THE FLAWS OF PERCEPTION

As spiritualism captured the Victorian imagination, stage magicians coolly debunked it – and gained intriguing insights into the workings of the mind on the way. A new book and exhibition show how their discoveries continue to fascinate today's psychologists

Alfred Russel Wallace is one of the heroes of Victorian science. He rose to prominence in the 1850s as the co-discoverer, along with Charles Darwin, of the principle of natural selection. During the fierce debates that ensued, he vigorously defended evolution in the face of more conservative scientists.

Yet in 1876, Wallace sparked a furore when he invited the physicist William Fletcher Barrett to read a paper on the topic of "thought reading" before the British Association for the Advancement of Science. Wallace would eventually go on to assert not only that spiritualism was a legitimate topic for scientific investigation, but also that the reality of spiritualist phenomena was undeniable, given the number of reports from what he considered to be credible observers.

He served as an expert witness in courtroom trials, speaking in defence of mediums accused of fraud. This brought him into conflict with sceptics, including the celebrated magician John Nevil Maskelyne, who had made a career out of debunking bogus mediums, and his own friend Darwin, who was adamantly opposed to spiritualism.

One of our prevailing cultural narratives is that scientific understanding of the world has been steadily marching forward in a neat, linear fashion. But, as Wallace's case shows, belief in the supernatural is persistent. And if you look closely, you might notice that debunked concepts have a tendency to recur over and over again with slight variations.

At one time, paranormal practitioners claimed to receive ▶

BY MATTHEW L TOMPKINS

Preceding page: German magician Jacoby-Harms in an 1866 photograph using double exposure. Above: a séance held by Italian medium Eusapia Palladino in 1906; the table appears to be levitating. Below: Eleanor Sidgwick, co-founder of the Society for Psychical Research

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◂ messages from spirits; later, they claimed that these messages were received through telepathy; and later still, they attributed their powers to extra-sensory perception. Such phenomena have been reported under "test conditions" witnessed by scientists. But while scientists are trained in gathering evidence based on empirical observations, they are not necessarily trained in deception.

Enter the professional magician. Like psychics and mediums, magicians present themselves as exceptional individuals who can facilitate impossible phenomena. But unlike spiritualists, magicians are artists who make it clear that they achieve these effects through trickery and illusion – through misdirection – and who often take professional satisfaction in exposing psychic chicanery.

Magicians have long known, and scientists are becoming increasingly aware, that misdirection can encompass much more than simply influencing where a spectator looks. It can also affect how we reason and remember. Most of us recognise that we cannot always trust our eyes, but a deeper, more uncomfortable truth is that we cannot always trust our minds.

If it seems odd to present-day readers that scientists were once fascinated with spiritualism, it is useful to consider the tumultuous state of science and technology at the turn of the 20th century. Again and again, researchers were uncovering invisible physical forces that had once been almost unimaginable. The scientific community embraced developments in radiation and electromagnetism; was it so much of a leap, some wondered, to consider mediums as a new sort of "spiritual telegraph"?

The physicist Sir Oliver Lodge, for example, conducted revolutionary research that had a major impact on the development of wireless telegraphy and radio; he was also a devoted spiritualist. He was convinced that, through mediums, he had repeatedly enjoyed direct communications with his dead son Raymond.

Lodge's autobiography, published in 1931, provides a fascinating insight into his views on what he considered to be parallel scientific and mystical developments that he witnessed throughout his lifetime. He reminisced that he had "walked through the back streets of London... with a sense of unreality in everything around, an opening of deep things in the universe, which put all ordinary objects of sense into the shade, so that the

square and its railings, the houses, the carts, and the people, seemed shadowy unrealities, phantasmal appearances, partly screening, but partly permeated by, the mental and spiritual reality behind."

