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Course Code: HI993

Course of Study: Themes and Approaches in the Historical Study of Religious Cultures

Name of Designated Person authorising scanning: Christine Shipman
Title: Renaissance and revolution : humanists, scholars, craftsmen and natural philosophers in early modern europe

Name of Author: Hunter, M.

Name of Publisher: Cambridge University Press

Name of Visual Creator (as appropriate):

The conscience of Robert Boyle: functionalism, 'dysfunctionalism' and the task of historical understanding

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It could be said that we currently have two Robert Boyles, reflecting the differing emphases of two contrasting scholarly traditions. On the one hand, there are studies which lay predominant emphasis on the intellectual enterprise to which Boyle devoted himself in refashioning knowledge about the natural world along corpuscularian and anti-scholastic lines, his motivation being taken to be an altruistic pursuit of scientific theories which would be internally coherent and compatible with his theological and philosophical commitments. Such a view of Boyle as the searcher after truth is writ large in Marie Boas Hall's various writings on his scientific work; more recently, it has been vigorously asserted by Rose-Mary Sargent and by Timothy Shanahan, who has argued that 'intellectualist considerations have explanatory and expository value of their own' in response to those who have thrown doubt on this.¹

Others, on the other hand, have emphasized the extent to which Boyle's intellectual goals fitted into a more or less overt programme aimed at furthering identifiable social and political ends. Thus J. R. and M. C. Jacob have argued that 'both the corpuscularianism and the experimentalism' of Boyle and other 'reforming philosophers' 'were designed to combat two threats, heresy and social insubordination, at the same time'.² More recently, Steven Shapin and Simon Schaffer, while agreeing that Boyle was out to enrol the new science in defence of a fundamentally conservative order, have laid more stress on a conscious attempt on Boyle's part to redefine the manner in

I am grateful to Edward B. Davis, Scott Mandebrote and John Spurr for their comments on a draft of this paper, but I am aware of the extent to which they retain reservations about its main thrust, for which I am solely responsible.

¹ Timothy Shanahan, 'God and nature in the thought of Robert Boyle', *J. Hist. Phil.*, 1988, 26: 547-69, p. 549n. See also Marie Boas, *Robert Boyle and Seventeenth-century Chemistry* (Cambridge, 1958); M. B. Hall, *Robert Boyle on Natural Philosophy* (Bloomington, 1965); Rose-Mary Sargent, 'Scientific experiment and legal expertise: the way of experience in seventeenth-century England', *Stud. Hist. Phil. Sci.*, 1989, 20: 19-45.

² J. R. and M. C. Jacob, 'The Anglican origins of modern science: the metaphysical foundations of the Whig constitution', *ISIS*, 1980, 71: 251-67, pp. 256-7. See also J. R. Jacob, *Robert Boyle and the English Revolution* (New York, 1977); J. R. Jacob, 'Boyle's atomism and the Restoration assault on pagan naturalism', *Soc. Stud. Sci.*, 1978, 8: 211-33.

which knowledge claims were delimited and assessed. According to this reading, Boyle consciously sought to promote a public image for himself with a political purpose, emphasizing his independence, probity and piety as a means of establishing his credentials as a polemicist, and hence helping to solve the problem of order to which conflicting knowledge claims otherwise gave rise.³

For all their differences, what these approaches have in common is that both are essentially rationalistic. Ulterior motives as much as overt intellectual aims are *intentional*. Yet it seems to me that both leave something out, and it is this missing dimension of Boyle that I wish to explore in this paper. I want to examine what might be described as the 'unintentional' or 'irrational' dimension to Boyle's intellectual outlook, considering the extent to which he was the subject of powerful impulses which were not necessarily 'functional' and which he did not even always have wholly under control. In doing so, I shall be teetering on the brink of psychoanalysis, but shall restrict myself to observations of a commonsensical variety: I remain agnostic about the value of an overtly Freudian or other approach to a long-dead figure like Boyle.⁴

That Boyle was 'mixed up', to adopt a fashionable phrase, was not altogether unfamiliar to his contemporaries. In his own time, the most noticeable facet of this was perhaps the stutter which he acquired as a child and which he never entirely lost for the rest of his life. The impression that this made on those who met Boyle was perhaps most strikingly illustrated by the Italian visitor, Lorenzo Magalotti, who wrote:

