standard picture are on par.

What differentiates the five minute theory and the standard picture is simplicity. The standard picture does have its share of unanswered questions, e.g., “why is there a universe at all?”, “why is the mass of the neutron 1.293 MeV heavier than that of the proton, rather than, say, 1.287 MeV?”, etc. Since current physics leaves these questions unanswered, they count as unexplained mysteries for the standard theory. The five minute theory naturally has those mysteries as well, since it adds no explanatory power to the standard picture. However, the five minute theory also adds innumerable other mysteries. Here are just a few:

- Why is it that our memories and the history books are in remarkable agreement about things that ‘happened’ long before five minutes ago?
- Why are there are huge numbers of things that bear an incredible resemblance to each other—multiple copies of books, animals of the same species, cars of the same make, etc.?
- Why is it that there are houses that work so well for people to live in? Why roads that work so well for cars to drive on?

Indefinitely many other questions could be added. The five minute theory has no answers to these questions; it must leave the facts referred to as unexplained, brute mysteries. By contrast, of course, the standard picture has easy simple and mundane answers to these questions.

The point is simply this: the five minute theory is a remarkably bad theory not because of any empirical inadequacy, but because it posits so many unexplained mysteries—because it leaves so many questions unanswered that can be answered by an alternative theory. The five minute theory fails badly on simplicity grounds, as judged by (S), and *it is for this reason* that nobody takes the theory seriously. In other words, it is only because of our commitment to principle (S), or something very much like it, that we

can reject the five minute theory; everyone rejects the five minute theory; therefore, everyone is committed to the truth of (S), or something very much like it.

Admittedly, as formulated, (S) is somewhat vague: it is not clear exactly how one counts unexplained mysteries, so it won't always be clear which of two theories leaves more mysteries. Moreover, some questions seem to cry out for explanation more than others, and it is perhaps more serious for a theory to leave such questions unanswered. Since we have no algorithm for determining the importance of mysteries or for counting them, we have no algorithm for applying (S) mechanically to alternative theories. In the simplest cases, one theory will have all of the same mysteries as the alternative, plus a

can have dramatic powers, why don't we see anything of the sort with other water samples? Or, to put it more specifically, homeopathic solutions themselves will have trace impurities in amounts beyond those of the supposedly active ingredient. How does the solution 'know' which impurities are supposed to give it therapeutic powers?

The law of similars is another curious aspect of homeopathy, for it claims that substances which in macroscopic doses cause a certain set of symptoms will relieve that set of symptoms when taken in infinitesimally small doses. This is unlike any other known medicinal substance. So:

- (5) Why does the law of similars apply to homeopathic ingredients when it has never been seen to apply to any other medicinally used substance?

Homeopaths sometimes make an analogy here to vaccines, for in both cases, a substance, which in large doses would cause illness, has a positive medicinal effect in the right form and in small doses. But the analogy is not, in the end, very apt; if we were to accept the analogy, further questions would arise:

- (6) If vaccines are diluted to the point where nothing remains of the active ingredient, they become ineffective. Why are homeopathic remedies different?
- (7) Why is it that vaccines only have preventative power, but homeopathic remedies have curative power? Why don't vaccines have curative power?

It is worth emphasizing that these questions are not mere matters of detail. If the homeopaths simply leave these questions unanswered, then they would be admitting that their theory leaves gaping unexplained mysteries not faced by the allopathic alternative. In accord with the simplicity principle, this would be strong reason to reject homeopathy.

Section 4. First homeopathic reply: explanations for homeopathy

Some committed homeopaths acknowledge that they have no explanatory theory, admitting that "there is a need for viable hypotheses of homeopathy [sic] mechanism of action," [10] "we don't know how or why homeopathy works," [11] "more than 200 years after Hahnemann, the homeopathic mechanism is as unknown as it was in the beginning." [12] On the other hand, some proponents of homeopathy claim that they do have answers, or at least the beginnings of answers, to those questions. Some of the proffered theories are very general. For example, some say that when people are ill, their bodies become hypersensitive to homeopathic preparations. [9] This observation might be thought to have some value in answering a number of the questions above, but, in reality, it just pushes the questions back a step: *Why* do ill bodies become hypersensitive to dilute versions of these substances but to no others? Why aren't healthy bodies hypersensitive to infinitesimally small amounts of these or other ingredients? How can a body be so sensitive to a substance that it reacts even when there are no molecules of the substance left? Without answers to these questions, talk of hypersensitivity is mere handwaving.

When homeopaths make a more serious effort to answer questions like those raised above, they offer two sorts of approaches. First, following Hahnemann himself, proponents sometimes claim that homeopathic medications cure by affecting something in the human person that goes beyond what science can quantify or explain. This special feature of persons is sometimes referred to as “vital force”, and it is given various different descriptions by homeopaths:

“life energy itself...difficult to quantify, but it is the very real difference that occurs between life and death.” [9]

“the spiritlike dynamism that flows through the material organism”[13]

“the inherent, underlying, interconnective, self-healing process of the organism. This bio-energetic force is similar to what the Chinese call ‘chi,’ Japanese call ‘ki,’ yogis call ‘prana,’ Russian scientists call ‘bioplasm,’ and Star Wars characters call ‘The Force.’ [8]

However, if such talk is meant to give us answers to the questions above, then it fails. We would need to know *why* homeopathic remedies affect our “vital force” in ways that other infinitesimally diluted solutions do not, etc. Moreover, merely positing a “vital force” generates substantial mysteries, for homeopathy thereby looks to be committing itself to a view of the mind that philosophers call *substance dualism*. Space does not allow us to go into a detailed discussion of substance dualist views, but we can say that substance dualism is almost universally rejected by those who have thought most about it, namely philosophers of mind. Moreover, philosophers reject substance dualism because it introduces many, many unexplained mysteries, and thus runs afoul of the simplicity principle.[14] Construed as an attempt at explanation, talk of vital force is, again, mere handwaving.

memory of an initial configuration is lost almost instantly. Why would things change with homeopathic preparations?