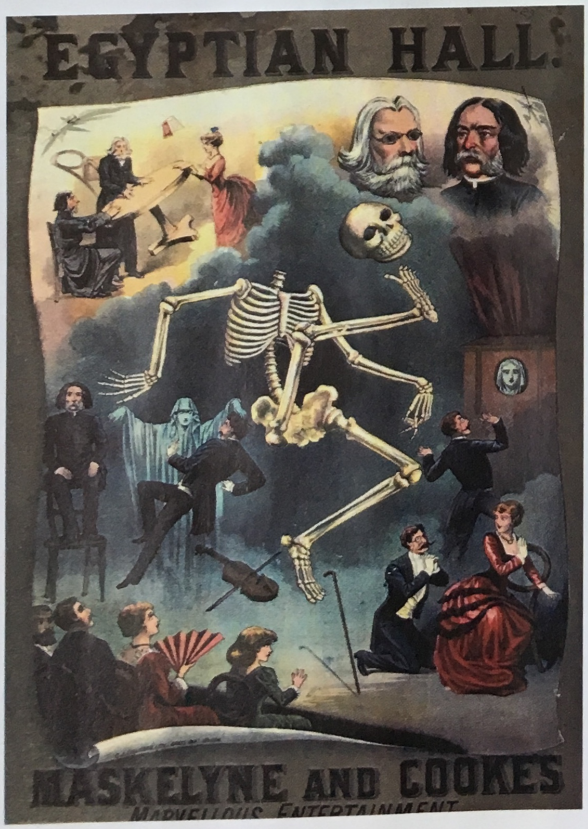
In 1894, at the Royal Institution in London, Lodge revealed a new method for proving the existence of electromagnetic waves. Before a crowd of scientists, he demonstrated that he could wirelessly transmit an electrical signal across a lecture theatre, with a spark at the front of the room causing a gunshot-like crack at the back. For Lodge, the wireless trick was merely a convenient demonstration of the scientific principle of invisible "Hertzian waves"; while he went on to investigate spiritualist phenomena, such as the medium Eusapia Palladino's ectoplasmic manifestations, it was left to the Italian inventor Guglielmo Marconi to capitalise on the enormous commercial potential of Lodge's apparatus as a mechanism for wireless telegraphy.

Just over a decade earlier, Lodge's fellow physicist William Fletcher Barrett – whose championing by Wallace had stirred such controversy – had co-founded a new scientific organisation for the investigation of paranormal phenomena: the Society for Psychical Research (SPR). The SPR and its subsequent transatlantic counterpart, the American Society for Psychical Research (ASPR), boasted many prominent scientists and intellectual figures, including the mathematician and writer Charles Dodgson (aka Lewis Carroll), Sigmund Freud, Mark Twain and many prominent early American psychologists such as Joseph Jastrow and G Stanley Hall.

In the US, the philosopher William James, today revered as the founding father of American psychology, became one of the leading proponents of paranormal research. James's book *The Principles of Psychology* (1890) is credited with helping to establish psychology as a respected scientific discipline. But many contemporary psychologists do not realise that James was also steadfastly sympathetic to psychical research. In addition to establishing the psychology department at Harvard University, he also served as the president of the ASPR, and even declared that he had personally ▶

Below: the magician John Nevil Maskelyne with his automaton 'Zoe' sketching a likeness of him on stage at the Egyptian Hall, London, in 1885

Above: a demonstration of slate-writing techniques, which were tricks used to produce the phenomenon of 'spirit writing'.
Below: a poster advertising magicians Maskelyne and Cooke, who were resident at 'England's Home of Mystery', Egyptian Hall in Piccadilly



◂ discovered at least one genuine spiritual medium, a Bostonian woman named Leonora Piper.

In a speech delivered to the ASPR in 1896, James argued that it would take only one genuine medium to legitimise the scientific possibility of the survival of the human soul after death. He noted that "if you wish to upset the law that all crows are black, you mustn't seek to show that no crows are; it is enough if you prove one single crow to be white", and declared that Piper represented his "white crow".

Piper claimed she could enter into a special trance state in which she received psychic messages from particular "spirit guides", including a French physician named "Phinuit". Her advocates came to believe that in some instances, when Piper entered her trance, the spirit guides would take control of her voice, and at other times they would take control of her hand so that they could write messages. When in a trance, she would refer to herself as "the Machine" and sitters who wished to communicate with the spirits that she channelled were instructed to hold her hand up to their mouths and speak into it, as if she were a telephone. She would sometimes admonish sitters to speak more loudly into her hand, as if there were a bad connection and they were communicating over a great distance.

