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THE "BRIDGE WHICH IS BETWEEN PHYSICAL AND PSYCHICAL RESEARCH": WILLIAM FLETCHER BARRETT, SENSITIVE FLAMES, AND SPIRITUALISM

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1. INTRODUCTION

Some time in the mid-1860s a young science student sat in one of John Tyndall's Royal Institution lectures on sound and jotted down the physicist's view that the "impressions of sense" were "perfectly incongruous with the physical causes which produce them. The mystery of life and sensation here come into play and the purely physical effects of external nature are converted by it into a wondrous psychological affect of consciousness and emotion".[1] The student was William Fletcher Barrett (1844–1925) and he was gaining one of his earliest lessons in the hazy boundary between the physical and the psychological domains. Thirty years later Barrett, then a physics professor in Ireland and a leading figure in the Society for Psychical Research (hereafter SPR), was also lecturing on the "wondrous" psychological phenomena of spiritualism at St James's Hall, a short walk from the Royal Institution. Barrett addressed the London Spiritualist Alliance, the principal Spiritualist organization in late-Victorian Britain. Barrett's audience comprised mainly Spiritualist converts, individuals who were convinced that the human personality survived bodily death and that such a discarnate 'spirit' could manifest itself to the living, typically in 'séances' held by specially gifted 'mediums'. When published in the Spiritualist weekly *Light*, Barrett's audience would also have included card-carrying Spiritualists, closet spiritualists and those merely interested in this scientific, philosophical and religious culture. His lecture attributed the poor reception of spiritualistic phenomena by the "educated world" to the fact that "the dominant school of scientific thought, is essentially, if not grossly, *materialistic*", the key claim of which was that matter contained the "'promise and potency of every form of life'".[2] Many of Barrett's auditors would have recognized instantly that the quotation was from the notorious 'Belfast Address', the presidential address to the 1874 Belfast meeting of the British Association, given by John Tyndall, the savant who was Barrett's first employer and the person who gave him his most important lessons in experimental physics.

Several commentators on Barrett have been intrigued by the fact that this pioneer of psychical research spent the mid-1860s as a laboratory assistant to Tyndall, one of the most charismatic physicists of the Victorian period and a figure notorious for his advocacy of a qualified form of materialism and his scathing views on spiritualism. One obituarist, for example, believed it was "significant of contemporary trends in scientific thought that a man who began his career in connection with one of the chief materialists of the past age should have attained his greatest achievement as the founder of psychical research", while the official history of the SPR notes without

comment that Barrett was trained by "that passionate sceptic [of psychic phenomena] Professor Tyndall".[3] These views probably owe something to Barrett's own portrayal of Tyndall as a supporter of materialism and his recollection that the "atmosphere" of the Royal Institution in the 1860s was hostile to "psychical phenomena" mainly because Michael Faraday, Tyndall and other professors believed they had debunked spiritualism as a delusion.[4]

Barrett did not always draw such a sharp contrast between Tyndall and psychical research. In the early 1900s he told his fellow physicist and psychical researcher Oliver Lodge that Tyndall's attitude towards spiritualism was "singularly unscientific & was contradicted by the whole tenor of his life's work".[5] Barrett may well have been referring to the fact that much of Tyndall's work was far more complex than suggested by the pejorative label 'materialist'. Several historians have demonstrated Tyndall's deep preoccupation with the spiritual and transcendental aspects of nature and his recognition that while the laws of matter and energy were the most reliable descriptions of the physical world, they were insufficient to answer such profound questions as the origin of life, force, and matter.[6] For this reason, Barton has rightly characterized Tyndall as a pantheist who adopted materialism as a "maxim of scientific research, but not as a general philosophy".[7] Tyndall's pantheistic view that spirit and matter were "two opposite faces of the self-same mystery" may have strengthened Barrett's belief in the underlying unity of matter and spirit, but this paper shows that it was Tyndall's *experimental* culture that played a more significant role in Barrett's construction of a science of mesmeric and spiritualistic phenomena.[8]

Historians have largely overlooked the ways in which Barrett's physics shaped his approach to psychical research. As with Barrett's more illustrious colleagues, William Crookes and Oliver Lodge, his experimental work has been relegated to a largely irrelevant background of apparently secure science that contrasts with the troublesome and eventually 'pseudo-scientific' investigations of spiritualism and telepathy.[9] As Sections 2 and 4 illustrate, the most striking aspect of Barrett's experimental work, the 'sensitive flame', cannot plausibly be called secure science because its behaviour remained puzzling to most physicists for much of the late-Victorian period. Far from being irrelevant to Barrett's psychical research, it was one of many aspects of his work on 'sympathetic vibrations' that he used to interpret the more controversial, but to him more wonderful and mysterious, phenomena of mesmerism and thought-reading.

This paper suggests another reason why we need to foreground Barrett's 'physics' in understanding his moves towards psychical research. Most of the controversies in which Barrett became embroiled — notably that sparked by his notorious paper on mesmerism and spiritualism at the 1876 meeting of the British Association — were ostensibly disagreements over the reality and provenance of psychic phenomena. However, as Sections 4 and 5 demonstrate, they were also conflicts over what kind of expertise was considered appropriate for investigating phenomena that were simultaneously physical, psychological and spiritual. In his tussles with the distinguished physiologist and psychologist William Benjamin Carpenter, he held that mesmeric and spiritualistic phenomena were puzzles that physicists could interpret and investigate more effectively than physiologists and psychologists. Most psychologists and

physiologists, however, thought that Barrett, and for that matter other physicists, were way out of their depth in the séance.

Barrett had many reasons to turn the debate on mesmerism and spiritualism into one on scientific expertise. Like many other Victorian physicists educated outside Oxbridge, he lacked many of the social and technical resources needed for making a scientific career and had to build his reputation and social prominence through a series of teaching posts in the new science colleges, private research, and articles for the blossoming periodical press. His career bears striking similarities to those of Tyndall, Lodge and Balfour Stewart, all of whom vigorously promoted physics as a way of securing personal career development and because they believed it was a supreme tool of intellectual, economic and cultural progress. The subtle argument that Barrett made for physics in his 1876 paper was delivered more spectacularly two years earlier in his co-establishment of the Physical Society of London, an organization devoted to communicating the methods and results of the research and pedagogical aspects of physics.

The Physical Society was joined by Tyndall, Lodge, James Clerk Maxwell, William Thomson and a host of experimental physicists, electrical engineers, physical chemists, and schoolteachers, but it is misleading to suggest that it illustrated consensus.[10] Few problems better illustrate the heterogeneity of the Physical Society and the emergent group of physicists than the relationship between physics and established religion. As Turner has shown, Tyndall, T. H. Huxley and their allies weakened this connection by insisting that physical laws and principles (including energy conservation and atomism) provided the most reliable accounts of the cosmos, and that scientific progress depended on abolishing metaphysics and the supernatural. This move was intellectual and social because banishing the supernatural undermined the power of the clergy whose meddling in scientific research and teaching the 'scientific naturalists' wanted to shatter.[11] The outspoken scientific naturalists were hardly the 'orthodoxy' of British science and were fiercely attacked by Maxwell, Thomson and many other leading British physicists, many of whom maintained that physical enquiry strengthened belief in the wisdom and power of a Creator, and thus made physics an important part of moral education.[12] Different physicists, therefore, had radically different ideas of the ways in which religion mattered to the profile of physics in Victorian culture.

Barrett's career illustrates how psychical research became another battleground on which the role of the physics was fought out. In many ways Barrett occupied a position between Tyndall and his pious adversaries on this issue. He agreed with Tyndall that it was the duty of the emerging breed of 'public' scientist to investigate allegedly 'supernatural' phenomena that manifested themselves on the physical plane (which for Barrett included 'spirits') and which appeared to threaten public morality and established natural laws.[13] For many of the Anglicans and Presbyterians who formed the élite of British physicists, however, prayer, 'spirits' and other manifestations of the 'supernatural' were morally dangerous and intellectually risky topics of research. For Barrett and Tyndall, the moral and social threat of immensely popular spiritualism far outweighed any moral risk to the sciences and its practitioners.

Barrett, of course, differed radically from Tyndall in arguing that some mesmeric and spiritualistic phenomena were genuine, and showed the operation of mind independently of the body, whether living or dead. As someone much more committed to Christianity than Tyndall, he also believed that materialism posed a bigger threat to the faith than spiritualism which, properly investigated, could be used in the struggle. In many ways, this was an extension of Barrett's mission to use the results of scientific enquiry in the illustration of spiritual truths. Believing in a fundamental correspondence between the physical and spiritual worlds, he emphasized that research on phenomena manifest to the senses (whether glaciers, sensitive flames or 'spirit' writing) showed the "existence of spiritual laws in the natural world" and thus aroused conviction in a Mind transcending, unifying, and giving intelligibility to the physical world.[14] By presenting himself in the public sphere as a physicist who had used his skills to investigate and interpret psychic phenomena, he wanted to clear up public misconceptions about thought-reading and discarnate spirits. By showing how the claims and instruments of physics could be used to establish truths regarding psychic phenomena, Barrett sought to make psychical research a branch of physics, a strategy that mattered a great deal to someone who, like many other physicists, abhorred the 'materialistic' image of physics commonly attributed to Tyndall. Barrett's case shows that it was possible for a Victorian practitioner to have interests in the intellectual, moral and cultural importance of physics, but unlike the 'scientific naturalists', believe that the so-called occult formed part of this.

The other event for which Barrett is remembered is his key role in the foundation in 1882 of the SPR, an organization that Barrett, like many of its early members, hoped would solve the puzzles of mesmerism, spiritualism and related phenomena once and for all.[15] Roger Luckhurst has rightly pointed out a key characteristic of the early SPR was its heterogeneity of personnel, goals, and practices.[16] Its early members hailed from scientific, clerical, political, and other backgrounds and, while agreeing that evidence, for or against, psychic phenomena was a matter of great intellectual and moral importance, they did not agree on precisely which experimental and interpretative resources were appropriate for probing phenomena that cut across boundaries between the physical, psychological, and spiritual.

Sections 6 and 7 show the troubled place of physics in the SPR's early attempts to produce reliable evidence and investigative protocols. Barrett's contributions to the SPR were small compared with those of his more illustrious colleagues, Edmund Gurney, Frederic W. H. Myers, and Henry Sidgwick. I suggest that this owed much to his eventual acceptance that his physical expertise had a limited role in a Society that was turning away from the 'physical' phenomena of spiritualism in which he was strongly interested, to telepathy, automatism and other purely psychological phenomena. Crucially, by the early 1900s he had abandoned his earlier belief in a strict analogy between telepathy and known physical forms of transmission, and accepted that success in psychical testing depended on 'sympathetic' mental conditions rather than controlling the physical environment of experiments. But while Barrett gave up the fight for physics as an appropriate form of expertise in these areas he maintained that it provided the skills, instruments, and concepts for propagating other, albeit more

risky, parts of psychical enquiry. Accordingly he devised electromagnetic tests of the apparent ability of humans to perceive magnets, he investigated the provenance of the physical deflections of rods used by water dowsers, and most unsuccessfully, tried to persuade the SPR of the importance of testing the *physical* phenomena of spiritualism. His most successful bridge, however, was probably that he built in expositions on physics, psychical research, and religion for non-scientific audiences. It was here that Barrett enjoyed his largest readership for illustrations of the congruence between physics (whether the older physics of radiation or the newer physics of the electron), psychical research, and Christian teachings on the spirit world.

2. TYNDALL'S AWKWARD ASSISTANT

William Fletcher Barrett was born in Kingston, Jamaica, where his father, William Garland Barrett, a Congregationalist minister, member of the London Missionary Society, and amateur naturalist, ran a station for saving the souls of emancipated African slaves. In early 1848, poor health and disenchantment with the social evils perpetrated in his neighbourhood forced the elder Barrett and his family to return to their native England. Within a few years the Barretts had settled in the Hertfordshire town of Royston where the Reverend Barrett continued his mission as pastor of a small Congregational chapel.[17]

William Garland Barrett certainly seems to have been successful in instilling the virtues of the Christian life in his children because two of his sons became Congregationalist ministers and William Fletcher Barrett, unlike his senior SPR colleagues hailing from evangelical families, never experienced a crisis of faith, remaining a "devout and earnest" Christian all his life.[18] William Fletcher Barrett's interests in scientific teaching, acts of civic virtue, and revealing the wonders of Creation, owed much, I suggest, to his father's example. Like many Nonconformists, the Reverend Barrett emphasized that virtuous acts on earth would be rewarded in the future life, and he regularly attacked aspects of Anglicanism including the "damnable heresy" of eternal damnation, Biblical literalism, and the supposed belief that geological study bred infidelity.[19] The Reverend Barrett took special pains to prove the last point because in the early 1850s he ran juvenile geology classes from which he hoped his young charges would understand that there was no contradiction between the "volume of Inspiration and the outspread volume of Creation" because both were "works proceeding from the same ever blessed and beneficent Creator".[20]

The Reverend Barrett's eldest son seems to have shared this missionary zeal and theology of nature throughout his life. William Fletcher Barrett spent much of his career teaching and helping the underprivileged of Dublin and in many of his popular articles and addresses he emphasized the religious lessons of scientific study. For example, in an 1866 article on glaciers in the natural theological *Popular science review*, he held that like "every other teaching of physical science", knowledge of the regular vibratory motion of molecules and etherial waves taught the "perfect harmony" of the cosmos and awoke "reverence to an unseen Ruler".[21] He upheld this theistic position almost fifty later when he told readers of the liberal Christian monthly the *Contemporary review* that while "Science reveals the garment of God, religion the

heart of God ... they are one in origin, and therefore in the progress of science we ought to see more clearly the existence of spiritual laws in the natural world".[22]

In addition to the religious and scientific education he received at home, Barrett attended a grammar school in Manchester (where the Barretts moved in 1855), but owing to his parents' tight financial situation he was forced to "earn his living" on leaving school, which made it difficult for him to pursue his scientific interests. He saved enough money, however, to attend on an informal basis scientific lectures in London, including A. W. Hofmann's and Edward Frankland's lectures on chemistry at the Royal College of Chemistry, and John Tyndall's lectures on physics at the Royal School of Mines.[23] Barrett seems to have displayed such enthusiasm for Tyndall's lectures that in late 1863, when the managers of the Royal Institution (RI) decided to give professors more money for assistants and resources, Tyndall, the RI's Professor of Natural Philosophy, invited Barrett to become assistant in his physical laboratory.[24] Barrett accepted and thus began working in the most fashionable site for scientific lecturing in Britain. Here, at the heart of London's intellectual life, Faraday, Tyndall and Edward Frankland gave lectures to general and specialist scientific audiences, as well as conducting private research in the institution's laboratories.[25]