He speaks French and Italian very well, but has some impediment in his speech, which is often interrupted by a kind of stammering, which seems as if he were constrained by an internal force to swallow his words again and with the words also his breath, so that he seems so near to bursting that it excites compassion in the hearer.⁵

There is also evidence that certain elements of Boyle's outlook which militated against the sober, rational view of him that has prevailed since his own time have been deliberately suppressed. An example of this is Boyle's belief in day fatality, as recorded in the autobiographical notes which he dictated to Bishop Gilbert Burnet in the last years of his life. Among other things, these frank memoranda record that it was on May Day 1642 that Boyle heard of the outbreak of the Irish Rebellion which had such a catastrophic effect on the Boyle family fortunes, and he noted of this day:

³ Steven Shapin and Simon Schaffer, *Leviathan and the Air Pump: Hobbes, Boyle and the Experimental Life* (Princeton, 1985). See also Steven Shapin, 'Pump and circumstance: Robert Boyle's literary technology', *Soc. Stud. Sci.*, 1984, 14: 481-520; Shapin, 'Who was Robert Hooke?', in Michael Hunter and Simon Schaffer (eds.), *Robert Hooke: New Studies* (Woodbridge, 1989), 253-85, esp. pp. 269f.

⁴ It is for this reason that I have placed the word 'dysfunctionalism' in inverted commas in my title. I have adopted it because it is the best term I can find to counter the restrictively defined 'functionalist' terms of reference of the authors discussed in the text: but I am aware that it echoes the terminology of modern psychotherapists, and I would not wish to push its direct applicability in this context too far. In fact, according to a scheme of otherworldly values, Boyle's views may have had a clear rationale, and I might be accused of imposing a dichotomy of my own on them. On the other hand, my sense is that even his casuistical advisors thought that he overdid things: see further below.

⁵ W. E. Knowles Middleton (ed. and trans.), *Lorenzo Magalotti at the Court of Charles II* (Waterloo, Ontario, 1980), 135. Compare R. E. W. Maddison, *The Life of the Honourable Robert Boyle* (London, 1969), 4.

'observed often Inauspicious'.⁶ Apparently in the first full life of Boyle to be written (though it was never published and is now mostly lost), its author, the scholar, William Wotton, 'disapproves of the notion & hints of the evils which may attend such a perswasion', but he felt bound to include it since he understood that these notes itemized topics which Boyle *definitely* wanted included in any life of him.⁷ On the other hand, Henry Miles, who helped to collect materials for the first adequate life of Boyle that *was* published, that of Thomas Birch, felt that Wotton was wrong about the mandate from Boyle; he therefore urged Birch to omit the episode, and it was forgotten until noted by Marie Boas Hall, in one of the very few modern references to the facet of Boyle that I intend to dwell on here, who describes Boyle's belief in day fatality as 'a rather endearing superstition for such a determined rationalist as he was to become'.⁸

Boyle's religiosity

Though eighteenth-century commentators may have suppressed *this*, however, the most important facet of Boyle's make-up from the point of view that I want to stress here was one that they took very seriously – even if interpreting it selectively – and this was his deep religiosity. There are important facets of Boyle's religious outlook which are familiar, and which I am going to take for granted here. Essentially, these are the features which are at one with the intellectualist tradition that I have already described, the profound, pious adulation of God's design in the Universe and the conviction that this was well-illustrated by the findings of the new science. These themes are perhaps best expounded by R. S. Westfall in his *Science and Religion in Seventeenth-century England* (1958).

But I believe that, to understand Boyle properly, we must lay equal stress on an aspect of his religiosity at which Westfall merely glanced.⁹ Boyle needs to be placed in the context of the tortured spirituality exemplified by works like John Bunyan's *Grace Abounding to the Chief of Sinners* (1666) and classically depicted by William Haller in *The Rise of Puritanism* (1938). Nearer to home, the tradition is exemplified in Boyle's sister, Mary Rich, Countess of Warwick, whose religious attitudes and activities have been the subject of a perceptive, if slightly reductionist, account by Sarah Mendelson in *The Mental World of Stuart Women* (1987). Boyle shared the deep, agonized, piety of his sister, though in him, as in her, there is evidence of a

⁶ British Library Add. MS 4229, fol. 60. An adjacent note records a fall from a horse on May Day. On this text, see my 'Alchemy, magic and moralism in the thought of Robert Boyle', *Brit. J. Hist. Sci.*, 1990, 23: 387–410, pp. 387–8.