Piper was a favourite subject for psychical researchers both in the US and England, conducting hundreds of sittings that generated thousands of pages of transcripts. In some instances, she and her spirits carried on after the death of her investigators. Following the death of the psychical researcher Richard Hodgson, who had conducted many sittings with Piper, the medium began to claim that she was speaking with the voice of his spirit. However, after her claim was tested extensively by the psychologists Amy Tanner and G Stanley Hall, they concluded that "what was present of him, if anything, was not only fragmentary but incredibly stupid, oblivious and changed".

In the late 1880s, Eleanor Sidgwick, one of the founding members of the SPR, reached out to Angelo Lewis, a British barrister and magician who published prolifically on magic under the pseudonym "Professor Hoffmann". Sidgwick asked him to give his opinion, as an expert in conjuring, on the possibility of fraud in reports of séances. In particular, she was interested in those points when witnesses "might be defective or misdirected".

Lewis responded that there was little value in any attempt to assess written reports for evidence of fraud. He argued that, when fraud was a possibility, then witnesses' descriptions must inevitably "be taken to represent (as do all descriptions of conjuring effects by uninitiated persons) not what the witnesses actually see, but what they believe they saw, which is a very different matter".

Recognising that post-séance reports were a poor way to assess the reliability of testimony, two other SPR members – Hodgson (who would go on to study the Piper case) and Samuel John Davey – took it upon themselves to develop a more formal investigation. Instead of using a self-professed "genuine" medium, they choreographed their own fake séances. Their study was published in 1887 under the title "The Possibilities of Mal-Observation and Lapse of Memory from a Practical Point of View", and it's arguable that it highlighted mechanisms of human perception that would not be appreciated by mainstream psychologists for many decades.

In total, the "Mal-Observation" report collects 27 distinct accounts from 17 separate performances. Those who reported that they had witnessed supernatural phenomena committed predictable and systematic errors in their statements. Their writing typically omitted crucial elements of the séances – specifically, elements that were instrumental for accomplishing the conjuring tricks.

For example, in one of the scripted segments of the séance, Davey – himself an ex-spiritualist turned sceptic – used a magician's ruse to produce spirit writing, by surreptitiously switching a blank slate for another slate that had been written on before the sitting. He would begin by showing the blank slate clearly, then place the slate under the table at which he and the other participants were seated, where he would switch it for the slate with writing. Without revealing the writing to the sitters,

Continued on page 41

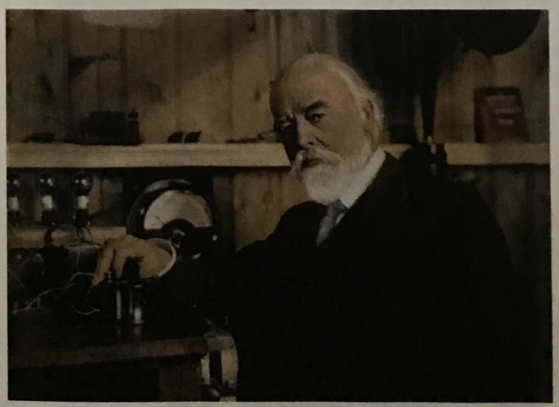
Continued from page 24

he would feign disappointment that no spirits had been in contact. Then he would place the pre-written slate on top of the table (writing side down) and ask the sitters to place their hands upon it. After a brief time, he would ask them to turn over the slate, revealing the writing, which he would pretend had just appeared while the sitters' hands were on the slate.

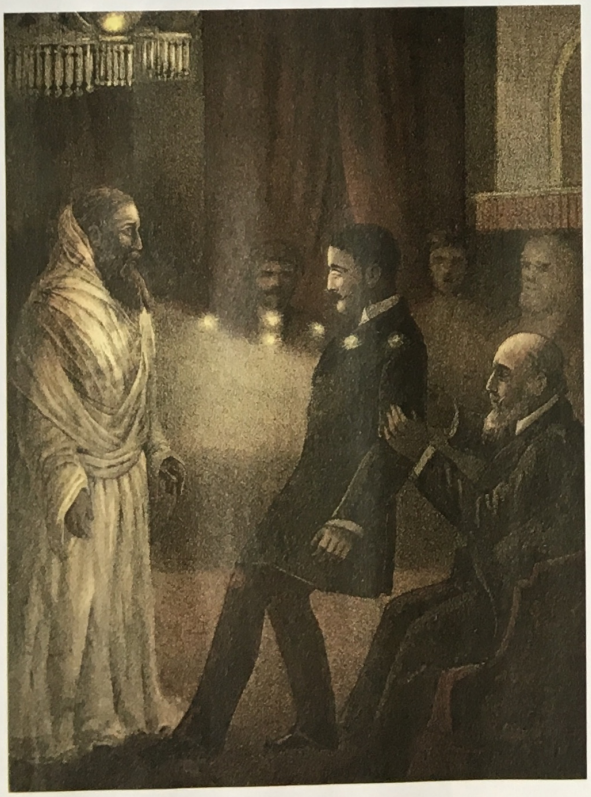
The trick was effective only because he was able to switch the slates. But the participants' reports consistently failed to mention that the slate had been placed beneath the table. These omissions created a powerful illusion of impossibility for the sitters, and anyone reading their reports alone would have been unable to reconstruct Davey's sleight of hand.

