

Those who recognise that significant discoveries in science are very often prompted by observations that do not fit expectations will find a stimulating challenge in accumulating evidence that it is possible to elicit psychic functioning in experiments with ordinary volunteers acting as subjects. Even more convincing results occur with specially selected subjects. In one type of experiment, a "target" photograph or video segment is randomly chosen out of a set of four possibilities. A "sender" attempts to transmit it mentally and a "receiver" is then asked to provide an account either verbally or in writing of what she imagines it might be. She is then shown the four possibilities, and selects the one she thinks best matches her perception. By chance alone, a correct match is expected on average one time in four, whereas the experiments typically show the considerably higher success rate of around one in three.

The recent declassification of the US government's psychical research programme (experiments on "remote viewing", similar to the type just described except that it used independent judges to assess the matches rather than having the subjects judge themselves) has permitted a comparison to be made of the results of this programme with those described in the open literature. Despite the different judging procedure, similar success rates were found. In addition, many of the governmental experiments used gifted subjects. The success rate was then even higher, typically over forty percent. The few experiments in the open literature that used gifted subjects found similar success rates.

In the past, critics have attempted to discredit positive results in psychical research on grounds of lack of repeatability. But, as anyone with a training in statistics knows, even where an influence exists, an isolated experiment with an insufficient number of trials may not demonstrate a statistically significant effect. Accordingly, without a more sophisticated analysis, "failure to reproduce an effect" does not demonstrate its absence. Suppose, for example, psychic abilities, in line with the results already described, increase the chances of a successful match from  $1/4$  to  $1/3$ . Then (according to the accepted statistical theories), an experiment with 30 trials, which has been typical of these experiments, would have less than a 17% chance of achieving a result of statistical significance. The more recent larger experiments still utilise only about 100 trials, and have only about a 57% chance of achieving statistical significance.

Detailed analysis of the complete collection of experiments on this type of phenomenon shows that what holds, despite changes in equipment, experimenter, subjects, judges, targets and laboratories, is far greater consistency with the 1 in 3 success rate already mentioned than with the 1 in 4 chance expectation rate. Such consistency is the hallmark of a genuine effect, and this, together with the very low probability of the overall success rate observed occurring by chance, argues strongly for the phenomena being real and not artifactual.

Reexamination of other types of psychical investigations reveals that they too achieved replicable effects, which went largely unappreciated because of a poor understanding of statistics. For instance, an analysis of experiments in precognitive card guessing and related "forced-choice" experiments, published by Honorton and Ferrari in the Journal of Parapsychology, found that gifted subjects were able to achieve consistently about a 27% success rate when 25% was expected by chance. Similar U.S. government experiments have been revealed to have achieved the same 27% success rate over thousands of trials. If chance alone were the explanation for these results, it would be truly remarkable to achieve a 27%

success rate over thousands of trials, and it would be even more remarkable to see identical results in the government work. For further details about the recent evidence, including both a favourable and a skeptical assessment of the U.S. government experiments, consult the Journal of Scientific Exploration, Vol. 10(1), or <http://www-stat.ucdavis.edu/users/utts/> on the Internet.

Strong statistical results are of course meaningless if experiments are not properly conducted. Debunkers of parapsychology are fond of showcasing the very few experiments that have been found to have serious problems. But that ignores the fact that the vast majority of experiments were done using excellent protocols, paying close attention to potential subtle cues, using well-tested randomisation devices and so on. For the past decade the U.S. government experiments were overseen by a very high-level scientific committee, consisting of respected academics from a variety of disciplines, all of whom were required to critique and approve the protocols in advance. There have been no explanations forthcoming that allow an honest observer to dismiss the growing collection of consistent results.

What are the implications for science of the fact that psychic functioning appears to be a real effect? These phenomena seem mysterious, but no more mysterious perhaps than strange phenomena of the past which science has now happily incorporated within its scope. What ideas might be relevant in the context of suitably extending science to take these phenomena into account? Two such concepts are those of the observer, and non-locality. The observer forces his way into modern science because the equations of quantum physics, if taken literally, imply a universe that is constantly splitting into separate branches, only one of which corresponds to our perceived reality. A process of "decoherence" has been invoked to stop two branches interfering with each other, but this still does not answer the question of why our experience is of one particular branch and not any other. Perhaps, despite the unpopularity of the idea, the experiencers of the reality are also the selectors.

This idea perhaps makes sense in the light of theories that presuppose that quantum theory is not the ultimate theory of nature, but involves (in ways that in some versions of the idea can be made mathematically precise) the manifestations of a deeper "subquantum domain". In just the same way that a surf rider can make use of random waves to travel effortlessly along, a psychic may be able to direct random energy at the subquantum level for her own purposes. Some accounts of the subquantum level involve action at a distance, which fits in well with some purported psychic abilities.

These proposals are extremely speculative. What needs to be done, in any event, is to integrate mental phenomena more thoroughly into the framework of science (including the quantum level) than is presently the case. The research of Lawrence LeShan (as described in his book *The Medium, the Mystic and the Physicist*), where interviews with psychics disclosed that they were aware of a "hierarchy of meaningful interconnections", perhaps provides a hint of what might be involved. Science has a poor handle on ideas such as meaningful interconnections since they are alien to its usual ways of thinking. Perhaps it will need to overcome its current abhorrence of such concepts in order to arrive at the truth.

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Jessica Utts is professor of statistics, University of California, Davis, and was one of two experts commissioned by the CIA to review the two-decade U.S. government psychic research programme in the Summer of 1995. She has recently published a book, *Seeing Through Statistics*, Duxbury Press, 1996, designed to improve understanding of statistical studies. Brian Josephson, Nobel Laureate, is professor of physics, University of Cambridge, and heads the Mind-Matter Unification Project at the Cavendish Laboratory, Cambridge.

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