Barrett was especially impressed with Faraday, whom he later revered as "what a philosopher's life should be" because he "lived Christianity" and because he viewed the "scientific investigator as a high priest of God".[26] But it was Tyndall's instruction and example that gave Barrett his most important resources for becoming a scientific priest. By the time Barrett entered his employment, Tyndall was one of the most celebrated experimental physicists and scientific lecturers in Britain.[27] Born in Ireland, Tyndall achieved fame through an exhausting lecturing schedule at the RI and other institutions, publication of impressive researches on magnetism and radiant heat, and energetic participation in science journalism and teaching. Just before Barrett began working for him, Tyndall was in the midst of his long series of researches on radiant heat and was exploiting his role as a leading expositor of the physical sciences to develop controversial views on the relationship between physics, philosophy, religion, and British culture: for instance, he infuriated many British physicists with his history and 'naturalistic' uses of energy conservation, he outraged many clergymen with his proposed test of prayer as a 'form of physical energy', and caused much debate in scientific circles for the view that the "physical philosopher ... must be a pure materialist" insofar as his sole objects of enquiry were the "forms which matter and force assume".[28] Only a year after Barrett began work, Tyndall, Huxley, and their allies launched the 'X-Club', the informal dining society that met across the street from the RI, and which debated the kinds of intellectual issues raised by Tyndall, and which used them to justify the struggle against clerical control of British science.[29]

When he hired Barrett, Tyndall hoped to "train up in [him] a competent experimenter" and told him that he would tolerate "no neglect of duty" in the RI. although outside its walls he would be "free from control or interference".[30] Tyndall trained Barrett to help him pursue researches on the absorption and emission of radiant heat and light by various gases, liquids and solids, and to stage public lecture courses on

acoustics, electricity, optics, and heat. Barrett's early publications suggest that he quickly mastered many of the techniques on which Tyndall's reputation as a skilled experimentalist and scientific showman rested, notably the use of the thermopile, tangent galvanometers, electrically-heated platinum wires, concave mirrors and other resources for manifesting, manipulating, and measuring vibrations in the invisible ethereal medium that were often beyond the range of human vision. Barrett well understood by the late 1860s that manifesting insensible vibrations was a question of choosing the right physical medium that could respond to those vibrations. Tyndall drew explicitly on Barrett's skill in his researches on the phenomenon of 'calorescence' (in which invisible heat rays were upgraded into visible red rays) and throughout the mid-1860s depended on Barrett to stage a welter of other displays of the seemingly magical properties of sound, light, heat, electricity, and magnetism. Barrett would have been on hand, for example, during Tyndall's exhibitions of such apparent action-at-a-distance effects as the ignition of distant gas-filled balloons with beams of light.[31]

Barrett's work in the lecture theatre and laboratory helped Tyndall propagate several claims about the interaction between radiation and the molecular constituents of matter.[32] Building on researches of Gustav Robert Kirchhoff and Balfour Stewart on the theory of exchanges, Tyndall sought to demonstrate the reciprocity between absorption and radiation: for a given frequency of radiation, the best absorber was also the best emitter. This depended on synchrony or sympathy between ethereal waves and the oscillations of molecules in material substances. In a textbook much admired by Barrett, Tyndall explained that the transparency of a gas to ethereal waves "is synonymous with *discord*, while opacity is synonymous with *accord*, between the periods of the waves of ether and those of the molecules of the body on which they impinge".[33]

Barrett's early publications show his practical mastery of synchrony and appreciation of its physical and non-physical applications. His first research paper, for example, described a method for detecting the trace amounts of carbonic oxide in breath that exploited the fact that carbonic acid molecules vibrated in exact synchrony with the radiation from carbonic oxide flames and were thus perfect absorbers of these ethereal vibrations.[34] More significant, in an 1870 issue of William Crookes's *Quarterly journal of science*, he developed analogies that Tyndall, Hermann von Helmholtz and others drew between light and sound, and between human organs of sense and musical instruments. Only five years after Tyndall compared the "optic, the auditory, and other nerves of the human body" to "so many [piano] strings differently tuned, and responsive to different forms of the universal power", Barrett was emphasizing that what linked human perception of light and sound was the result of "sympathetic vibration" between the acoustical and luminous waves and, respectively, the fibres in the inner ear and the rods and cones of the eye.[35] Sympathetic vibration was also one of the "facts" concerning both light and sound that gave "unity and simplicity" to the cosmos and by the late 1860s Barrett was using this to make sympathetic vibratory physics fulfil religious functions. Recall that in an 1866 article on glaciers Barrett argued that the "perfect harmony" pervading the physical cosmos awakened

"reverence to an unseen Ruler".[36] He developed a similar argument in an 1868 lecture to the Royal Dublin Society where he was reported to have said that the study of sympathetic vibrations illustrated that when the "student of nature" listened to the "sweet, though silent, music sung to him by every object of his diligent study" he bowed before "an oratorio as far above that of Handel as the works of the Creator are superior to the composition of the creature".[37]

By early 1866 Tyndall, notwithstanding his public commendation of Barrett's "rapid progress in scientific knowledge and experimental skill", no longer felt he could work with his assistant and this ultimately led to Barrett's resignation in July 1866.[38] Tensions between Barrett and Tyndall mounted in late 1865 when Barrett incurred the wrath of the RI patron, John Peter Gassiot, after writing a damning anonymous review of *Elements of physics* by Gassiot's close friend, Neil Arnott.[39] The review appeared in the *Reader* and represented one of many ways in which Tyndall was encouraging Barrett's scientific writing: he got Barrett published in the *Philosophical magazine* (which Tyndall helped edit) and asked him to help prepare articles for the *Reader*, a weekly journal with which Tyndall was already closely associated.[40] In his review, he aped Tyndall's example of using journalism to promote better physics, praising Tyndall's textbook *Heat*, criticizing Arnott's book for its "exceedingly irrelevant" material, and urging the need for "some popular yet sound elementary treatise on experimental physics".[41] In response Gassiot threatened to withdraw his regular contribution to the RI's Donation Fund unless he was given a satisfactory explanation of the review that he soon established was by Barrett. Gassiot's threat eventually forced Tyndall to explain that he had no control over his assistant outside the RI and to compel Barrett to write to the RI Secretary with his apologies and resignation.

Barrett did not retract his opinion of Arnott's book.[42] Barrett's resignation, however, owed more to a deteriorating relationship with Tyndall. A long entry in Tyndall's diary for February 1866 notes his exasperation with Barrett who allegedly resented the harsh manner in which Tyndall addressed him and other assistants after a lecture mishap, who seemed to forget how Tyndall had promoted his career, and who impertinently criticized Tyndall for not giving him due credit in an article on radiation.[43] While Tyndall praised Barrett in public as an "acute and skilful young experimenter", he was probably glad to replace him.[44] Barrett told the RI Secretary Bence Jones that he was reluctant to leave someone who had shown him "many acts of kindness", but was probably grateful that Tyndall had secured him a teaching position far from the RI at the London International College, a fledgling boys' college in Spring Grove whose curriculum Tyndall had helped design.[45]

Barrett's new position gave him time to consolidate private researches that he had undertaken at the RI. None of these preoccupied him more than the phenomenon of what Tyndall christened the 'sensitive flame'.[46] In his first technical paper on the subject, Barrett recalled that in late 1865, while helping Tyndall prepare a Christmas lecture for children, he had observed the dramatic effect of high-pitched notes on a "tall and slender gas-flame". "At the sound of any shrill note", he explained, "the flame shrank down several inches, at the same time spreading out sideways into a flat

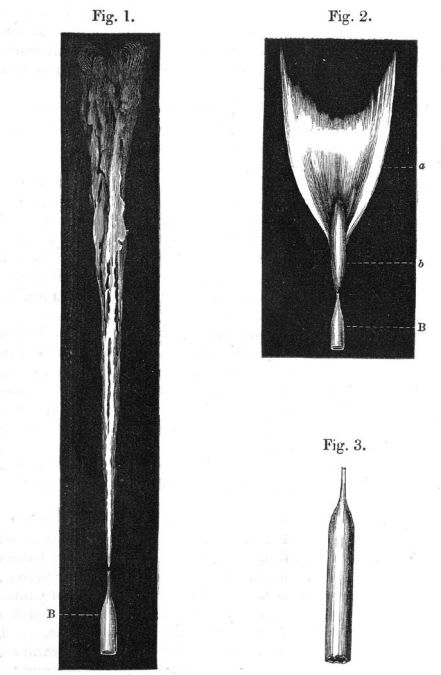

FIG. 1. Sensitive flames. Figure 1 shows a 15-inch "loose and ill-defined" flame, while Figure 2 shows that the flame becomes "flat" and "divergent" when struck by a shrill note. Figure 3 is a close-up of the tapering burner designed by Barrett to give greater sensitivity. From W. F. Barrett, "Note on 'sensitive flames'", *Philosophical magazine*, xxxiii (1867), 216–22, p. 218. Reproduced by permission of the Syndics of Cambridge University Library.

flame" (see Figure 1). The flame's behaviour was comparable to that of a "sensitive, nervous person uneasily starting and twitching at every little noise". What Barrett, Tyndall, and plenty of RI attendees found particularly fascinating was the sensitivity of the flame to the faintest sound. Barrett considered it

> astonishing how far off a sound affects the flame, notwithstanding the intervention of solid obstacles.... Whilst I observed the flame, a friend whistling [with a shrill whistle] left the room wherein was the flame, and, closing the door after him, slowly retreated upstairs; though its action was enfeebled by closing the door, the flame still continued to shrink at every whistle, and was visibly affected even when the whistle was sounded where it could barely be heard, in a closed apartment three stories away.[48]

In an RI lecture Tyndall graciously noted that the sensitive flame had been independently observed by Barrett and by the American physicist Joseph Leconte in 1858, but thereafter made the phenomenon his own, turning it into the most spectacular part of his lectures on acoustics and heat.[49] Barrett's first papers on sensitive flames, published

in the *Philosophical magazine*, embodied research apparently unknown to Tyndall and were clearly Barrett's way of preventing Tyndall from stealing his thunder. Barrett's first paper simply augmented Tyndall's by describing the best shape and size of burner and gas pressure for producing the flame; but his second paper, based on new research conducted in his mother's Pimlico residence, explicitly criticized Tyndall's explanation of the sensitive flame. Tyndall and Barrett agreed that the sensitive flame was a manifestation of resonance or sympathetic vibration in a system in unstable equilibrium. When the gas flow to a flame was adjusted until it was at "near roaring" point, the flame became unstable and extraordinarily sensitive to sounds containing frequencies corresponding to the faint hissing sound that was known to be produced by the friction between the gas and the burner. The effect of these sonorous vibrations on a flame was to upset the equilibrium of the flame and push it into its state of roaring or rapid vibration. An "external sound of this character", Tyndall reasoned, "added to that of the gas-jet already on the point of roaring is equivalent to an augmentation of pressure on the issuing stream of gas".[50] Barrett, however, pointed out that Tyndall had failed to explain *how* sonorous vibrations augmented the pressure of the gas and argued that his investigations showed that the flame's "perplexing" behaviour depended largely on the impact of sound waves on the pipe leading to the burner: such impacts caused the pipe to vibrate which forced the gas flow to be concentrated more towards the middle of the pipe, and to compensate for this the gas issued from the burner more quickly causing the flame to shorten and diverge.[51] What puzzled many observers of the sensitive flame was that it defied straightforward explanations of how mechanical effects were transmitted across space. For Barrett, the fact that the flame responded, albeit less dramatically, to certain vibrations, even when the vibrations were "infinitely small" or large distances and material obstacles intervened between source and flame, vanquished the "possibility of some tangible connection with the flame" and showed that what was transferred between the flame and sound source was something altogether less material: it responded to "translated *motion*" which mediated sound, not "translated *matter*" which constituted wind.[52] As Section 4 will show, the very intangibility of the connection between source and receiver proved immensely useful to Barrett, who sought an explanation of the apparent sympathetic and resonant mental phenomena that was thought reading.

Although most mid- and late-Victorian physicists agreed with Tyndall and Barrett that the sensitive flame was an example of unstable equilibrium in fluids, few regarded the matter as completely settled. The acoustics expert Lord Rayleigh spoke for many when in 1879 he noted that the "beautiful phenomena of sensitive flames is now familiar to students of acoustics; but its rationale is by no means understood", although by the time he published the second volume of his monumental *Theory of sound* of 1896 (a work citing Tyndall's and Barrett's researches), he was somewhat more confident and gave mathematical form to the supposition that the flame was an example of the instability accompanying vortex motion.[53] For their parts, Tyndall and Barrett were less interested in sophisticated theoretical analyses of the flame than in its potential as a tool for promulgating the intellectual and moral lessons of physics — Tyndall in his RI lecture courses and textbooks on sound, Barrett in his

popular lectures, school classes, and popular articles. Barrett was keen to exploit the mystery and wonder of the flame in his own attempt to rival Tyndall as a producer of sanitized wonder. Thus, in his Royal Dublin Society lecture he dazzled his audience by making the "wonderful" flame bob up and down in exact synchrony to the ticking of a distant watch.[54] He employed similar language in an article for the *Popular science review* which suggested that "so very magical is the unseen connection" between the flame and sound source that it seemed "more appropriate for a conjuror's stage than a scientific lecture table". But for Barrett, the sensitive flame highlighted a key difference between experimental physicists and conjurors. The lesson drawn by Barrett was that the "experiments of the philosopher [are] always more wonderful than the tricks of the conjuror" and that science, unlike conjuring, did not vanquish mysteries but, quoting Huxley, was in the business of moving phenomena from the realm of "disorderly mystery" to "orderly mystery".[55]

3. BARRETT'S IRISH MISSION

Barrett's Royal Dublin Society lecture of 1868 made a strong impression on at least one prominent Irish scientist in the audience — Robert Stawell Ball — and in late 1873 Ball invited Barrett to apply for the recently vacated Professorship of Experimental Physics at the Royal College of Science for Ireland in Dublin (RCSI), where Ball was the Professor of Applied Mathematics and Mechanism.[56] Ball's confidence in Barrett was based on more than his ability to manipulate sensitive flames. By 1873 Barrett had honed his pedagogical skills at the London International College and, thanks to Tyndall's further assistance, at the Royal Naval School of Architecture in South Kensington which was run by the chief administrative body of British science teaching, the Science and Art Department.[57]

