



Editorial

In praise of coffee and scientific anomalies

Finally, an argument in the debate about homeopathy and its purported irreconcilability with science, and not just ill-informed opinions! In this issue of *Sleep Medicine* Bell and colleagues [1] provide us with an intriguing piece of creative research that does something which all scientists shun: it places a problem before us. In science, problems (i.e., “anomalies”) are normally ignored. But what if there comes a time when they can no longer be ignored? Are they then taken seriously? I feel this study may mark a turning point. A few studies published recently pull the mosaic of anomalies together: homeopathic remedies diluted beyond Avogadro’s number (to be precise diluted more than twice beyond Avogadro’s number), up to 10^{-60} , produce biological effects in tightly controlled experiments in humans [2,3]. It is notoriously difficult to find effects in clinical trials of homeopathy, but they do exist – more often than one would expect from an intervention that, theoretically speaking, should not do anything. But experimental models are more efficient when confronted with the question: Is there any chance these remedies (beyond recall) can affect the human organism at all? This study is a neat example. It is important because it has three features that make it stand apart from the usual methodological requirements of blinding and control:

- 1) Firstly, it used a hard, objective criterion: night sleep measured with polysomnography at home (when people were sleeping and could not potentially influence or bias their data).
- 2) It implemented the homeopathic principle of individual susceptibility, at least in a prototypical model way.
- 3) It used a rarely employed method to make groups even, namely, balancing.

The objective criterion is not debatable. Even though the contrast between placebo and experimental intervention was only single blind, the two remedies were given double blind. Although a critic might suspect that some subtle cueing could have entered the picture (this is unlikely with blinded technicians), it is indisputable that cueing effects normally would be expected to affect overt behaviour and self-reports, but not polysomnography during sleep.

Homeopathy is the art of fitting individual symptom patterns in patients to generic symptom patterns produced by many people who have ingested the particular remedy in the past and experienced those very symptoms. Coffee, tested here as a homeopathic remedy, is a good case in point. Most people have experience with coffee. We know it makes us alert, and, if we drink too much, it can make us irritable and prevent us from falling asleep. Our thoughts may wander, rush around or jump in wide hoops. The authors used a relatively coarse-grained type of individualisation, a questionnaire that measures hostility and sensitivity. Thus

screening potentially susceptible individuals allowed the researchers to see whether different types of volunteers would react to their respective remedy in a typical way. There are clear effects vis-à-vis placebo. Total sleep time changes, and time spent in non-REM sleep increases. Also, there are small differences between the two groups, but none that are robust enough to convince critics.

Small groups like the one used here are often prone to bias because randomisation is only effective with large numbers in creating evenly balanced groups. Hence the authors used a minimisation or balancing strategy [4]. This method uses the information of a few individuals who have been completely randomly assigned and then calculates a regression, predicting and allocating the next person to be taken into a particular group in order to balance the baseline variables evenly. This allows for more powerful statistics and less bias. That is why it is not always the big numbers that win the game, so to speak, but smart dealings with the resources at hand.

Taken together you have a data-set that challenges some dogmatic beliefs. This study adds weight to the accumulating evidence that something is happening here. Perhaps it is something we have not yet understood. I have suggested the tentative idea that homeopathy is an instance of some sort of generalised non-locality that we do not understand yet [5,6].

But what about potential methodological shortcomings? The design was a within-group controlled study with baseline, placebo and intervention. But they were not counterbalanced as would be classically expected. The study certainly used objective criteria, but the placebo was not given double-blind. The set-up was not in a sleep-lab but at individuals’ homes with no further observation or control added. All those points may be raised by critics.

Homeopathic placebos are the perfect placebos: they look like the real thing, taste like it, are like it, chemically speaking. The only difference is in their systemic properties; these connect the remedy with the original substance via the production process, a fact that is not true for the placebo. They relate the substance and its potential pharmacological properties with the histories of former patients and individual cases that have taken this very substance. For all those reasons homeopathic remedies and their placebos are different and identical at the same time. For study participants there is no way to tell which is which, nor is there a way for researchers, except through their logs. Since all contact with study participants was through technicians who were blinded, one can safely speak of a tight blind that was implemented for participants. But why not fulfil the requirements and double blind all? The reason lies in the pre-suppositions that we make. Complete double-blinding always pre-supposes that the system in question can be completely isolated and studied without losing any of its important properties. This pre-supposition is made against the background of a Newtonian world view. This has never been tested, it is likely valid only for a subset

of systems, and homeopathy might not be one of them. If our model of a generalised non-locality is true and homeopathy is an instance thereof, then complete blinding destroys the system in question [7,8]. Bell has taken this point on board and has succeeded in walking the fine line of experimental rigour and model validity in the system under study.

There is a price to be paid for *not* taking anomalies seriously: ignorance and stagnation. There is also a price to be paid for taking them seriously: false alarm and its resulting consequences. We can set our stakes high and demand, at all costs, not to accept something that is possibly wrong. But this makes us prone to overlook potentially important things. Better would be to balance those mistakes, not only in individual studies by making them powerful enough, but also as a research strategy. It seems that the time has come to take these anomalies seriously.

Homeopathy has refused to go away for over 200 years. How long are we going to continue ignoring it scientifically? And is ignoring scientific? Bell and colleagues have shown an alternative route and it would be interesting to see others take it as well.

Conflict of interest statement

The ICMJE Uniform Disclosure Form for Potential Conflicts of Interest associated with this article can be viewed by clicking on the following link: [doi:10.1016/j.sleep.2011.03.001](https://doi.org/10.1016/j.sleep.2011.03.001).

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