Modern cognitive psychologists have since developed a theoretical framework for a surprising phenomenon called "inattentional blindness", where viewers may fail to perceive seemingly obvious visual events when their attention is otherwise engaged. Davey's actions were clearly visible, yet the sitters consistently expressed the belief that the writing was produced while they held the slates, and they either failed to notice or failed to remember the placing of the slate below the table. A famous recent example of inattentional blindness was reported by the US psychologists Daniel Simons and Christopher Chabris, who demonstrated in 1999 that ▶

Above, Egyptian Hall, London, c1890. Below: Oliver Lodge, English physicist and spiritualist, c1920



Right: Boston medium Leonora Piper, aka 'the Machine'. Far right: Maskelyne, a spiritualist sceptic, shows how the illusion of a 'spirit cabinet' may have been achieved. Below: an artist's rendering of medium William Eglinton manifesting the spirit 'Abdullah' (1886)



Exposure to false information can lead mentally sound individuals to create strong memories of entirely fictitious events, such as a childhood trip to Disneyland

◂ individuals watching a video of a basketball game could fail to notice a person in a gorilla costume crossing the court.

Reactions to the "Mal-Observation" report indicate just how radical the results were perceived to be. One of those who participated in a Davey "séance" was Alfred Russel Wallace, who was utterly convinced that he had witnessed genuine supernatural phenomena. After the report was published, and Hodgson and Davey had revealed that they had been using trickery, Wallace wrote an angry letter to the SPR, stating that the duo were engaged in a deliberate cover-up of Davey's genuine mediumistic talents.

Even when we do accurately perceive events, our memories can easily become distorted. Contemporary experts believe that recalling events can be best conceptualised as a reconstructive process, meaning that memories can contain not only elements that were witnessed, but also elements drawn from the imagination and from external suggestions. The psychologist Elizabeth Loftus coined the term "misinformation effect" to describe exposure to false information that can change a witness's recollection of events. In 1974, Loftus and her graduate student John Palmer demonstrated that simple verbal suggestions could change the way observers recalled a video of a car accident.

Since then, similar experiments have shown that exposure to false information can lead healthy, mentally sound individuals to create strong memories of entirely fictitious events, such as a childhood trip to Disneyland. In 2015, a study by forensic psychologists Julia Shaw and Stephen Porter demonstrated that participants could be induced to falsely remember and even confess to fictional crimes. And in research more closely echoing the spirit of the "Mal-Observation" report, the psychologist Richard Wiseman has reported multiple studies demonstrating that participants who view hoax stagings of paranormal phenomena can be induced by verbal suggestion to "recall" wholly fictional details.

Another line of psychological research that can be traced back to

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early investigations of spiritualist phenomena concerns table tilting. In its most basic form, a table-tilting test could simply involve a group of participants sitting around a table. Each would place their fingertips on it and, apparently without any effort on the part of the sitters, the table would mysteriously begin to sway, sometimes even float into the air. For believers, table-tilting effects reinforced their belief that external invisible forces could indeed act on the physical world.

A less ghostly explanation was reported in 1853 by the physicist Michael Faraday, who developed a simple apparatus that surreptitiously recorded the muscle movements of sitters. Faraday concluded that the table's movements could be attributed to non-conscious muscle movements by the sitters themselves. Because they were unaware of their own actions, they attributed them to external forces.