Pedagogical activities were only some of the ways in which the ex-laboratory assistant was building his scientific reputation. Barrett managed to construct a network of scientific colleagues through association with the RI and Tyndall (including John Hall Gladstone, Balfour Stewart, and George Gabriel Stokes), through fellow South Kensington teachers (notably Frederick Guthrie), through presentations of research at British Association meetings, and through book reviews in technical and generalist periodicals including *Nature* and *Good words*. In these contexts, Barrett aped Tyndall's example by turning a personal struggle for scientific reputation into a plea for the greater place of physics education in British culture. Just as Tyndall had in 1853 extolled the study of physics as a key "instrument of intellectual culture" exerting a wholesome "moral influence", so some twenty years later Barrett called for more physics in schools because it was a "means of *education*" rather than a mere "vehicle of *instruction*" and "this because of its high power — when properly taught — of educating individual judgment by training the senses to habits of accurate observation and the mind to clear and precise modes of thought".[58] For Tyndall and Barrett, teaching physics was as much about inculcating moral values as imparting useful technical skills, and it was by showing that physics was mysterious and wonderful, not merely reductive and mechanical, that they sought to emphasize the role of the

experimental physicist as spiritual educator. As we shall see, Barrett's criticisms of the paucity and low quality of physics teaching in schools were shared by Guthrie and other South Kensington physicists: indeed, at the 1873 meeting of the British Association, he canvassed support for Guthrie's proposed Physical Society of London, an organization launched in 1874 to spread knowledge of physical investigations to researchers and teachers and to raise the cultural profile of physicists.[59]

Barrett's greatest mission for physics lay much further afield in the Royal College of Science for Ireland (RCSI) in Dublin, to whose chair in experimental physics he was appointed in 1873.[60] Tyndall again helped Barrett's placement, and it was to Barrett's advantage that the Irish-born physicist had played a leading role in the foundation of the RCSI.[61] Notwithstanding Robert Ball's assurance that he would enjoy plenty of resources for teaching and research, Barrett fought hard until his retirement in 1910 for more resources, space and time for teaching physics at an institution whose primary goal was to give students, from Britain and Ireland, the technical skills needed for improving agriculture and industry.[62] His crusade was partly successful: he oversaw the construction of the college's first physical laboratories, he launched the RCSI's (and Ireland's) first systematic classes in practical physics, he raised physics to a subject in which students could graduate, and he effected an overall growth in staff and students for physics.[63]

Barrett's efforts to establish experimental physics were hampered by the same space problems that dogged other directors of new British teaching laboratories, but also by national politics.[64] Barrett's tenure at the RCSI coincided with one of the most turbulent periods in Irish history owing to growing support for Home Rule and Irish nationalist hostility to the British government, some of which was directed at such institutions as the RCSI.[65] For Barrett and his RCSI colleagues the ongoing problem was low student attendance and many agreed this had more to do with a lack of appreciation of scientific training than nationalist resentment. Convinced that promoting science in Ireland was "most important to the country", Barrett dedicated himself to teaching physics in Dublin, whether to regular students of the RCSI or working-class attendees at his astonishingly popular evening classes hosted by the college.[66]

Barrett's pedagogical work was part of a broader mission to improve the physical and moral condition of the underprivileged of Dublin: he ran a non-sectarian teetotal working men's club, and promoted free libraries, women's education, and temperance. Barrett's educational work outside the RCSI was also part of a mission to popularize physics inside and outside Ireland, whether in lecture theatres, schools and articles in popular magazines. By the 1870s Barrett was making his public role strikingly similar to that enjoyed by Tyndall. He was commanding large popular audiences for discourses on the very topics with which Victorian publics associated Tyndall — the pious life and extraordinary discoveries of Faraday, sensitive flames, glaciers, and the inventions of Thomas Alva Edison — and was associated with the secularizing gospel promulgated by his old teacher. A good example of this occurred in 1878 when Barrett masterminded an evening conversazione at the Royal Dublin Society for delegates of the British Association meeting in the Irish capital. One reporter was so impressed

with the professor's display of sensitive flames that he opined: "The science-worship, which is the religion of the hour, reached the pinnacle of its popularity last night in the conversazione."[67] Barrett's occupation of Tyndall's territory increasingly irritated the RI professor. In 1874 the resentment reached the public sphere, with Barrett and Tyndall arguing over the old issue of intellectual property. Tyndall was exasperated with Barrett for allegedly claiming to have been the first to use sensitive flames as instruments for displaying acoustical reflection and in response omitted all original references to Barrett in future editions of his textbook *Sound*.[68] After this, Barrett and Tyndall seem never to have reconciled their differences.

Shortly after Barrett's death, his sister explained that he believed his "first duty was to his pupils and no private work was ever allowed to interfere with that".[69] Barrett's dedication to pedagogical and charitable causes certainly help explain why, compared with such contemporaries as Lodge and S. P. Thompson, he published little original research. Between 1873 and 1910 his articles mainly comprised papers on the anomalous thermal and mechanical effects accompanying the magnetization of metals, extensive studies of the physical properties of iron alloys, and the description of an instrument for observing defects inside the eye. Although some of his researches secured him scientific recognition — his work on iron alloys won him a Royal Society Fellowship in 1899 — the quantity and obscure publishing location of the work may have weakened his reputation in the most important British scientific circles.[70] Lodge succinctly expressed this point when in 1890 he reflected that Barrett's "comparative neglect of Physics has made him less powerful than he ought to be".[71] But if devotion to pedagogical, journalistic, and charitable activities limited his standing in the Royal Society and other élite scientific societies, it increased his power over other audiences to whom he, like Tyndall, wanted to project the image that science, because it revealed nature's mysteries and spirituality and inculcated right thinking, was a form of religion.

4. SENSITIVE FLAMES, SYMPATHETIC MINDS, AND SPIRITUAL BODIES

Not long after Barrett entered the RI, Tyndall wrote "Science and the 'spirits'", one of the most scathing of all Victorian attacks on spiritualism whose increasing appeal owed much to its promise of reconciliation with the dead, solutions to religious and scientific questions concerning man and the cosmos, and startling and often entertaining 'physical' manifestations.[72] Thousands of people were going to séances where they saw such astonishing feats as mediums levitating off the ground and messages from professed spirits of the dead rapped out on tables. Appearing in the *Reader*, Tyndall's article derided the Spiritualist practices and claims as he experienced them at a séance he had attended in 1857 at the Blackheath residence of Newton and Camilla Crosland.[73] Tyndall went in place of Faraday who, having concluded in 1853 that table-turning was merely the result of a quasi-muscular force exerted by table-turners and having religious grounds for condemning any communion with 'spirits', offered the Croslands' invitation to his protégé. Tyndall turned up already fiercely hostile to Spiritualists, believing their testimony regarding "natural facts",

like that of witnesses to miracles, "usually worthless" because it was "wrapped in this atmosphere of the affections, the most earnest subjective truth being thus rendered perfectly compatible with the most astounding objective error".[74] Tyndall held that spiritualistic phenomena were too "gross" to be legitimate mediators of spiritual truths which he thought could only be truly established by faith.[75] But it was precisely because the phenomena were gross that Tyndall believed they were fit topics of scientific enquiry, much as he argued that since prayer was supposed to have consequences in the physical world then the "scientific student" had "the right of subjecting it to those methods of examination from which all our present knowledge of the physical universe is derived".[76]

Tyndall arrived at the séance convinced that "some physical principle, not evident to the Spiritualists themselves, might underlie their manifestations".[77] He noted the failure of the medium to read his thoughts and that her ability to perceive luminosity surrounding magnets (a faculty that the early nineteenth-century German chemist Karl von Reichenbach claimed was shared by several 'sensitive' individuals) was rendered doubtful by her failure to sense a magnet concealed in his pocket. He also thought his fellow séance-goers were so keen to receive proof of the spirit world that they erroneously attributed to "spirits" the sounds produced by objects moved by Tyndall. More tellingly, Tyndall persistently tried to upstage the wonders of the séance with the wonders of the physics laboratory. When the medium boasted about the musical instruments played by "spirits", Tyndall retorted that "such performance was gross" in comparison to flames which could be made to emit loud melodious notes by someone standing some distance from it.[78] Tyndall was alluding to the 'singing flame' — a sensitive flame over which was placed a tube that amplified the "song" of the flame made when it was subject to sonorous vibrations corresponding to the faint hissing sound made by gas emerging from the burner. Tyndall noted, with much irony, that the "spirits" thought this phenomenon to be as "great marvels as any of those of spiritdom" and that Tyndall must therefore be a "first-class medium". Tyndall left the séance convinced that the Spiritualist was a "drugged soul ... beyond the reach of reason" and the little he experienced of spiritualism thereafter dissuaded him from the view that it was "vile nonsense" that had to be "permanently abolished".[79] He continued his tirade against Spiritualists in public lectures where he exploited the similarity of physics and spiritualism to debunk the latter. In his acoustics lectures, for example, he showed how to imitate the well-known séance manifestation of musical instruments playing without direct contact. He moralized that an "uneducated person might well believe that witchcraft or 'spiritualism' is concerned in the production of this music" that he explained was actually produced by a deal rod connecting the harp to a concealed piano.[80]

In 1924 Barrett recollected that the "atmosphere" surrounding his years at the RI was hostile to "any belief in psychical phenomena" and implied that this was the key source of his initial scepticism towards spiritualism.[81] Barrett's religious background, however, arguably played at least as important a part in his attitude. Like many Christians, Barrett was raised to believe in the immortality of the soul and that following

bodily death, the soul entered into a state of probation in which, as one of his father's sermons argued, communication with the living was an "utter impossibility".[82] When Barrett first announced his spiritualistic interests in 1875 he revealed his deep understanding of other common arguments against spiritualism by writers from the range of Christian denominations.[83] He agreed with the Nonconformist view, commonly made in the context of critiques of Catholic supernaturalism, that spiritualism caused "mental derangement" in the "simply curious", superstitious and uneducated. He also agreed with Catholic and Protestant writers that spiritualism could not be a religion because it depended on messages from 'spirits' who were potentially mendacious, and because it diverted attention away from the Christian God.[84]

Despite these strong metaphysical arguments, Barrett joined plenty of Victorians from all Christian denominations in finding scriptural justification for spiritualism and regarding it as a potentially crucial weapon against a bigger threat to public morality — materialism. Like many Nonconformists, Barrett was averse to Biblical literalism and suggested that mediums were not necessarily fraudulent and avaricious necromancers, but latter-day seers, and that "spirits" were not necessarily "demons" as suggested in the New Testament, but benign entities in an "intermediate" state between the physical and spiritual.[85] If investigated with a "reverent and balanced mind" and if one adopted the belief that spiritualism was only an "aid towards the attainment of higher spiritual truths", Barrett anticipated that the professed "spirits" could strengthen conviction in the spiritual body.[86] As we shall see, he thought the potential moral benefits of a properly investigated spiritualism far outweighed the moral dangers of leaving it to credulous séance-goers, incredulous scientists steeped in the materialistic philosophy, and dogmatic Protestants and Catholics (of which he encountered many in Dublin) who condemned all communion with "spirits".[87]

What partly justified Barrett's belief that "spirits" could be sanitized by science was a crucial distinction between natural and supernatural. As far as he was concerned, it was not correct to classify "spirit" manifestations as "supernatural" because they manifested themselves to the natural faculties and because "only the Deity is *super*natural".[88] Barrett eventually agreed with his SPR colleagues that such rare but natural phenomena were more properly classified as "psychical" and "supernormal", but he maintained that they could be used in understanding "the laws of the spiritual kingdom".[89] Barrett's justification for the uses of natural phenomena to illuminate the spirit world owed much to the fact that he, like many Victorian scientists, believed that the universe displayed unity of Divine purpose and continuity in its visible and invisible dimensions. For Barrett this suggested that the physical and spiritual worlds were homologous rather than analogous, and this underpinned his belief that "scientific observation" of the natural world, in which he located spiritualistic and psychical phenomena, performed the spiritual function of revealing Divine purpose and wisdom.[90]

Barrett's recollections about the anti-psychical atmosphere of the RI are misleading for at least two other reasons. As we shall see below, the physical researches he undertook at the RI played a significant role in shaping the way he interpreted, and tried to make more plausible, psychical phenomena. The RI was also important

because some of its leading personnel were involved in psychical investigation. Tyndall and Faraday may have reached damning conclusions about spiritualism but by even bothering to investigate spiritualism they set an important example to younger savants such as Crookes and Barrett.[91] Just as Tyndall argued in the 1860s that the "supernatural" phenomena of prayer were open to physical investigation because they had alleged physical effects, so Barrett explained decades later that "the fact that [a spiritualistic phenomenon] impinges on our senses, and so affects our perceptive faculties, or can leave a permanent automatic record of its presence" placed spiritualism "within the pale of legitimate experimental enquiry".[92]

An equally consequential component of the RI "atmosphere" was John Wilson, whose mesmeric investigations put Barrett on the path to mesmerism and ultimately spiritualism. Wilson was an Irish physician who in the 1830s had performed experiments on mesmerizing animals and whose membership of the RI brought him into contact with Barrett.[93] Some time in the mid-1860s Barrett visited Wilson on his estate in County Westmeath, Ireland, where he witnessed Wilson mesmerize a "sensitive subject". Barrett recalled that he was "naturally incredulous" of the result but conducted his own mesmeric experiments on children from a local village.[94] Barrett recalled that he had asked the children to stare at a piece of paper, and one girl among them then passed into a state of reverie in which condition she "could readily be made to believe the most extravagant statements, such as the table was a mountain". Barrett concluded that the girl displayed an apparent exaltation of the sensory powers that was not documented by William Benjamin Carpenter and other leading authorities on altered mental states. What particularly impressed Barrett was that, entranced and blindfolded, the girl appeared to display the 'sympathetic' mental powers that had long been a key feature of mesmerism and which mesmerists attributed to real magnetic forces flowing between the operator and subject. Barrett's juvenile subject exhibited the "sensations or emotions occurring in the operator ... without the intervention of any sign or visible or audible communication".[95] She also correctly determined the suit of a card or the value of a bank note that Barrett concealed in a book held near her head, she successfully read his thoughts, and she correctly described the interior of a place of which Barrett thought she could not have any knowledge — William Ladd's scientific instrument shop on Regent's Street in London.