⁷ Miles to Birch, 21 October 1742, British Library Add. MS 4314 (not 4316, as stated by Boas, *op. cit.* (note 1), 11 n.4), fol. 70. On Wotton's life, see Michael Hunter, *Letters and Papers of Robert Boyle* (Bethesda, MD, 1992), Introduction.

⁸ British Library Add. MS 4314, fol. 70; Boas, *op. cit.* (note 1), 11.

⁹ R. S. Westfall, *Science and Religion in Seventeenth-century England* (New Haven, 1958), 40–1, see also pp.142–3.

degree of conflict between this outlook and the fashionable world with which their upbringing also brought them into contact.¹⁰

One text which places Boyle firmly in this tradition is his autobiographical 'Account of Philaretus during his Minority', written in the late 1640s, which chronicles his conversion experience and the religious traumas which preceded and followed it.¹¹ This has long been well known, but what has not been generally recognized is that the intensity of religious experience which Boyle felt at that time continued throughout his life, influencing his social role and intellectual attitudes more profoundly than has hitherto been acknowledged. This is perhaps most clearly illustrated by Boyle's lifelong concern with casuistry – in other words, with the assessment of 'cases of conscience', the resolution of difficult moral dilemmas in the context of a highly acute sense of sin. Such pastoral activity was highly regarded in religious circles in Protestant England as in Catholic Europe in the seventeenth century, with a distinctive 'reformed' strand of interpretation emerging which was codified in works like William Perkins' *Whole Treatise of the Cases of Conscience* (1606), Jeremy Taylor's *Ductor Dubitantium* (1660) and Richard Baxter's *Christian Directory* (1673).¹² It is to this tradition that Boyle belongs.

The evidence for Boyle's casuistical concerns appears to have been more profuse in the generation after his death than it is now, probably because this style of piety was becoming less popular in Anglican circles even in his own later years. By the eighteenth century, embarrassment about it had become acute, and Henry Miles, whose role in relation to Birch's *Life* has already been referred to, mentions an item of this kind – now lost – which 'a very judicious friend to whom I shewd the MS' considered 'not suited to the genius of the present age'.¹³ Such distaste evidently accounts for the rarity of such material among Boyle's extant remains, but fortunately enough survives to illustrate his unremitting concern with matters of conscience; he was constantly reviewing his activities in the light of a strong sense of right and wrong, valuing the advice of churchmen as experts who could help him and others to come to informed decisions on such issues. In 1659 Boyle paid a pension to the divine, Robert Sanderson, so that he could prepare for the press his lectures on conscience, while in 1662 it was to Sanderson that Boyle applied for advice as to whether it was legitimate for him to accept a grant of impropriations from former monastic lands in Ireland which was made to him as part of the Restoration settlement. These impropriations seem to have been the subject of particular anxiety for Boyle, evidently

¹⁰ British Library Add. MS 4229, fol. 68v, printed in Maddison, *op. cit.* (note 5), 53–4; S. H. Mendelson, *The Mental World of Stuart Women* (Brighton, 1987), ch. 2.

¹¹ Maddison, *op. cit.* (note 5), 2–45, esp. pp. 34–6.

¹² For modern studies of casuistry, see H. R. McAdoo, *The Structure of Caroline Moral Theology* (London, 1949); Thomas Wood, *English Casuistical Divinity during the Seventeenth century with Special Reference to Jeremy Taylor* (London, 1952); G. L. Mosse, *The Holy Pretence* (Oxford, 1957); Camille Slights, 'Ingenious piety: Anglican casuistry of the seventeenth century', *Harvard Theo. Rev.*, 1970, 63: 409–32; and Edmund Leites (ed.), *Conscience and Casuistry in Early Modern Europe* (Cambridge, 1988).