Moreover,

- (9) Why would the changed structure of the water have curative properties? Why would those curative properties become enhanced by further dilution of the substance? Why would those curative properties happen to match the symptoms caused by the original ingredient when taken in higher doses?

Moreover, even with some sort of 'water memory' explanation, there would still be analogues of all the questions raised in (4) above:

- (10) All samples of water will have trace amounts of impurities both natural

Clinical experience and individual case histories certainly count as a kind of evidence. However, when examined more carefully in light of the simplicity principle, such cases typically provide much weaker evidence than it would first appear. True, it seems that the homeopath has an explanation of a particular patient's recovery and the conventional doctor does not, and thus conventional medicine must leave an additional unexplained mystery. However, it is one of the basic facts of medicine that some patients seeking treatment will improve, sometimes dramatically, whether treated or not. Suppose, for example, that a particular patient, call her Jane, takes a homeopathic remedy and recovers quite quickly from condition *X*; but suppose that we also know that approximately 10% of patients with *X* also exhibit a similar recovery, and that nobody knows why. So there are two questions, a particular question and a general one:

Why did Jane recover from condition *X*?

Why do 10% of patients recover in this fashion from *X*?

The homeopathic theory can answer the particular question about Jane, for the homeopath claims that the homeopathic remedy explains Jane's recovery. But conventional medicine will also have something to say in answer to the particular question: "Jane recovered for the same reason as the approximately 10% of patients with *X* recover; Jane's case is not unique." So both homeopathy and allopathy answer the particular question, but neither currently has an answer to the second and more general question. So, in terms of the number of unanswered questions, the homeopath and the conventional doctor are on a par. Thus, individual cases of dramatic recovery will not

way: Waber et al. found that the analgesic response to placebo pills was greater when subjects were told that the pills were more expensive. [29]

Thus, from the standpoint of the simplicity principle, case series evidence and other observational studies do not provide very strong evidence, for the observations made (*viz.*, patients whose conditions improved after taking homeopathic medications) are *not* significant unexplained mysteries for the alternative theory.

Precisely because of the evidential weakness of case studies, the scientific community has long since recognized the value of controlled trials and randomized controlled trials (“RCTs”) in particular

If we still denied its effectiveness, we would have the massive unexplained mystery of the positive clinical evidence. On the other hand, if we accepted the effectiveness of homeopathy, we would have the massive mysteries outlined above: how something chemically indistinguishable from water can have dramatic effects, etc. Neither stance would look remotely acceptable, and we would be well advised to have our best scientists start analyzing the mechanism behind homeopathy, for we would surmise that our chemical and physiological theories must be in need of extremely substantial revision. However, we are not in this dire situation, because there is far from overwhelming clinical positive evidence for homeopathy.

Section 6. Third homeopathic reply: attack on science and simplicity

Some proponents do not attempt to explain how homeopathy might work, but are also not particularly concerned with the results of controlled trials. Some would say that we do not need an explanation for the success of homeopathy because we are dealing with a phenomenon that is beyond the explanatory scope of normal western science.

However, our arguments above did not rely on canons or epistemological norms specific to western science. We relied only on the principle of simplicity, and we pointed out in section 2 that simplicity considerations underlie not only scientific discourse but also our common sense justification for rejecting such nonsense as the five minute theory of the world. Thus the simplicity principle is common ground. It is not a parochial expression of a conventional, western approach to science and medicine; rather it is deeply engrained in common sense, and is implicitly accepted by all participants in the homeopathy debate.

In fact, even apart from arguments about Aristotelian physics or the five minute theory, proponents of homeopathy implicitly commit themselves to (S) or something like it. Recall that homeopaths believe that homeopathy works primarily because they claim to have observed its success in practice. But it is important to see that such experience counts as evidence precisely because we accept the simplicity principle. As we saw above, homeopaths present cases in which a patient was given a homeopathic remedy, and the patient's condition then improved. The homeopath claims to have a theory which

weaker evidence consisting of anecdotal and observational reports from practitioners and consumers alike; on the other hand, those who claim that homeopathy is effective have enormous unexplained mysteries, and answering those mysteries would appear to require massive revision of standard chemistry and physiology. As with all scientific questions, it is one of balance and evidence rather than proof. Given the weakness of the clinical evidence, and given the vast mysteries imposed upon us by the acceptance of homeopathy, the balance is heavily against homeopathy, and this is not a matter of intransigence or blind faith in an allopathic paradigm.

Acknowledgments

The authors are indebted to Hayden Sartoris, Ingrid Stanley, and two anonymous referees for valuable comments on an earlier draft of this essay.

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