The most telling aspect of Barrett's account of his Westmeath experiments is the subtle allusion to the sensitive flame. It was 1876 when Barrett first explicitly linked sympathetic mesmeric subjects and sensitive flames, but it is clear from his description of the girl's decided response to practically inaudible vibrations that in the late 1860s he already saw her as a human analogue to that celebrated instrument of the RI that was sensitive to inaudible transmissions and which itself behaved like a nervous human person:

> It was impossible for [the operator] to call the girl by her name, however faintly and inaudibly to those around, without at once eliciting a prompt response. Even when the operator left the house, and at intervals called the girl's name, at the same time indicating the facts by signs to those within sight, she still responded,

more and more faintly, it is true, as the distance became greater.[96]

Whereas Tyndall used the sensitive flame to make physics look more marvellous than spiritualism, Barrett began to see the flame as a way of linking physics to a borderland of psychology. Barrett did not publish his Westmeath experiments until 1876, but from the late 1860s he seems to have drawn on them to explore the psychological implications of the physics of sympathetic vibrations. In popular expositions Tyndall juxtaposed physical and puzzling human powers to the detriment of the latter, while Barrett in his rival expositions sought to show that the two were connected via the 'principle' of sympathetic vibration. His Royal Dublin Society lecture, for instance, emphasized that "by diseases or nervous derangement" human bodies, like sensitive flames, were in a state of unstable equilibrium and "in that condition are sensitive to the slightest stimuli, if of the proper kind".[97] Two years later he argued in the *Quarterly journal of science* that just as perception of light and sound depended on synchrony between the frequency of physiological structures and that of incoming waves, so it was possible that there were some sentient beings whose bodies were tuned to vibrations insensible to others. It was possible that "certain sounds and certain lights perceived by some persons are totally unperceived by others" and that "forces unrecognised by our senses are perceptible elsewhere".[98]

By "elsewhere" Barrett undoubtedly meant the perspective of the mesmerized subjects he had investigated a few years earlier, and it may have included the perspective of spiritualist mediums. Barrett did not attend his first séance until 1875, but by 1871 he was sufficiently acquainted with spiritualism that William Crookes, the chemist and journalist whose published evidence for the medium D. D. Home was stoking the ongoing controversy over spiritualism, was asking him to help "form anything like a physical theory" to explain such "obscure" physical phenomena as Home's levitation feats.[99] Barrett agreed with Tyndall that there was "some physical principle" unknown to Spiritualists themselves underlying séance manifestations, but from his greater knowledge of spiritualism, Barrett was becoming convinced that this 'physical principle' was new to scientific practitioners too. In his first (anonymous) article on spiritualism — a hostile review of a book on apparitions penned by Tyndall's séance host Newton Crosland — Barrett followed his mentor in criticising Spiritualists for their "abuse" of scientific methods and language and agreed with Carpenter that some cases of "spirit manifestations" were due to self-deception, itself prompted by séance-goers' strong desire to see spirits. But in the first of many challenges to Carpenter, Barrett believed that some subjective impressions came from forces outside, not within, the body. Siding with mesmerists and Crookes against the Spiritualists and Carpenter, he sought a more comprehensive explanations of "spirits" in the "profound power [that one could exert] over the thoughts of another" to which he could "testify", and in Crookes's psychic force or "another agency".[100] The sober experiments of physical scientists (Barrett and Crookes) were thus presented as the most promising way forward for dealing with spiritualism.

The place and conclusion of Barrett's review were telling. It appeared in the *Nonconformist*, a dissenting weekly that had shown more tolerance of spiritualism

than representatives of other Christian denominations. An 1872 review of Spiritualist works, for instance, concluded that spiritualism contained "much of false to little of genuine" but that this did not "justify assumption that would in effect declare all spiritual intercourse whatever to be à *priori* impossible".[101] Barrett's review was only slightly more optimistic. He warned that spiritualism was proving to be an aid and a "shipwreck" to people's Christian faith, and so it was the duty of "scientific men who are Christians" to do what Huxley said should be done to all puzzling physical phenomena — to remove it "to the realm of orderly mystery which is science".[102]

Scientists had to overcome any moral repugnance of spiritualistic investigation to demonstrate to the public what, if anything, was wholesome about spiritualism. Over two years later, *Nonconformist* readers were presented with a stronger intellectual and moral argument for spiritualistic investigation from Barrett.[103] There were several explicit and implicit reasons why Barrett wrote this article, a book review that proved so popular that he was compelled to write a slightly enlarged and signed version three weeks later.[104] First, it was ostensibly a critical review of recently published spiritualistic books by three well-known investigators of spiritualism, Crookes, Alfred Russel Wallace, and the American clergyman, Asa Mahan. Second, it was an opportunity for Barrett to present his own experiences of spiritualism; and third, it was an opportunity for Barrett to respond implicitly to the "materialistic" 'Belfast Address' delivered by Tyndall the previous year.

Barrett's review began by emphasizing that spiritualism was one of *the* intellectual issues of the day because it was "spreading widely in every civilised country" and in the "glare of natural science". He praised Crookes, Wallace, and Mahan for approaching the problem from the "right side — namely that of experimental enquiry", and was impressed by the authors' positive evidence for the objective existence of such startling manifestations as spirit 'raps', the movement of objects without apparent means of support, and materialized spirit forms.[105] He was not so impressed with the common theories of these phenomena. He explained that psychologists' theory that 'spirits' were merely subjective impressions could not explain the physical traces produced by the invisible intelligences; he suggested the 'trickery' theory was weakened when considering the scientific acumen of such enquirers as Crookes and the good character of some mediums; and he urged suspended judgement on the materialized spirits witnessed by Crookes and Wallace whose objective existence he accepted on the basis of Crookes's and Wallace's acumen, but whose spiritual provenance he questioned because such events required a "great weight of testimony".[106]

What gave weight to the testimony of Crookes, Wallace, and Mahan was personal experience of spiritualism. Shortly before writing the review, he witnessed spiritualistic phenomena in séances at the home of a Dublin friend who was an "English solicitor of high standing".[107] He learned that Florrie Clarke, the solicitor's ten-year-old daughter, had been plagued by rapping noises that followed her around the house. He observed that when sitting with the girl and her family, knocking sounds were produced on a table, sounds that appeared to be intelligent because they kept time with the beat of music and, using the spiritual telegraphic code of one knock

for 'yes' and two for 'no', correctly gave Barrett's Christian name (which Barrett insisted was known to nobody else besides him). Barrett imposed more stringent conditions in a bid to isolate the cause of the phenomena — he held the sittings in a brightly lit room, he made sure he could see the hands and feet of all participants, and he closely examined the sources of the noise — but emerged from the sittings convinced that the girl was "simply incapable of practising any deception", and that even if she had been of low character, she could not have performed her tricks in sunlight before so many witnesses.[108]

Satisfied of the objective reality of the 'intelligence', Barrett remained unsure of its explanation. Barrett was, however, prepared to draw the crucial anti-materialistic conclusion that it was possible for mind to act outside the bodily frame. His own mesmeric and spiritualistic experiences, the 'psychic force' of Crookes, the "*exoneural action of the brain*" proposed by the early Victorian physiologist and mesmerist Herbert Mayo, suggested that it was "highly probable" that there was a "radiant force associated with conscious life", a force that some people could apprehend through what he accepted as a sixth sense.[109] Again, the expert on invisible radiation forces had turned humans into organic equivalents of detectors whose organization allowed them to sense vital radiation emitted by others. By suggesting an analogue between thought and heat, Barrett was extending physics into psychology far more than Tyndall allowed. In the 1870s Tyndall denied that the gap between physical causes and subjective impressions could be filled by "mechanical deduction" but in the same period Barrett was effectively being more naturalistic than his mentor in trying to bridge the gulf with a subtler form of physical radiation.[110]

Barrett warned that the existence of a radiant vital force or 'nervous effluence' was a plausible hypothesis for transfers between minds, but not from mind to matter. At this stage Barrett thought it was more difficult to accept that energy conservation could be abrogated though direct mental action on matter, than the Spiritualist idea that "spirits" moved objects in séances. The only way out of this difficulty was further investigation of phenomena that he accepted might always lie beyond the resources of natural science because they "cannot at pleasure be submitted to cross-examination". Nevertheless the troubled scientific study of spiritualism remained important for moral reasons. Barrett warned that in the hands of the superstitious, simply curious and ignorant, spiritualism was the path to moral derangement and impiety, but when "conducted in the spirit of an honest search for truth" and considered by the "dry light of science" it promised "objective proof" of "facts of transcendent importance", hope for those "yearning for some deliverance from the meshes of materialism" and "groaning beneath a mechanical universe", and a source for "stirring the potent conviction that 'there *is* a spiritual body'".[111]

Barrett's allusion to materialism was probably inspired by one of the most notorious scientific events of 1874 — Tyndall's presidential address to the Belfast meeting of the British Association — although Barrett did not explicitly attack the 'Belfast Address' until his London Spiritualist Alliance address of 1894.[112] The apparently materialistic uses to which Tyndall put physics in this notorious speech were powerfully

challenged by the Scottish physicists Balfour Stewart and Peter Guthrie Tait in their anonymous *Unseen universe* which used the latest physical theories of matter and ether to support Christian teachings about an unseen spiritual world transcending the visible cosmos, immortality and miracles and thus to vanquish the "presumed incompatibility between Science and Religion".[113]

Barrett not only allied himself with the anti-Tyndallic *Unseen universe* by calling for a cheaper and more popular edition of the work, but by emphasizing that the notion of intelligent spirit agencies intervening in séances was merely developing Stewart and Tait's argument for an unseen universe acting energetically on the visible cosmos. Stewart and Tait were not willing to go this far. They dismissed all spiritualistic manifestations as subjective impressions but, crucially, thought such impressions "enlarged our knowledge of the power that one mind has in influencing another".[114] Evidence of mind acting outside the body was particularly useful to Stewart who told Barrett in 1881 that he already had "strong grounds" for rejecting the view of the "atomic materialists". His interest in thought-reading prompted him to join the SPR but his strong Presbyterian faith made him shun investigation of alleged 'spirits' as morally "dangerous".[115] For Barrett, however, it was more important for scientists to curb the moral danger of spiritualism by systematic scientific investigation rather than by avoiding it.

5. PHYSICS VERSUS PSYCHOLOGY

By mid-1876 Barrett was sufficiently convinced that his experimental evidence challenged accepted physiological explanations of mesmeric and spiritualistic phenomena that he was ready to present his work to scientific audiences. A major opportunity to promote new scientific studies of these phenomena came through his friendship with the naturalist and Spiritualist Alfred Russel Wallace whom he first contacted in autumn 1875. Wallace had read Barrett's *Nonconformist* article and while objecting to Barrett's claim that the intelligence of professed 'spirits' never seemed to go beyond that of séance-goers, he thought it "must do good".[116]

Wallace's interests in Barrett extended to more than simple platitudes. In early summer 1876 he exploited his position as chairman of the Anthropological Section of the British Association to secure Barrett a place at the Glasgow meeting of the Association. Barrett's paper, "On some phenomena associated with abnormal conditions of mind", was regarded as the liveliest event of the meeting and was certainly a key moment in Barrett's career. It fuelled ongoing debates, extending back to the 1850s, about the necessity and legitimacy of scientists' investigating spiritualism, and fed into the more topical subject of 'Dr' Henry Slade, an American medium who had been accused by the biologist Edwin Ray Lankester of using fraudulent methods to produce 'spirit writing' within enclosed slates and who was about to stand trial for his activities in London.[117]

Barrett's implicit goal was to distinguish himself from on the one hand, psychologists and physiologists, and on the other, Spiritualists. He agreed with the existence of the mesmeric state but went beyond physiologists and psychologists in

attributing this state to a subtle force between minds; and he argued that the power of one mind on another explained much of spiritualism without spirits or supernatural agencies. He began by strategically emphasizing that Carpenter and James Braid had shown the objective reality of the exalted sensory abilities of mesmerized and hypnotized subjects, but proceeded to explain how tests of the County Westmeath girl challenged Carpenter's theory that mesmerized subjects were highly susceptible to the operator's suggestions only because they were previously possessed with the conviction that the operator would influence them. Noting Carpenter's warning that thought-readers were usually just expert at reading people's unconscious gestures, he insisted he had taken measures to prevent "giving any indication to the subject" but that when blindfolded and entranced, the girl had been able to share, swiftly but faintly, the mesmeric operator's ideas, emotions and sensations, indicating a "still more wonderful degree of exaltation of the perceptive powers" than that described by Carpenter and Braid. Barrett argued that, "when a person is thrown into an utterly passive condition, the nervous action that constitutes thought can be excited by a corresponding action in an adjoining individual, and this across space and *without* the intervention of the senses". This was Barrett's first implicit endorsement of mesmerists' claim that there was transference of an imponderable force from mesmerist to mesmerized or from a person to a thought-reader — the very explanation that Carpenter and Braid repudiated. For this scientific audience, he made much more of the physical analogies he had drawn in his *Nonconformist* review. What physiologists and psychologists found so difficult to accept was perfectly understandable to the physicist experienced in the way that subtle forces could be transmitted through space and induce sympathetic states in the passive receiver. Thought reading was not "an altogether incredible fact" when considering that nerve energy, like electrical energy, might act "by influence across space" as well as by conduction, and was another form of radiant energy "capable of throwing the nerve tissues of passive, receptive individuals into states of activity corresponding to the states existing in an active adjoining mind".[118]

Barrett had more problems finding arguments for the plausibility of spiritualistic phenomena, a subject that he strategically approached more concisely and cautiously owing to the fact that it was one of the most divisive scientific issues of the day. Hence he agreed with physiologists and psychologists that spiritualistic manifestations seen in subdued light were undoubtedly illusions because in these conditions, ideas held by the observer or suggested by the medium turned into impressions that séance-goers mistook for objective reality. However, he believed that spiritualistic manifestations seen in daylight (including his Dublin séances) could not be so easily explained and appeared to account for stories of "supernatural irruptions into the visible universe". He concluded by anticipating that a "scientific explanation" would be produced because he thought that the British Association, as *the* public science institution of the country, would fulfil its duty and "appoint a committee to inquire into the matter leisurely and systematically, and not to allow thousands of people to be deluded by the matter".[119]

Barrett's paper prompted mixed reactions inside and outside the hall where it

was delivered. Respondents were divided over the merits of Barrett's evidence and the propriety of his actions: some praised his courage for tackling the burgeoning problem of spiritualism, while others (notably E. Ray Lankester) attacked him for bringing the British Association into disrepute by giving credence to a residuum of spiritualistic manifestations.[120] Unsurprisingly, the most potent criticism came from Carpenter who denied that Barrett's mesmeric experiments were scrupulous enough to support conclusions regarding subtle forces being transferred in the space between minds. He warned Barrett in the discussion following the paper that he had not guarded against "certain little unconscious revelations ... made in tone, gesture, expression of face" that mesmerized subjects often exploited in their apparent feats of reading thoughts, and had therefore not shown "direct communication between one nervous system and another", whose possibility he nevertheless tolerated. Barrett had not only failed to understand the workings of his own mind and body, but those of his subjects. Irritated that Barrett had not deferred to the proper experts on abnormal psychology, Carpenter later chastised the physicist for failing to appreciate that