¹³ For documentation of this and the other points in this paragraph see my 'Casuistry in action: Robert Boyle's confessional interviews with Gilbert Burnet and Edward Stillington, 1691', *J. Ecc. Hist.*, 1993, 44: 80–98.

because those in possession of such rights could be regarded as guilty of the sin of sacrilege.¹⁴

In the following decades Boyle repeatedly consulted his friend, Thomas Barlow, Bishop of Lincoln, on matters of conscience: in fact, it was Barlow's answers to such questions which Miles's friend expressed distaste for in the 1740s and which have since disappeared. What *have* survived are Boyle's notes on two confessional interviews that he had in the last months of his life with two prominent churchmen, Gilbert Burnet, Bishop of Salisbury, and Edward Stillingfleet, Bishop of Worcester. This striking document is now among the Boyle Papers at the Royal Society, and I have published it with a commentary elsewhere.¹⁵ Here I will summarize what can be learnt from it about the kind of anxieties that Boyle was harbouring as his death drew near; it also reveals the amount of mental effort that he invested in salving his conscience. Thus he had prepared himself for the interviews by writing a paper, though this no longer survives, and at one point in his notes on his interview with Stillingfleet, he added a poignant note: 'I wish I had put him to speake more positively & roundly about this Point'.

One of Boyle's concerns was the legitimacy of his receipt of the impropriations already referred to, and especially the question of whether the earlier casuistical advice that he had been given ought to have inspired him to more charity than it had. Boyle was also concerned as to whether he had dealt uprightly with transactions over the landed estates that he had inherited from his father, the great Earl of Cork (it is perhaps worth speculating that Boyle's acute anxiety on moral issues may have owed something to an awareness of the rather dubious legitimacy with which the family fortunes had been made in the first place).¹⁶ In addition, Boyle asked both churchmen for their advice about the blasphemous thoughts that assailed him. Clearly he suffered agonies of religious doubt, believing that he had committed the ultimate blasphemy of the Sin against the Holy Ghost, as reported in the Gospels. The idea that a believer had committed unforgiveable blasphemy was not an uncommon one in godly circles in Boyle's period, and that such worries were not new at the end of Boyle's life is shown by earlier references of a similar kind.¹⁷

The bishops were inclined to try to minimize Boyle's anxieties. Entire treatises were written at this time to assure those who feared that they had committed the Sin against the Holy Ghost how unlikely it was that they were guilty of such outright apostasy, and Stillingfleet echoed such views in his advice to Boyle. He stated 'That none that are affraid of haveing committed that Sin are guilty of it; since one cannot commit it without haveing a full Intention to do it'. Both Stillingfleet and Burnet were also inclined to give a naturalistic explanation of such worries as 'depressions or weaknesses of the Animal Spirits oftentimes proceeding from the want of Nourishment or Free Air or Exercise or pleasing Circumstances &c'. Such reactions are

¹⁴ See esp. Keith Thomas, *Religion and the Decline of Magic* (London, 1971), 96ff.

¹⁵ Hunter, *op. cit.* (note 13).

¹⁶ Compare Nicholas Canny, *The Upstart Earl* (Cambridge, 1982).

¹⁷ For this and the points in the next paragraph, see Hunter, *op. cit.* (note 13).

themselves an interesting sign of the way in which Anglican attitudes were changing in Boyle's later years. Even earlier, however, it had been a commonplace of casuistry that individual believers were prone to undue disquiet in matters of conscience – what casuists described as 'scrupulosity'¹⁸ – and it is in this context that one should see the bishops' attempt to quieten Boyle's worries about past moral dilemmas. Indeed, it is hard to avoid the impression that they were slightly irritated by the extreme to which Boyle took his anxiety, finding it tiresome and counterproductive, and, though I am aware of the difficulties of passing judgment on matters which are by their nature inscrutable, I think that it is hard not to see this aspect of his religiosity as 'dysfunctional'.