In 1888, the physiologist William Carpenter coined the term "ideomotor effect" to describe these unconscious muscular actions. He argued that ideomotor phenomena could also explain the mystery underpinning dowsing rods and pendulums, and the planchettes of Ouija boards – in each case, the ostensibly external forces that operators reported may have actually been misidentified internal forces. Carpenter's experiments showed that these instruments could only provide accurate results if the operators themselves already knew the correct responses.

The ideomotor effect provides rich opportunities for the unscrupulous. In 2013, James McCormick, a British businessman, was convicted of selling fake bomb detectors to police forces in countries including Iraq, Romania and Thailand. The operator was supposed to hold the device, called the "ADE-651", like a wand, and allow its subtle movements to direct them towards dangerous substances. The devices themselves have been determined to be entirely non-functional. But thanks in part to the ideomotor effect, they could easily feel functional, especially if the operator had faith in their legitimacy.

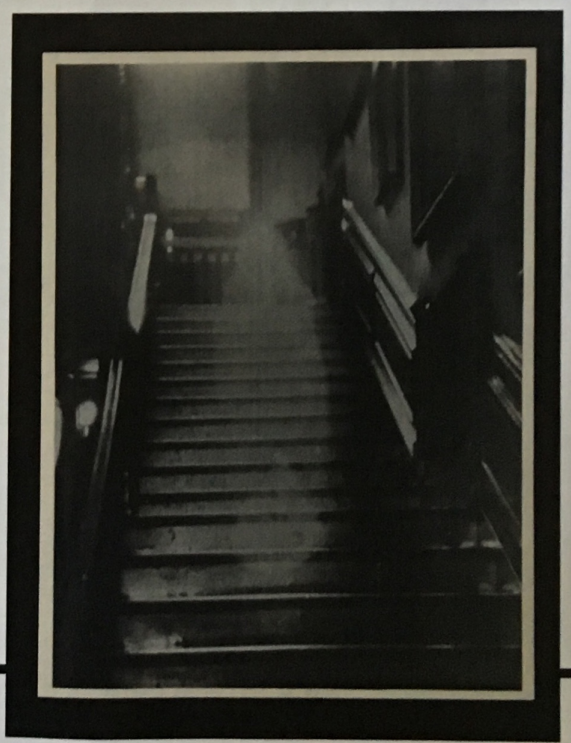
From the late 1990s, scammers sold fake detection devices with names such as "Sniffex", "GT 200" and "Alpha 6" to governments across the world. The World Peace Foundation of Tufts University, which tracks corruption related to international arms trading, estimates that fake bomb detectors generated more than $100m in profit between 1999 and 2010.

Such phenomena seemingly paint a pessimistic picture of human cognition, but rather than thinking of illusions as failures of our cognitive systems, we can think of them as evidence that our minds are highly specialised and adaptive. Inability to detect stimuli often occurs because our minds are adept at tuning out irrelevant information; seeing things that are not really there can be an indication of how our minds anticipate patterns and movements in ways that can facilitate our ability to interact with the world around us.

Magic tricks and misdirection techniques exploit such eccentricities, and can be interpreted as benevolent entertainments, malevolent frauds and everything in between. In the context of a magic show, illusions can be entertainingly harmless, but in the context of a mediumistic demonstration, the same illusions can represent predatory attempts to take advantage of people who are emotionally vulnerable.

No psychologist can claim that science has been able to fully describe how the human mind constructs conscious experience. But just because something remains unexplained today, that does not mean it is unexplainable. And careful investigations into the mechanisms of anomalous experiences and magic illusions have led to useful insights about the nature of the mind. Such research is ongoing and will continue to enrich our understanding not just of illusions, but of consciousness in general. FT

Matthew L Tompkins is an experimental psychologist and professional magician. This is an edited extract from "The Spectacle of Illusion", to be published by Thames & Hudson in association with Wellcome Collection on April 4 to coincide with the exhibition "Smoke and Mirrors: The Psychology of Magic" at Wellcome Collection, London, April 11-September 15; wellcomecollection.org



Above: a young girl operates a planchette, used to generate written messages from spirits. Below: 'The Brown Lady of Raynham Hall', supposedly the spirit of Dorothy Walpole, photographed in Norfolk for Country Life magazine in 1936