> my medical education, my psychological enquiries, my experience of the dodges of the deceivers and in the unintentional assistance given to them by incautious victims of their arts, and in the extraordinary self-deception of those who go into the enquiry prepossessed with an idea, gave me a qualification which you do not possess, and that you must first gain a position as an expert in this particular line of investigation, before anything you say will carry in the least conviction to those who have earned the rights to be considered as experts.[121]

Carpenter thus rejected Barrett's implicit claims to authority based on his type of scientific training. Indeed, what was so lamentable about Barrett, Crookes and other physicist investigators of psychological domains was their ignorance of "*the nature of their instruments of research*; putting as much faith in tricky girls or women, as they do in their thermometers or electroscopes".[122] This was certainly not the last time that Barrett and his fellow physicist investigators of spiritualism had to face such a serious argument against the very possibility of a physics of spiritualism. In 1914, several decades after the SPR had begun its attempt to make psychical research scientifically more respectable, the leading psychologist Ivor Tuckett echoed Carpenter in explaining that, had Barrett and Lodge been "trained in experimental psychology", they would have seen that the evidence they had produced for telepathy was "unsound".[123]

As far as Barrett was concerned, however, expertise in the extraordinary phenomena produced by the instruments of physical research gave him an insight into abnormal mental phenomena that medical men and psychologists lacked. In December 1876 he delivered another public *tour de force* on sympathetic vibrations, but this time he connected stunning displays of sensitive flames and tuning forks with his Glasgow paper. "Our bodies and minds", he apparently remarked, "often resemble a resonant jar or sensitive flame, and a very slight disturbance, if it is synchronous with our state, may produce unlooked for effects". Mental resonance was apparent from "far and near testimony" collected during the last six months suggesting that "we are on the threshold of the action of mind on mind". It was especially important for the public

to appreciate the physical wonders and psychological implications of acoustical physics because "certain philosophers, to whom [the public looked] for instruction in psychology ... talked confidently about the impossibility of any at present inexplicable phenomena".[124] In many ways Barrett was participating in an existing battle over scientific expertise waged by Tyndall against doctors and physiologists. Over the previous few years Tyndall, Barrett's fellow evangelist for physics education and fellow member of the Physical Society of London, provoked the ire of leading medical practitioners by arguing that his radiation measuring instruments were more sensitive than microscopes and therefore that physicists were better than medical men at proving the truth of the controversial germ theory of disease — a topic on which medical men believed they were the pre-eminent authorities.[125] Like Tyndall, Barrett sought control of the public mind. Tyndall's public lectures and popular journal articles were designed to show that experimental physics could vanquish delusions, perpetrated by medical men, about diseases with which the public were intimately acquainted; Barrett's activities used the insights of radiation and acoustical physics to educate the "uncultured minds" of the public in the dangers of spiritualism and worse, the "flimsy explanations" of psychologists.[126]

Barrett's bitterness about the attitude of "certain philosophers" to "inexplicable phenomena" owed much to the fact that the British Association had blocked his proposal to establish a committee for conducting new scientific investigations into mesmerism and spiritualism. He later recalled that he felt his British Association paper had caused him to be "more or less alienated" by "most of [his] scientific friends" even though it had been commended by several eminent scientific colleagues including Robert Angus Smith, William Huggins, Lord Rayleigh and Crookes.[127] Encouraged by scientific allies, Barrett was so exasperated with the British Association that he tried a different way of launching a systematic enquiry into obscure human faculties: to appeal to the same audiences who already knew him through popular lectures and articles. Thus, only days after his Glasgow paper, he entered the fierce *Times* correspondence battle over Henry Slade's mediumship by asking readers to send him cases of "the direct action of mind upon another ... occurring in general or to persons reduced to an extremely sensitive condition, either by illness or by what is popularly known as 'mesmeric trance' and cases of 'sixth sense'".[128] Despite his warning that he wanted only cases that could not be attributed to a keen 'muscle sense' or exaltation of the known senses, Barrett's plea caused myriad letters on thought reading, second sight and other strange mental powers to pour into his Dublin home. From late 1876 he began sifting cases that he believed could be attributed to imposture, poor observation, and "exalted muscular action" from others that required explanations that went beyond known psychological and physiological mechanisms.[129] Sifting cases was not enough. Barrett and his supporters needed to do more to establish themselves as the proper authorities on strange psychological phenomena. He would undoubtedly have agreed with Wallace that it was time for "every one who has any scientific or literary or medical standing" and who had evidence for mesmeric and spiritualistic phenomena to "make them known & keep them well before the public".[130] A new scientific forum for these phenomena was needed.

6. BARRETT AND THE SOCIETY FOR PSYCHICAL RESEARCH

Among the many letters that Barrett received in Dublin after his national appeal were several from a Unitarian minister from Buxton, the Reverend A. M. Creery, who described the extraordinary success scored by his children at the 'willing game'. In this parlour game, which became immensely popular in Britain during the 1880s and 1890s, a person would be blindfolded and asked to identify or find a concealed object by means of light physical contact with another person mentally 'willing' them towards the object (see Figure 2). By summer 1881 the game had become the subject of much public debate in Britain owing to the performances of Washington Irving Bishop, a self-professed 'thought reader' whose astonishing ability to locate objects known to a person with whom he was in light physical contact was frequently ascribed to genuine abilities to receive the thoughts of others.

The debate spilled into *Nature* where the biologist George John Romanes, William Carpenter and others concluded from tests of Bishop that he was merely skilled in reading "indications involuntarily and unwittingly supplied to him by the muscles of his subject".[132] Barrett privately agreed that Bishop's powers were examples of exalted muscular sense but was keen to disabuse the public of the belief that *all* cases of thought reading could be put down to such mundane causes.[133] Accordingly, he entered the *Nature* discussion on Bishop's performances with a description of his investigations of the Creery children conducted during Easter 1881. Barrett noted the Reverend Creery's observation that his children, four girls and a boy aged between nine and fourteen, had guessed, without any physical contact, "letters and words, or names of places, of persons, and of cards ... with promptness and accuracy; the failure in any examination not mounting to one in ten consecutive trials". His own more rigid tests supported the minister's observations. One child, Maud Creery, was led out of the room where the game was being played, and having locked the doors to the room, Barrett wrote on paper the name of a randomly selected object not in the room and then passed the paper to other observers in the room. Bringing Maud back to the room, and ensuring (by blindfolding her or by insisting on silence) that she could not pick up auditory or visual clues unconsciously given by the investigators, Barrett asked her to name or retrieve the named object. He repeated the test on Maud's siblings and a maidservant and concluded that they were all "more or less successful, but some were singularly correct in their divination of what I had written down". To further disarm sceptics, Barrett stressed that during even more stringent tests — where he asked the child to name or fetch objects as soon as it "guessed" them — the children had scored many more successes than failures.[134] As in his British Association paper, Barrett concluded that there was an apparent "nervous induction" taking place between the minds of the investigators and those of the children, and that his evidence was not meant to prove the case for mind reading, simply to prompt further investigation.

Barrett's puffing of this evidence in *Nature* and other periodicals was driven by a deep conviction that he had made an original scientific discovery — the transference of thoughts between individuals in a normal or non-hypnotized state — and that this

FIG. 2. "Amateur Thought-Reading", *Illustrated London news*, 19 October 1889, 505. Reproduced by permission the Syndics of Cambridge University Library.

would secure him scientific fame.[135] His evidence impressed Romanes who suggested that Barrett form a committee of "scientific experts" to re-test the Creerys.[136] Barrett agreed, but the only scientist who joined his committee was Balfour Stewart who regarded his tests of the Creerys in late 1881 and early 1882 as "corroborative" of those done by other investigators.[137] The other investigators were Henry and Eleanor Sidgwick (wife of Henry and brother of the statesman Arthur Balfour), Frederic W. H. Myers, and Edmund Gurney, individuals closely associated with the intellectual and social élite of Victorian Britain. As several historians have shown, Sidgwick, the eminent Cambridge moral philosopher, had been interested in spiritualism since the mid-1860s and by the early 1870s was attending séances with Myers, a Cambridge-based poet and Government school inspector, and Gurney, a Cambridge-educated psychologist and music scholar.[138] Whereas Barrett saw spiritualism as a potential weapon to defend Christian teachings in which he was already a strong believer, Sidgwick, Gurney and Myers saw spiritualism as a way of propping up a faith eroded by Biblical Criticism and scientific claims regarding human evolution. Gurney, Myers and Sidgwick's investigation of spiritualism, as well as mesmerism, apparitions and other abnormal psychological phenomena, offered a more satisfactory, because empirical, basis for belief in Christian teachings on the independence of mind and body, the afterlife, and spiritual values. Sidgwick and Myers's confidence in spiritualistic

investigation, however, faded after witnessing several acts of mediumistic trickery, but Barrett's British Association paper raised their confidence because by autumn 1877 they were collaborating on and funding Barrett's investigations of spiritualism and thought reading.[139]

Barrett recalled that during these early collaborations with Myers and Sidgwick he had discussed the possibility of doing what the British Association had failed to do — establishing a scientific society for organizing and publishing research into mesmerism, spiritualism and other obscure physical-psychological phenomena. He recognized that this would depend on cooperating with Spiritualists whose approach to 'spirits' he thought was "hardly scientific" and generally not as reverent as it needed to be, but who could furnish "opportunities for investigation".[140] By late 1881 Barrett was in a better position to achieve this goal because he had kindled friendships with William Stainton Moses, the highly respected medium, Anglican minister and schoolteacher, and with Edmund Dawson Rogers, a prominent figure in the leading Spiritualist organization, the London Spiritualist Alliance, and editor of the Alliance's organ, the weekly journal *Light*. Discussions with Rogers prompted Barrett in December 1881 to invite "friends interested in Spiritualism and Psychological Research" to attend a conference for discussing future research and the possibility of a "Central Society organised under some such name as the London Psychical Society".[141]

Barrett's canvassing was not as successful as his efforts for the London Physical Society eight years earlier. Many of the scientists, clergymen, and card-carrying Spiritualists whom Barrett invited were sceptical of the alliance between members of Spiritualist societies and those without such organizations: W. S. Moses, for instance, thought the differences of social class and methodologies between the typically plebeian/lower-middle class Spiritualist and the bourgeois/aristocratic non-spiritualist investigator would create "insuperable" "disintegrating forces" in the society.[142] Conference attendees, however, were sufficiently roused by speeches by Myers, Gurney and others that a conference committee agreed to Barrett's proposal and in mid-February 1882 the Society for Psychical Research was launched in London. The committee agreed that the principal object of the SPR was to make "an organised and systematic attempt to investigate that large group of debatable phenomena designated by such terms as mesmeric, psychical, and Spiritualistic", phenomena which "amidst much illusion and deception" were "*primâ facie* inexplicable on any generally recognised hypothesis, and which, if incontestably established, would be of the highest possible value".[143]

Recent studies of the early SPR have shown that the society was as preoccupied with creating an image of a respectable scientific society as with producing reliable evidence for what it broadly classified as psychical phenomena.[144] Its rules, membership, and structure reflected its attempt to persuade scientific and more general intellectual audiences that it was not another Spiritualist organization whose commitments to a theory of 'spirits' distorted its scientific credibility. The SPR's rules stressed that membership did not "*imply the acceptance of any particular explanation of the phenomena investigated, nor any belief as to the operation in the Physical*

world, of forces other than those recognised by Physical Science", and its most active early members comprised more non-Spiritualists (for example, the Sidgwicks, Myers, Gurney, Barrett, and Stewart) than Spiritualists (notably Rogers and Moses).[145] Much to the delight of the image-conscious core of the SPR, the Society successfully recruited to its ranks a host of famous scientific savants including William Crookes, Lord Rayleigh, and J. J. Thomson, although most lent little more than their name to the organization. In its early years, the SPR also sought scientific credibility from sharing investigative work between different research committees on the very areas that Carpenter and many other psychologists believed had been satisfactorily explained in terms of known mental mechanisms: 'thought-transference' (which was preferred to 'thought-reading' owing to the passive way in which one person was believed to receive mental transmissions from another person), mesmerism, Reichenbach's experiments on the alleged ability of humans to perceive magnetic luminosity, apparitions and haunted houses, and the physical phenomena of spiritualism. For early SPR members, however, it was not straightforward what "exact and unimpassioned inquiry" meant for phenomena that, as Barrett noted in 1873, were so difficult to control, and which were grossly physical, psychological, and relevant to spirituality. Accordingly, the SPR spent much of their time debating canons of evidence, theoretically neutral language, and appropriate protocols of testing that in the first instance sought to exclude mediumistic trickery, involuntary muscular action and other common explanations of psychic phenomena.[146] The varied talents of SPR members and the heterogeneous nature of psychical phenomena meant that the society drew upon a wide range of techniques from literary analysis to experimental physics to invent research methods that would generate reliable evidence.

