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THE IMPORTANCE OF UNDERSTANDING PROBABILITY

This paper first appeared in the Spring issue of the 'Skeptical Intelligencer', 2021, pp 4-5.

ASKE recently received an enquiry about a revival of interest in a Mexican 'Healer' called Pachita, who came to fame in the last century. I quote Rational Wiki here (*note 1*):

Pachita (19??-1979) was a Mexican "psychic" surgeon who claimed that after being possessed by the spirit of the Aztec emperor Cuauhtémoc and going into a trance she was able to perform miraculous healings in a similar way to psychic surgeons in the Philippines, except she used a rusty hunting knife instead of just using bare hands. Her exploits in English-speaking countries are mostly known through Johanna Michaelsen, who after visiting the theologian Francis Schaeffer in Switzerland was convinced that Pachita was using demonic powers to do her acts and became a paranoid fundamentalist.

The enquiry contained a link (*note 2*) to an article (in Spanish) that refers to Pachita and has a grisly photograph of her supposedly performing open-heart surgery on a woman using her bare hands. A follow-up enquiry provided another link (*note 3*), this time with two equally grisly photographs showing Pachita seemingly cutting open someone's chest with a knife and then dramatically seizing his innards with both hands.

The enquiry asked whether there is evidence of 'fakery' in these photographs.

Readers will have their own opinions on this but whatever the case, it would be correct to describe the claims made by this woman and her supporters as 'miraculous'.

What then is a miracle? The Wikipedia entry for this term begins 'A miracle is an event not explicable by natural or scientific laws'. However, scientific knowledge is ever changing, so we are allowed to interpose that little word 'yet' between 'not' and 'explicable'. But then so many things are 'not yet explicable by scientific laws' (e.g. consciousness) but we don't call them miracles. Maybe 'contradicted by' or 'inconsistent with', instead of 'not explicable' would be better. But I don't think either of them nail it. I like the philosopher David Hume's assertion that we should only agree that a miraculous explanation is true when it would be even more miraculous for it not to be true (from which it would follow that all other available explanations, such as mistaken or false reporting, would be even more miraculous).

For example, if we pray for someone who has an incurable disease and that person makes a remarkable recovery, we may announce that 'a miracle has occurred' through divine intervention (perhaps facilitated by the intercession of a saint). However, very occasionally a disease might 'spontaneously remit' for reasons unrelated to treatment, or the treatment to which a patient has failed to respond may finally start to kick in. An agreed explanation for such occurrences may yet elude medical science, but it would be hyperbole to describe either as 'miracles'. And applying Hume's test, we would deny that they are more miraculous than the hypothesis of divine intervention. This then brings us into the realms of probability (although in this case we have no means of estimating the probability of divine intervention).

Science and skepticism adhere to a more general form of Hume's dictum: Don't accept an unusual—including a paranormal—explanation if an explanation is available that is more likely to apply on the basis of present knowledge. Note that we do not have to *prove* that the latter explanation is correct (e.g. that a photograph purporting to be that of an alien spacecraft is a more everyday object, and illusion, or a hoax of some kind). It is the person making the unusual claim who must show that any such explanations must be rejected.

Hence the simplest and most effective response to an enquiry such as the one about Pachita is not to spend time and energy scrutinising the photographs for signs of fakery, but to say that the probability of her claim being true is vanishingly small and other more likely explanations are available.

Now consider this tragic example. Reference is made in 'From the ASKE Chair' to Sally Clark, a Manchester solicitor who, in November 1999, was found guilty of the murder of her two infant sons, both within a few weeks of their births, in December 1996 and January 1998. The defence argued that sudden infant death syndrome (SIDS)

accounted for the deaths of both babies, but according to the prosecution expert witness, Professor Sir Roy Meadow, the chance of this happening in an affluent and healthy family was over 1 in 73 million. He arrived at this figure by squaring the probability of just one baby dying of SIDS, name 1 in 8,500.

Following a first unsuccessful appeal, Sally Clark's conviction was overturned after she had served over 3 years of her prison sentence. Despite there being no real evidence that she and her husband were anything other than caring and loving parents, she had been vilified by the press and targeted by other inmates while in prison. Coming on top of the deaths of her two babies, all this was too much for her to bear, and in March 2007, just over 4 years after her release from prison, she was found dead at her home with acute alcohol poisoning.

Aside from the non-disclosure of some significant medical information, a major component of the basis of Sally Clark's appeal was the inappropriate use of statistical information provided by Professor Meadow. There were two instances of this. Firstly, calculating the probability of occurrence of two events by multiplying the probabilities of each assumes that all relevant variables common to these events have been factored in. For example, the probability that two named individuals both suffer from type 1 diabetes is low, but not so low when we introduce the information that they are siblings. In the Sally Clark case, Professor Meadow ignored the information that the two babies were brothers. There may be—indeed there are—medical risk factors for SIDS that are familial. Even if it were unknown whether there are such risk factors (the unknown unknowns) it would appear indisputable that in such a case like this, where the two victims were of the same parents, much caution is due when making any kind of probability estimate.

The second error made by the prosecution is more germane to the theme of this article. It was the failure to consider the probability of the prosecution's charge, namely that a mother in Mrs Clark's circumstances would murder her two babies. This was calculated to be far lower than losing the two babies to SIDS. Thus a more likely explanation than double homicide was available. As with the scientist and skeptic, the law places the burden of rejecting this explanation on those bringing the charge, in this case the prosecution.

Notes

1. <https://rationalwiki.org/wiki/Pachita>
2. <https://tinyurl.com/nkdpsjep>
3. <https://tinyurl.com/337957vn>