The SPR quickly became dominated by the researches of Myers, Gurney, and Sidgwick into thought-reading, mesmerism, and apparitions, and despite his geographical distance from Gurney in London and Myers and Sidgwick in Cambridge, Barrett managed several important contributions in the society's early years: he contributed to most of the research committees, he served a brief stint in 1884–85 as editor of the Society's privately issued *Journal*, and he successfully canvassed support in late 1884 (again during a British Association meeting) for the American branch of the SPR which was established in 1885.[147] Significantly, Barrett seems to have contributed most to those areas of research that depended more on skills in experimenting on and isolating real-time effects — the kinds of effects encountered in physics laboratories — than the ability to collect and analyse thousands of documents describing psychical phenomena occurring in the past. As honorary secretary of the Thought-Transference Committee, Barrett was involved in running and analysing the hundreds of tests that he, Myers, Gurney and other SPR members conducted into the skills of the Creery girls, and the ability of a Brighton-based stage mesmerist and 'thought-reader', George Albert Smith, to draw pictures and utter words in the mind of his associate Douglas Blackburn, who usually stood behind Smith and typically needed to make brief physical contact with Smith for the effect to work. Barrett and his colleagues were confident that the stringent conditions of

most of their trials prevented collusion between participants and the possibility that the 'percipient' could have used normal channels of sensation in performing the extraordinary mental feats. They shrewdly recognized that some of their trials were inconclusive but stressed that the evidence had to be taken as a whole: it was the "*cumulative* character of the evidence", they concluded, "and the extent to which we have eliminated the hypotheses of collusion, chance-coincidence, and muscle or sign-reading" that rendered their claim to have "established the reality of this novel class of phenomena a very strong one" (see Figure 3).[148]

Critics, however, disagreed and denied that Barrett and his colleagues had satisfactorily ruled out the common 'hypotheses' of thought reading, emphasizing that the experiments did not exclude all visual clues that the Creery girls could have used and placed too much reliance on the judgement of such unreliable witnesses as children and sympathetic relatives.[149] Barrett was not deterred by this or later criticism of the Creery evidence. When in 1887 Henry Sidgwick broke the embarrassing news to Barrett that he, his wife and Gurney had caught the Creery girls cheating during Cambridge tests, Barrett warned Sidgwick that this was no reason to "expunge the whole of their evidence".[150] For the rest of his life, he stood by the positive results of the Creery tests and insisted that the girls cheated simply to compensate for a decline in an otherwise genuine power.[151] Many of his SPR colleagues, however, sought to persuade their audiences with less risky cases; they were acutely aware that tainted evidence was a perfect weapon for the large number of medical practitioners and psychologists who throughout the SPR's early decades maintained that poor experimental design, trickery, coincidence, and hallucination were the most likely explanations of telepathy.[152]

7. BRIDGING THE PHYSICS–PSYCHICS DIVIDE

Barrett's preference for tackling psychical phenomena that better exploited his talents was spectacularly evident in his spearheading of the SPR's 'Reichenbach Committee', a committee established in early January 1882.[153] The Committee aimed to make a "critical revision of Reichenbach's researches with certain organizations called 'sensitive'" who appeared to perceive a luminous emanation flowing from the poles of magnets, crystals and other objects, an experience typically accompanied by warmth, pain and other sensory impressions.[154] Most controversially, Reichenbach had held that the magnetic luminosity had an objective reality and was a manifestation of an all-pervasive force that he christened 'od'. Barrett chaired the Committee and was undoubtedly its inspiration, given that it was he who explained in an 1883 *Philosophical magazine* article that despite many failed attempts to repeat Reichenbach's observations and criticisms that the magnetic luminosity was a purely subjective phenomenon, he still considered it "difficult to explain away the abundant, and in some cases, weighty testimony which Reichenbach adduces", including that of a Professor Endlicher who in a "normal healthy condition" described the luminosity appearing over an electromagnet whenever Reichenbach excited the magnet.[155]

The form of Reichenbach's tests was particularly attractive to the handful of physicists and electrical engineers who had joined the SPR and who were clearly

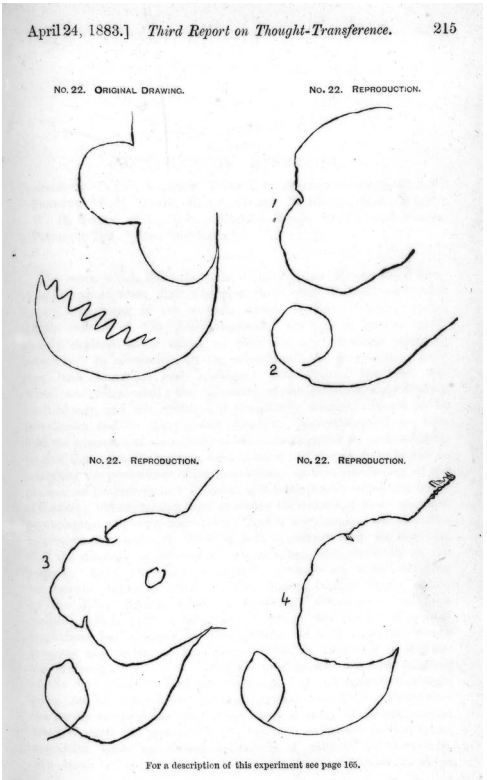

FIG. 3. One of the drawings used by the SPR to test thought-transference between a member of the SPR's Thought-Transference Committee and the stage mesmerist, George Albert Smith. The "original" was drawn by a committee member and then shown to Smith's accomplice, Douglas Blackburn, who stood outside the room in which Smith sat. Blackburn then sat behind Smith and a few minutes later the latter began to draw a "reproduction". The SPR were particularly impressed with this test because Smith's normal channels of sensation were heavily blocked: his ears were stopped with putty whilst his vision and hearing were masked with a bolster-case and a blanket was placed over his head. From W. F. Barrett *et al*., "Third report on thought-transference", *Proceedings of the Society for Psychical Research*, i (1882–83), 161–215, p. 215. Reproduced by permission of the Syndics of Cambridge University Library.

excited by the prospect of using their expertise to study abnormal psychological phenomena. Thus Barrett's Committee included the electricians Walter Coffin and St George Lane-Fox, and William Henry Stone, a medical physicist at St Thomas's Hospital whose Westminster home was used by the SPR for meetings and research. Committee members analysed previous attempted replications and criticisms of Reichenbach's experiments, but devoted most of their time to their own replications of the experiments.[156] Testing alleged magnetic luminosity was seen as a prime opportunity to raise the status of psychical research by associating it with physics and other established scientific enterprises. The Committee boasted that their work "would

not only have a high scientific interest outside the main objects of this Society, but distinctly lend importance and a degree of credibility hitherto wanting to [Reichenbach's] description of correlative and less purely objective phenomena".[157]

The Committee reported that repeated trials with forty-five individuals revealed that only three showed any sensitivity to permanent magnets and electromagnets placed in a darkened room in the SPR's Westminster headquarters. Barrett was sufficiently impressed with these individuals that he asked them to participate in a more stringent test of whether their perception of magnetic luminosity was merely coincidental. The new trials turned the SPR's rooms into a physical laboratory. The subjects joined several SPR investigators (including Barrett) in the darkened room in which a large electromagnet had been placed; in an adjoining room other SPR workers (including Coffin and Gurney) operated a commutator for making and breaking the current to the electromagnet at various intervals. All three "sensitives" claimed to see faint and flickering luminosity surrounding the magnets, but one subject (George Smith), in thirteen out of fourteen consecutive trials, noted the appearance or disappearance of the luminosity which was "absolutely simultaneous" with the sudden and unexpected movement of the commutator on the electromagnet (see Figure 4).[158] For Barrett, this result undermined the possibility that Smith's observations were due to chance coincidence and was strengthened by the unlikelihood that the subjects could have used other signs to infer changes in the state of the electromagnet: for instance, Barrett stressed that since the commutator worked noiselessly, it would have been impossible for the subjects to exploit the 'ticking' sound made by magnets during magnetization and demagnetization. To disarm criticism that the Committee were relying too much on the "good faith" of the subjects, Barrett explained that one Committee member had placed his forehead between its poles and, without any other means of knowing the state of the magnet, had been able to "distinguish accurately" when the electromagnet was excited.[159]

Barrett advanced his "*primâ facie* case" for the existence of a magnetic sense with the most sophisticated developments in physics and photography.[160] His report included a letter from his Dublin colleague George Francis Fitzgerald who, in a recent paper on the electromagnetic origin of light, had suggested that the alleged luminosity surrounding a magnet did not, as some charged, contravene the law of energy conservation because air molecules moving in an intense magnetic field could collide and change direction so rapidly that it was possible that they emitted visible radiation. Fitzgerald also suggested one way in which Barrett could avoid depending on the judgement of individuals and thus achieve greater 'objectivity' — by trying to detect the feeble emissions on dry photographic plates — but the Committee reported that such photographic tests had been disappointing.[161] Nevertheless, Barrett struggled to secure scientific interest outside the SPR but managed to publish his preliminary findings in the *Philosophical magazine*, a journal now edited by Fitzgerald and William Thomson, and in *Nature*. Barrett's *Nature* piece, in fact, was a response to a recent public lecture given by Thomson that, while noting Cromwell Varley and Lord Lindsay's failure to detect human sensitivity to magnetism, conceded

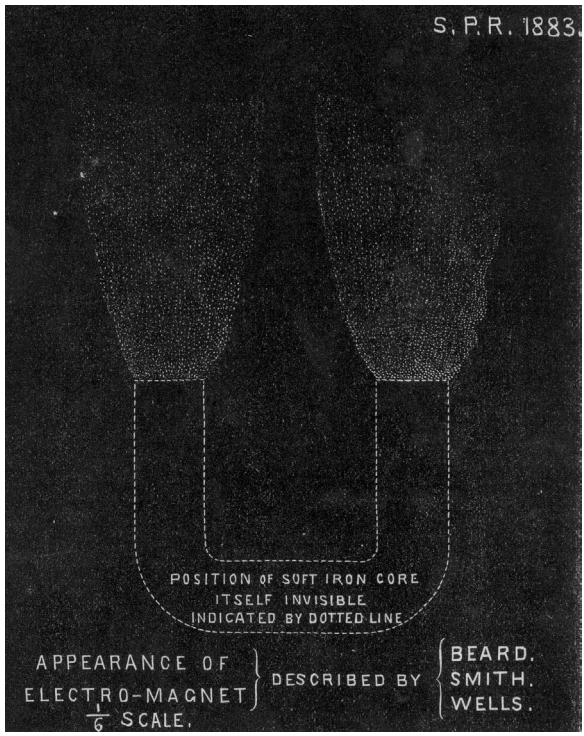

FIG. 4. The appearance of magnetic luminosity as perceived by three subjects tested by the SPR in 1883. From W. F. Barrett *et al*., "First report of the 'Reichenbach' committee", *Proceedings of the Society for Psychical Research*, i (1882–83), 230–7, p. 234. Reproduced by permission of the Syndics of Cambridge University Library.

that experiments with a more powerful magnet might reveal the effect. Thomson's anticipation prompted Barrett to tell *Nature* of the Reichenbach Committee's work as well as experiments he had staged in the RCSI physics laboratory that gave positive evidence for a "peculiar sensation" induced by magnets.[162]

Judging by the few references to Reichenbach, let alone the Reichenbach Committee's work, in SPR publications after 1884, Barrett's additional activities persuaded few of his colleagues that this was an area of psychical research that could yield satisfactory results. This may have owed something to the work of Joseph Jastrow and George Nuttall, two psychologist members of the American SPR who claimed that their more extensive tests of the magnetic sense had been inconclusive and showed the difficulty of excluding 'normal' ways of sensing the magnetic state.[163] Myers reinforced this point when, in his posthumous *Human personality* of 1903, he merely noted that the Reichenbach Committee had taken "precautions" to avoid subjects' knowing when electrical contact was made, and said nothing about Barrett's positive evidence for a magnetic sense.[164] Nonetheless, Barrett pressed on with the research

at the RCSI and was upholding his original evidence as late as 1924.[165]

In many ways the attitude of the SPR élite to the results of the Reichenbach Committee reflected their more general view that the most reliable evidence for obscure mental powers depended more on 'spontaneous' cases where the subject was unprepared for psychical transmission, than on such 'experimental' cases as the Creery investigations and the Reichenbach tests where the subject was consciously and voluntarily participating in a test of their powers and therefore, as such critics as Carpenter had warned, might sense only what they expected to sense. Indeed, the argument that Myers, Gurney and Podmore made in their magisterial *Phantasms of the living* (1886) for 'telepathy' (which was coined to describe the transmission of thoughts and a much broader range of sensory impressions) depended mostly on 'spontaneous' cases — apparitions of the dying perceived by individuals who had no idea they would experience such phantasms and which seemed to occur more frequently than accounted for by mere chance coincidence.[166]

By the time *Phantasms* appeared, the SPR were also highlighting the difficulties of investigating and interpreting psychical phenomena as if they were analogues of known physical phenomena. Barrett was no exception. In his reports for the Thought-Transference Committee, he reiterated many of the analogies between psychical and physical phenomena he had been drawing for over two decades — he accepted that nervous energy might act by induction as well as conduction, and that the brain might be a body whose state of unstable equilibrium made it responsive to a specific mental disturbance flowing from outside the body. However, his reports also contained the crucial warning that useful as these analogies were in undermining the view that telepathy was *a priori* impossible, "wider and more exact knowledge of psychological phenomena will shew the insufficiency of any physical analogy or materialistic explanation".[167] Vanquishing material explanations of telepathy was desirable because, like other SPR members, Barrett believed this would give further credence to the independence of mind and matter and thus "accelerate the passage of the existing wave of materialism".[168] He also considered it legitimate because the SPR's experiments suggested that the transmission of thoughts, images, tastes, feelings, and other sensory data did not appear to diminish with distance, as with most physical forces, but seemed to be effective over short and long distances between agent and percipient. By the early 1900s, Barrett and his fellow physicist-psychical researcher Oliver Lodge were among the leading sceptics of the claim (fuelled by Hertz's and Lodge's work on electric waves) that telepathy was a physical 'brain wave', because experiments on long-distance telepathy showed that the power of transmission was independent of distance.[169] Telepathy, as Barrett explained in the early 1910s, had to be a "transcendental and spiritual mode of communion, wholly distinct from the physical forces in its origin and mode of transmission" although he envisioned that scientists might eventually identify the telepathic medium as one more rarefied than the ether, possibly the "ultimate atmosphere" postulated by the eighteenth-century Swedish natural philosopher and seer Emmanuel Swedenborg.[170]

If telepathy looked increasingly like an area where the interpretative resources

and investigative skills of experimental physicists were limited, then the *physical* phenomena of spiritualism remained a promising though still highly risky area of psychical research where physicists could make an important contribution. As Barrett explained in 1894, the phenomena of spiritualism "belong essentially to the region of experiment with which as a physicist I am more familiar".[171] Over a decade later Barrett was equally emphatic and claimed that the phenomena placed spiritualism "within the pale of legitimate experimental inquiry, but invites and demands the attention of science". By 1886 he had accepted that psychical investigation differed radically from physical investigation in that success depended primarily on mental conditions such as "sympathy", but this did not rule out the use of physical expertise in psychical research *per se*, notably "observing, recording, and classifying the phenomena [of spiritualism], noting the physical and psychical conditions most favourable to their production, and the variations induced by a change in these conditions".[172] He believed physicists were supremely qualified for this task. In his most popular Spiritualist book, he considered that it was "highly-trained investigators like Mr. Crookes and Professor Lodge" who could best determine "with reasonable precision, whether certain physical movements or appearances are due to a known or an unknown cause"; that it was physicists who, far from ridiculing the idea of mediums, appreciated the need for "definite physical media to enable operations to become perceptible which would otherwise remain imperceptible", and physicists who, knowing how obscure radiation from their body affected such sensitive new instruments as Samuel Langley's bolometer, understood how their very presence in séances changed the outcome of experiments.[173] The physical nature of spiritualistic phenomena explains why so many SPR physicists besides Barrett were attracted to this part of the Society's work and why it was Barrett and Lodge who were the most vocal in criticizing neglect of this work.[174]

The conclusions that Barrett drew from his spiritualistic investigations placed him increasingly far from many in the SPR élite. In 1886 he gave a paper at the SPR that Henry Sidgwick saw as "pro-spiritualistic, but guardedly so", a paper that apparently had "good effect on the audience" but did not thwart the "natural drift" of Sidgwick's mind "towards total incredulity in respect of extra-human intelligences".[175] Drawing on his tests on Florrie Clarke and two other mediums, he tentatively suggested that under conditions precluding mediumistic trickery and self-deception there was evidence that "*mind, occasionally and unconsciously can exert a direct influence upon lifeless matter*", a conclusion that he was prepared to accept despite the fact (as he had explained in 1875) that it defied energy conservation.[176] Many in Barrett's audience would have been sceptical of his conclusion because their spiritualistic investigations had simply not been as favourable: Myers and Henry Sidgwick, as we have seen, had considerable experience of the fraudulent behaviour of mediums and this partly explains why the SPR's Committee on the Physical Phenomena of Spiritualism never published any reports.

Barrett's evidence for the objective reality of spiritualistic phenomena, his friendship with leading Spiritualists, and his frequent publications in Spiritualist journals,

distinguishes him from Myers, the Sidgwicks and other leading SPR figures who spent much of the late 1880s and 1890s challenging Spiritualists' explanations of spiritualistic phenomena: they highlighted the serious flaws in protocols used to support claims that physical phenomena were caused by unknown forces; they collapsed supposed intelligent discarnate 'spirits' into what Myers christened the 'subliminal self' of the medium which emerged from the depths of subconsciousness during trance; and they published sensational evidence for the apparent trickery of such mediums as Madame Blavatsky, Eglinton and Eusapia Palladino. These revelations compounded the opinion shared by many leading SPR members that spiritualism, with its history of associations with fraud, was the most dangerous scene of scientific enquiry for the SPR. As Moses had foreseen in 1881, however, the SPR core had other reasons for distancing themselves from spiritualism. They were generally wary of mixing with Spiritualists whom they regarded as their social and intellectual inferiors, and trusted a respectable automatist more than a plebeian medium.[177] Eleanor Sidgwick spoke for many such SPR members in 1886 when, in the midst of increasing Spiritualist discontent with the Society's apparently hostile approach to their culture, she told her husband that the SPR was "better and stronger" without Spiritualists because their "attitude and state of mind distinctly hinder [the truth of the spiritualistic phenomena] being found out".[178]

The threat that gross spiritualistic manifestations posed to the intellectual integrity of the SPR is one reason why from the late 1880s its leading researchers devoted most of their time to the more psychological topics of hallucinations, hypnotism, and the automatic writing of trance mediums, much of which they used to support the case for telepathy. Like Lodge, Myers and other representatives of what Eleanor Sidgwick called the "forward section" of the SPR, Barrett went further with SPR colleagues' investigations and in 1894 insisted that the intelligences revealed in the automatic writing scripts of Moses and Lenore Piper were not mere telepathy between living souls, but the intervention of a discarnate spirit in the personality of the medium.[179] This was the beginning of Barrett's gradual shift towards a highly qualified Spiritualist position. While accepting evidence for survival of the soul, he never agreed with Spiritualists that this proved its immortality — something that, like many devout Christians, he believed was beyond natural proof and solely the gift of God to the reverent and righteous.[180]

Much as Barrett publicly appreciated the work of the leading SPR members, his publication record with the SPR and other evidence suggests that he found it increasingly difficult to work in an organization whose research focus was shifting away from spiritualism, which he maintained was a "perfect goldmine of scientific research" that could be used to counter the "popular assaults on the Christian religion, based on its incredibility".[181] From 1886 until his death, Barrett published several major research articles for the SPR — including two long studies of the divining-rod and short papers on 'physical' topics such as poltergeists and ectoplasm — but his overall input and attendance at SPR meetings was paltry compared with that of such colleagues as Lodge and Myers.[182] This was low due to Barrett's burgeoning commitments in Ireland, but his increasing use of non-SPR forums to present his researches (principally

Spiritualist journals), and private correspondence between SPR members, highlight his genuine dissatisfaction with the Society. With the death of Myers in 1900 and Sidgwick in 1901, the Society lost two of its biggest intellectual assets, and control of the Society largely fell to Eleanor Sidgwick (the research officer), Alice Johnson, Gerald Balfour and J. G. Piddington. The new SPR core were even more sceptical of spiritualistic investigations and interpretations, and shared Eleanor Sidgwick's view that it would be the "cautious section" of the SPR who, once persuaded that psychical phenomena could be controlled and reduced to laws, would give the society "a hearing from and convince the world at large".[183] But by 1912 Barrett had become so frustrated with the SPR's overly hostile approach to what he considered strong evidence for the reality of discarnate spirits and 'physical' phenomena, that he threatened to resign and establish a breakaway society for doing the work "our SPR was founded to carry out".[184] Barrett's deep loyalty to the SPR eventually dissuaded him from the idea, and after his move back to London in 1916 he had more opportunities to attend meetings where he tried, albeit unsuccessfully, to steer the society back to its original research agenda.

The SPR core often found it difficult to work with Barrett. In 1904 Piddington complained of Barrett's "constant fussiness & suspiciousness" in SPR meetings, while Eleanor Sidgwick had reason to doubt his evidence for telekinesis and survival, and criticized the "curious vanity" that made him more supportive of evidence for poltergeists and clairvoyance than he should have been.[185] Sidgwick also recalled that Myers and Gurney had "suffered greatly" in trying to keep Barrett in "good humour".[186] One of Myers's most effective attempts to humour Barrett was to invite him, in the early 1890s, to investigate the divining rod. Detailed analysis of this work must be deferred to another paper, but for the purposes of this article it is sufficient to emphasize that Barrett approached the topic with "great reluctance" owing to its association with folklore, but soon saw it as another way of making psychical research a branch of physics. "It is a partly physical subject like the D[ivining] Rod", he enthused to Lodge in 1897, that "we shall probably find the bridge which is between physical & psychical research. I mean the recognition by physicists of an ultra physical region of enquiry".[187] Indeed, one of Barrett's first conclusions about the divining-rod was that it could be treated like a sensitive flame or the other systems in unstable equilibrium known to physicists. It was a system that moved disproportionately to the impulses causing the motion that were the "imperceptible, involuntary, and unconscious muscular movements" induced in the dowser's hands when he passed sources of underground water.[188] Barrett concluded from field trials of dowsers' ability to locate water without using surface signs and other 'normal' sources of information, together with analysis of historical records, that he had made a case for "some kind of transcendental discernment possessed by the [dowser's] subconscious self", a "tentative" explanation that he believed would frame further and conclusive research into the topic.[189] Criticized, by some scientists, as being inconclusive and overly reliant on the testimony of non-expert witnesses, Barrett's dowsing work proved to be one of his most successful legacies to psychical research.[190] It was the aspect of his research most frequently cited by colleagues in support of such

fashionable explanatory hypotheses as the 'subliminal self', and it persuaded some geologists (who were among the most vociferous critics of dowsing) that experiment and "adequate inquiry" were needed before "widespread" occult beliefs were repudiated.[191] Insofar as it persuaded J. J. Thomson and other physicists that this was the aspect of psychical research most amenable to physical experiment, it was also one of Barrett's more successful attempts to bridge the physical-psychical chasm.[192]

Barrett's acceptance of the "insufficiency" of physical analogies for telepathy, and his troubled attempts to introduce experimental physics into the SPR via Reichenbach, spiritualism and dowsing, did not stop him from trying other ways of making his expertise in physics count in promulgating psychical and spiritual truths. He still believed physical analogies were useful in making the broader claims of psychical research more comprehensible to Spiritualists, liberal Christians, Nonconformists, and general audiences to whom he addressed a large number of his writings from the 1890s. Barrett's belief that psychical research produced facts that aroused conviction in Christian conceptions of the spirit world meant that in this process he linked physics to spirituality, a connection depending on his increasingly strong belief in the Swedenborgian correspondence between the physical and spiritual worlds. These writings show that for non-scientific audiences, Barrett, like his more prolific colleague Oliver Lodge, believed physical sciences, more than any other science, were effective in showing the "existence of spiritual laws in the natural world" and that spiritual truths had homologues in nature.[193] Take, for example, his "sympathetic vibrations" in an 1891 number of *Good words*. This moved from a concise survey of resonant phenomena in acoustics to the conclusion that sympathetic vibration was a "principle" that held for the invisible vibrations of the ether and supported "many obvious spiritual analogies", notably the Christian view that "amid the mingled voices of the world the pure heart responds only to what is beautiful and true, for to that alone his soul vibrates in unison".[194] Resonance seemed to be a physical and a spiritual truth. Barrett reinforced the connections between RI physics, the SPR and spirituality by making the sequel to this article a survey of psychical research which insisted that the evidence for telepathy proved that a transcendental form of sympathetic vibration was more than a mere analogy, and showed the "reasonableness of inspiration, and of answers to prayer".[195] Barrett was at least as convinced as Lodge, Stewart and other physicists that the ether of physics was useful in illustrating the significance of the world beyond matter.[196] The power of etherial radiations to produce solidarity in the physical universe made likely the power of telepathy to produce unity among human beings and showed that it was the immaterial domain that gave unity and intelligibility to the universe.[197]

Barrett sought to rouse conviction in spiritual laws in the natural world from recent physical science, as well as psychical research and the physics he had researched in the mid-Victorian period. His later writings on psychical and religious topics can be seen as contributions to the promulgation and discussion of the 'new physics'. In 1914, for example, he explained to the Swedenborgian Society that "physical science" had "not only abolished our crude ideas of atoms and mass, resolving matter and inertia into the infinitely swift molecular motions of points or corpuscles, but it has

shown that ultimately time and space are meaningless". Electrons in particular had manifold uses in the continued struggle to thwart public doubts about the spiritual world.[198] They undermined materialistic notions of atomic indivisibility, but considering how fast they vibrated compared with the human voice, and how small they were compared with "human standards of space", they made time and space "meaningless". As one of the "highest elements of the physical universe", Barrett thought the electron occupied the borderland of the physical and spiritual, and accordingly showed the same defiance of the temporal and spatial that one eminent Christian philosopher — Swedenborg — believed characterized the spiritual world.[199] By this time Barrett had accepted that experimental physics could play only a limited role in rousing Christian faith via experimental psychical research, but he sustained his long-held view that this goal could be achieved by emphasizing the morality, mystery and spirituality of the claims of physics.

8. CONCLUSION

This paper has demonstrated new ways of understanding the well-known association between physics and psychical research in the late Victorian period.[200] Historians have suggested that for many Victorian physicists, psychical research was an enterprise promising the revelation of a transcendent world of mind and spirit beyond matter, a revelation that undermined the naturalistic cosmology and liberal political and bourgeois economic values that appeared to threaten social cohesion. The two most vocal physicist-psychical researchers of the late Victorian and early Edwardian periods, Barrett and Oliver Lodge, owed much of their early scientific education to one of the most outspoken representatives of the naturalistic cosmology, John Tyndall.[201] The transition they made from Tyndallic physics to psychical research has been represented as one from an orthodox, secure and naturalistic physics to heterodox, risky and metaphysically-tainted psychical research.[202] The case of Barrett shows that this contrast can no longer be sustained when we look closer at the physics on which pioneers of psychical research were engaged in their careers. The 'sensitive flame' physics was not secure science because for much of the late Victorian period there was no consensus on its interpretation; indeed, it was the mysterious behaviour of the flame that made it so useful in the very different assessments that Barrett and Tyndall made about the mysterious phenomena associated with mediums and thought-readers. Tyndall's "transcendental" materialist philosophy may have strengthened Barrett's belief in the unity of the material and spiritual domains, but it was Tyndall's *experimental* culture of sensitive flames and sympathetic vibrations that informed Barrett's strongest arguments for the connections between physics, psychology, and ultimately spirituality.

This paper has also shown that making such links was a fraught business in the late Victorian period. In 1893 Lodge explained that psychical research was a field sharing borders with physics, psychology, physiology and medicine, but he proclaimed that physics, the "King of the Sciences", had to "lead" in the investigation of spiritualistic phenomena that, he needed to stress, had a "physical side".[203] But Barrett's struggles from the 1870s show that such a lead was not easy to sustain in the heterogeneous

area of psychical research, an enquiry that representatives of different scientific disciplines sought to control or undermine. Barrett's conflicts with Carpenter show a struggle for control that was simultaneously professional and epistemological. The question of whether psychical research was a branch of physics or psychology, for example, was also the question of whether psychical phenomena could be interpreted as transmissions (physical or otherwise) between minds or purely subjective phenomena. By the same token, Barrett's abandonment of the strict physical analogy with telepathy was an abandonment of telepathy as a branch of experimental physics. The bridge between physics and psychical research was also resisted by scientists who saw psychical phenomena as a threat to the security of their discipline, not a scene of enquiry that was rightfully theirs. This was certainly the case for the physicist George Carey Foster who, having read Lodge's 1893 argument for physics to "lead" the way into psychical research, warned that the "progress of physics" was "based on the assumption" that spiritualistic phenomena did not occur.[204] It was commitment to the 'assumptions' underpinning emerging scientific disciplines that may have played the most decisive role in shaping scientists' increasing objections to psychical research as a worthy enterprise, and thus in making psychical research the 'elusive' science that it remained.[205]

The publishing forms commonly used by Barrett gave him one of his best tools for bridging the deep-rooted divisions between physics and psychical research that Foster articulated. Recent work has stressed the role of popular science writing in catering to a public taste for the moral and religious implications of the sciences, interpretations increasingly absent from the writings of professional scientists who turned to specialist publications as forums for their work.[206] The creation of a 'psychic physics' by Barrett, Lodge and others from the 1870s was arguably an integral part of this. It was in non-technical books, periodicals and lectures that professional science journalists as well as trained scientists were most likely to articulate the spiritual implications of the sciences and to draw analogies between different domains of scientific endeavour. It was in these non-specialist forums that Barrett, Lodge, Stewart and others could show the convergence of physics with psychical research and Christian teachings. We need to understand the possibilities created by these non-specialist publications forms, as well as the possibilities suggested by puzzling phenomena generated in the heart of experimental physics, to gain a better understanding of why so many Victorian physicists thought they could take the lead into psychical research.

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105. [Barrett], "The phenomena of spiritualism" (ref. 84), 934. The works reviewed were Crookes, *op. cit.* (ref. 91); A. Mahan, *The phenomena of spiritualism, scientifically explained and exposed* (London, 1875); and A. Wallace, *Miracles and modern spiritualism* (London, 1875).
106. [Barrett], "The phenomena of spiritualism" (ref. 84), 936.
107. W. F. Barrett, *On the threshold of the unseen: An examination of the phenomena of spiritualism and of the evidence for survival after death* (London, 1920), 38. This work was a revised edition of Barrett, *On the threshold* (ref. 92).
108. [Barrett], "The phenomena of spiritualism" (ref. 84), 936. Barrett's emphasis.
109. [Barrett], "The phenomena of spiritualism" (ref. 84), 936. Mayo's emphasis. Barrett was citing Mayo, *On the truths contained in popular superstitions with an account of mesmerism* (Edinburgh, 1851), 73.
110. See Tyndall, "Science and Man [1877]", in Tyndall, *Fragments* (ref. 8), ii, 337–74, p. 358.
111. [Barrett], "The phenomena" (ref. 84), 937.
112. Tyndall, "The Belfast address [1874]", in Tyndall, *Fragments* (ref. 8), ii, 137–203. For discussion see Barton, *op. cit.* (ref. 6).
113. [Balfour Stewart and Peter Guthrie Tait], *The unseen universe; or, physical speculations on a future state* (London, 1875), p. vii. For discussion of this text see P. Heimann, "The *unseen universe*: Physics and philosophy of nature in Victorian Britain", *The British journal for the history of science*, vi (1972), 73–79.
114. [Stewart and Tait], *op. cit.* (ref. 113), 43.
115. Stewart to Barrett, 26 December 1881, William Barrett Papers, Society for Psychical Research archive, Cambridge University Library (henceforth WFB-CUL), SPR.MS.3, A2/19, and Balfour Stewart, "President's address", *PSPR*, iv (1886–87), 262–7.
116. Wallace to Barrett, 30 October 1875, WFB-CUL, SPR.MS.3, A2/132. For Wallace and spiritualism see M. Fichman, "Science in theistic contexts: A case study of Alfred Russel Wallace on human evolution", *Osiris*, xvi (2001), 227–50.
117. On the Slade controversy see R. Milner, "Darwin for the prosecution, Wallace for the defense", *North Country naturalist*, ii (1990), 19–35, 37–50.
118. Barrett, "On some phenomena" (ref. 95), 86–87.
119. Barrett, "On some phenomena" (ref. 95), 88.
120. [Anon.], "The British Association and Professor Barrett's paper", *Spectator*, 30 September 1876, 1209–11, and E. Ray Lankester, *Times*, 16 September 1876, 7.

121. Carpenter to Barrett, 2 November 1876, WFB-CUL, SPR.MS.3, A2/12. Carpenter's emphasis.
122. W. B. Carpenter, "Spiritualism", *Spectator*, 14 October 1876, 1282–3, p. 1283. Carpenter's emphasis.
123. I. Tuckett, "Psychical researchers and 'the will to believe'", *Bedrock*, i (1912–13), 180–204, p. 204.
124. [Anon,], "Sympathetic vibrations", *Times*, 29 December 1876, 3.
125. J. Strick, *Sparks of life: Darwinism and the Victorian debates over spontaneous generation* (Cambridge MA, 2000), 167–70.
126. W. F. Barrett, "The demons of Derrygonnelly", *Dublin University magazine*, xc (1877), 692–705, p. 700n.
127. Barrett, "Some reminiscences" (ref. 4), 285; R. A. Smith to Barrett, 18 October 1876, WFB-CUL, SPR.MS.3, A2/131. Citation from Barrett to Lodge, 29 January 1925, OJL-CUL, SPR.MS.35/140. For Crookes and Rayleigh see [Anon.], "The British Association at Glasgow", *Spiritualist*, ix (1876), 88–94, p. 89.
128. W. F. Barrett, *Times*, 22 September 1876, 10.
129. W. F. Barrett, "Mind-reading versus muscle-reading", *Medium and daybreak*, vii (1876), 646.
130. Wallace to Barrett, 18 December 1876, WFB-CUL, SPR.MS.3, A2/133. Wallace's emphasis.
131. For the "willing game" see W. F. Barrett, *Psychical research* (London, 1911), 44–46.
132. G. J. Romanes, "'Thought-reading'", *Nature*, xxiv (1881), 171–2, p. 172.
133. Barrett's doubts about Bishop are noted in O. Lodge, *Past years* (London, 1931), 273.
134. W. F. Barrett, "Mind-reading versus muscle-reading", *Nature*, xxiv (1881), 212.
135. For Barrett's feeling of priority see Barrett to Lodge, 8 April [*c*. 1900], OJL-CUL, SPR.MS.35/145.
136. Romanes to Barrett, 18 July [1881], WFB-CUL, SPR.MS.3, A2/106.
137. Balfour Stewart, "Note on thought-reading", *PSPR*, i (1882–83), 35–38.
138. Gauld, *op. cit.* (ref. 15); Cerullo, *op. cit.* (ref. 15); and Williams, *op. cit.* (ref. 15).
139. Myers to Barrett, 23 September 1877, WFB-CUL, SPR.MS.3/61, and Myers to Barrett, 9 October 1877, WFB-CUL, SPR.MS.3/62.
140. W. F. Barrett, "The origin of the Society for Psychical Research", *Light*, xiii (1893), 453–4, p. 454, and Barrett, "Professor Barrett" (ref. 86).
141. W. F. Barrett, "The early years of the Society for Psychical Research", *Light*, xxiv (1924), 395.
142. Moses to Barrett, 12 January [1882], WFB-CUL, SPR.MS.3, A2/54.
143. [Anon.], "The Society for Psychical Research. Objects of the society", *PSPR*, i (1882–83), 3–6, p. 3.
144. Gauld, *op. cit.* (ref. 15), 137–355, and Cerullo, *op. cit.* (ref. 15), 38–108.
145. [Anon.], "Constitution and rules", *PSPR*, i (1882–83), 331–6, p. 331. Emphasis in original.
146. See, for example, Henry Sidgwick, "The canons of evidence in psychical research", *PSPR*, vi (1889–90), 1–6.
147. For Barrett and the American SPR see [Anon.], "General meeting", *Journal for the Society for Psychical Research* (hereafter *JSPR*), i (1884–85), 172–9.
148. W. F. Barrett *et al*., "Third report on thought-transference", *PSPR*, i (1882–83), 161–215, p. 173. Emphasis in original.
149. See, for example, Horatio Donkin, "A note on 'thought-reading'", *Nineteenth century*, xii (1882), 131–3.
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151. W. F. Barrett, "Thought-transference", *Times*, 27 January 1925, 10.
152. See, for example, H. Maudsley, *Natural causes and supernatural seemings* (3rd edn, London, 1897), 11–47, and Tuckett, *op. cit.* (ref. 123).

153. Society for Psychical Research: Minutes of Council Meetings, Volume 1, Society for Psychical Research Archive, Cambridge University Library, p. 8.
154. [Anon.], "The Society for Psychical Research. Objects of the Society", *PSPR*, i (1882–83), 3–6, p. 3.
155. W. F. Barrett, "Note on the alleged luminosity of the magnetic field", *Philosophical magazine*, xv (1883), 270–5, p. 271. Barrett was probably referring to Karl von Reichenbach, *Researches on magnetism, electricity, heat, light, crystallisation, and chemical attraction, in their relation to the vital force*, transl. and ed. by William Gregory (London, 1850), 394.
156. W. F. Barrett *et al*. "Preliminary report of the 'Reichenbach' committee", *PSPR*, i (1882–83), 99–100.
157. W. F. Barrett *et al*. "First report of the 'Reichenbach' committee", *PSPR*, i (1882–83), 230–7, p. 230. The official author of this report was the Committee's Honorary Secretary, Walter Coffin, but as the Committee's Chairman Barrett played a large part in its construction.
158. Barrett *et al.*, "First report" (ref. 157), 232.
159. Barrett *et al.*, "First report" (ref. 157), 233–4.
160. Barrett *et al.*, "First report" (ref. 157), 236.
161. Fitzgerald to Barrett, 23 April 1882, cited in Barrett *et al.*, "First report" (ref. 157), 236–7, p. 236.
162. William Thomson, "Six gateways of knowledge", in William Thomson, *Popular lectures and addresses* (3 vols, London, 1889–93), i, 253–99, pp. 258, 260–1, and W. F. Barrett, "On a 'magnetic sense'", *Nature*, xxix (1884), 476–7, p. 476.
163. J. Jastrow and G. Nuttall, "On the existence of a magnetic sense", *Proceedings of the American Society for Psychical Research*, i (1885–89), 116–26.
164. F. W. H. Myers, *Human personality and the survival of bodily death* (2 vols, London, 1903), i, 525.
165. W. F. Barrett, "On the luminosity of the magnetic field and of certain human beings", in *L'état actuel des recherches psychique d'après les trauvaux des IIme Congrès International tenu à Varsovie en 1923* (Paris, 1924), 169–73, and Barrett to S. P. Thompson, 13 April [1910?], S. P. Thompson Papers, Imperial College Library, London, no. 24. This letter showed Barrett's interest in his friend S. P. Thompson's evidence for the effect that Lindsay and Varley failed to detect: Thompson, "A physiological effect of an alternating magnetic field", *Philosophical transactions*, ser. B, lxxxii (1909–10), 396–8.
166. E. Gurney, F. W. H. Myers, and F. Podmore, *Phantasms of the living* (2 vols, London, 1886).
167. W. F. Barrett, "Appendix to the report on thought-reading", *PSPR*, i (1882–83), 47–64, p. 62. See also Barrett *et al*., "First report on thought-reading", *PSPR*, i (1882–83), 13–34, pp. 33–34.
168. Barrett, "Appendix" (ref. 167), 62, and Gurney *et al*., *op. cit.* (ref. 166), i, 93.
169. W. F. Barrett, "Some experiments in thought transference by Miss Miles and Miss Ramsden", *JSPR*, xiii (1907–8), 50–52, and Lodge, "Presidential address", *PSPR*, xvii (1901–3), 1–21, pp. 19–20.
170. W. F. Barrett, "Telepathy and the spiritual significance of nature", *Quest*, iv (1912–13), 3–18, p. 9, and "Discrete degrees", *New-Church magazine*, xxxiii (1914), 415–25, p. 415.
171. W. F. Barrett, "The evidence for spirit identity", *Light*, xv (1895), 62–75, p. 62.
172. Barrett, "On some physical phenomena" (ref. 89), 41, and *On the threshold* (ref. 92), 11.
173. Barrett, *On the threshold* (ref. 92), 47–48, 91.
174. See, for example, Oliver Lodge, "On the scientific attitude to marvels", *Fortnightly review*, lxxix (1906), 460–74, p. 471.
175. Sidgwick, diary entry for 7 March 1888, in A[rthur] S[idgwick] and E[leanor] M[ildred] S[idgwick], *Henry Sidgwick: A memoir* (London, 1906), 441.
176. W. F. Barrett, "On some physical phenomena" (ref. 89), 40–41. Barrett's emphasis. Barrett probably agreed with Stewart that in the "very different conditions of things" in the psychical domain there might be an "apparent and *prima fâcie* breakdown" of "the laws of Energy": Balfour Stewart,

"Note on above paper", *PSPR*, iv (1886–87), 42–44, p. 44.

177. Cerullo, *op. cit.* (ref. 15), 57–87.
178. E. M. Sidgwick, n.d. [1886], in E. Sidgwick, *Mrs. Henry Sidgwick, a memoir by her niece* (London, 1938), 99.
179. E. Sidgwick to Barrett, 23 November 1905, WFB-CUL, SPR.MS.3, A2/115, and Barrett, "Science and spiritualism" (ref. 2), 560.
180. Barrett, "Science and spiritualism", 584.
181. Barrett, "Science and spiritualism", 559, 597.
182. By 1894 Barrett's original contributions to the research had become so paltry that Myers had to beg him to "start some experimental work": Myers to Barrett, 8 November 1891, WFB–CUL, SPR.MS.3, A2/77. Myers's emphasis.
183. Sidgwick to Barrett, *op. cit.* (ref. 179).
184. Barrett to Lodge, 21 October 1912, OJL-CUL, SPR.MS.35/73. See also Barrett to Lodge, 12 December 1912, OJL-CUL, SPR.MS.35/77.
185. Piddington to Lodge, 24 September 1904, OJL-CUL, SPR.MS.35/1632; E. M. Sidgwick to Lodge, 19 May 1912, OJL-CUL, SPR.MS.35/2148.
186. Sidgwick to Lodge, *op. cit.* (ref. 185).
187. W. F. Barrett, "On the so-called divining rod, or virgula divina", *PSPR*, xiii (1897–8), 2–282, p. 2; Barrett to Lodge, 15 September 1897, OJL-CUL, SPR.MS.35/70, Barrett's emphasis.
188. Barrett, "On the so-called divining rod" (ref. 187), 10.
189. W. F. Barrett, "On the so-called divining rod", *PSPR*, xv (1900–1), 130–383, p. 311.
190. "The writer of the article", "The supposed dowsing faculty", *Nature*, lvii (1897), 78.
191. Myers, *op. cit.* (ref. 164), i, 480–1, and J. W. Gregory, "Water-finding", *Times*, 23 January 1905, 3.
192. J. J. Thomson, *Recollections and reflections* (London, 1936), 158–63, and C. von Klinckowstroem, "The present position of the divining rod in Germany", *JSPR*, xxii (1925–26), 54–60.
193. Barrett, "The spiritual significance" (ref. 14), 791.
194. W. F. Barrett, "Sympathetic vibrations", *Good words*, xxxii (1891), 41–46, p. 46.
195. W. F. Barrett, "Psychical research", *Good words*, xxxii (1891), 467–71, pp. 468–9.
196. David B. Wilson, "The thought of late Victorian physicists: Oliver Lodge's etherial body", *Victorian studies*, xv (1977), 29–48, and Heimann, *op. cit.* (ref. 113).
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198. W. F. Barrett, "Some aspects of psychical research", *Contemporary review*, cxxii (1922), 595–603, p. 603.
199. Barrett, "Discrete degrees" (ref. 170), 423–4.
200. B. Wynne, "Physics and psychics: Science, symbolic action and social control in late Victorian England", in Barry Barnes and Steven Shapin (eds), *Natural order: Historical studies of scientific culture* (Beverly Hills, 1979), 167–87.
201. For Lodge and Tyndall see Lodge, *op. cit.* (ref. 133), 76–78.
202. Oppenheim, *op. cit.* (ref. 9), 355–90.
203. O. Lodge, "Address [1891]", *Report of the sixty-first meeting of the British Association for the Advancement of Science* (London, 1892), 547–57, p. 553.
204. Foster to Lodge, 25 October 1894, Oliver Lodge papers, University College London, MSS. Add 89/33.
205. S. Mauskopf and M. McVaugh, *The elusive science: Origins of experimental psychical research* (Baltimore, 1980).
206. B. Lightman, "'The voices of nature': Popularising Victorian science", in Bernard Lightman (ed.), *Victorian science in context* (Chicago, 1997), 187–211.