Boyle's casuistical concerns have hitherto been largely ignored. Insofar as they have been noticed, their significance has been misconstrued, due to an attempt to link them to a supposed political programme on Boyle's part. The culprit here is J. R. Jacob, who devotes three pages to the episode in 1659 when Boyle paid Sanderson a pension to publish his lectures on conscience, but interprets it much more narrowly than is warranted: he sees Sanderson's book as 'an answer to the republicanism rampant at the time', on the grounds that theories of popular sovereignty had needed refutation in the late 1640s when the lectures were originally given, and were topical again in the aftermath of Oliver Cromwell's death.¹⁹ Now undoubtedly the political turmoil of the Interregnum caused acute dilemmas for many, and Sanderson's casuistical advice on such issues was widely valued, perhaps particularly as to whether royalists should subscribe to the so-called Engagement Oath in 1649–50.²⁰ But, though Sanderson alluded to the political circumstances of the time, his lectures provided a broad treatment of the relationship between divine and human law, significant not just in its immediate context but more generally: if this had not been the case, it would be hard to understand why, in 1877, Bishop Christopher Wordsworth should have had the work reprinted for the use of theological students in his diocese of Lincoln.²¹ It is the purest of speculation to suggest that Boyle's reasons for sponsoring the book stemmed from its topicality at a particular moment, rather than from an appreciation of its long-term value similar to that of Bishop Wordsworth.²²

This is not, however, atypical of the approach of Jacob in his *Robert Boyle and the English Revolution*, one of the main expositions of the 'social functionalist' view of Boyle. For, when the arguments of this book are examined closely, it repeatedly turns out that Boyle's supposed views have been divined by a highly selective reading of his

¹⁸ McAdoo, *op. cit.* (note 12), 75, 96.

¹⁹ Jacob, *Robert Boyle*, *op. cit.* (note 2), 172. See also *ibid.*, pp. 130–2.

²⁰ See, for instance, the manuscript copies of Sanderson's response to Anthony Ascham's views on allegiance to ejected princes and his case of conscience on the subject, published in 1649, now to be found in British Library Add MS 32093, fols. 272–5, Egerton MS 2982, fol. 254; Stowe MS 746, fols. 146–7. See also Sanderson, *Works*, ed. Jacobsen (Oxford, 1854), v. 20–36, Isaac Walton, *Lives*, ed. George Saintsbury (London, 1927), 391, and Slight's, *op. cit.* (note 12), 419ff.

²¹ C. Wordsworth (ed.), *Bishop Sanderson's Lectures on Conscience and Human Law* (Lincoln and London, 1877).

²² For an account of Sanderson which sees him as adopting an abnormally purist moral stance even by the standards of other casuists of the day, see Mosse, *op. cit.* (note 12), 141–4. Compare Slight's, *op. cit.* (note 12), 422–3. It seems to me typical of Boyle that it was this approach that he chose to sponsor.

writings, or from extrapolation from the views of colleagues with which Boyle may or may not have agreed; in addition, unwarranted presumptions are frequently made as to the targets at which such writings were aimed. Thus the views of the so-called 'Boyle circle' around 1660 are extrapolated from the rather secularist opinions of Sir Peter Pett which there is no reason to think that Boyle wholeheartedly seconded: Jacob's principal evidence that he did so is a reading of the second section of Part II of *The Usefulness of Experimental Natural Philosophy* which depends on taking passages out of context and ignoring the main thrust of that work.²³ Similarly, Jacob's conviction that the figure whom Boyle had in mind in sponsoring Sanderson's lectures was Henry Stubbe seems to me fanciful in the extreme, while, though it is true that in the mid 1660s Boyle *did* become publicly embroiled with Stubbe through the Greatrakes affair, Jacob's portrayal of the latter almost entirely overlooks the convoluted nature of Boyle's attitudes, in many ways the most striking feature of the episode.²⁴

The interpretation of Steven Shapin and Simon Schaffer is sometimes vulnerable to similar criticism. An instance is provided by their account of Boyle's refusal to take holy orders when it was suggested to him that he might do so after the Restoration. By way of explanation for this, they cite Boyle's view that, by speaking as a layman, he might claim an impartiality as an orthodox apologist which clergymen lacked. On the other hand, they completely ignore what he claimed to be 'his main reason' for the decision, namely his feeling that he had no vocation for the ministry, and that, if he accepted ordination without this, he 'should have lied to the holy Ghost'.²⁵ As such examples illustrate, very frequently the 'social functionalist' view is based on a much more selective reading of sources than the reader is ever told.

Boyle and oaths

It is for this reason that I think that it is so important to stress casuistry. For this is not just a closet concern of Boyle's, significant solely for the increase in historical verisimilitude that it gives. Rather, it is important because it actually affected and inhibited his attitudes and behaviour in crucial ways which have not hitherto been properly understood. Perhaps the most striking instance of this – if not the easiest to interpret – is Boyle's refusal to become President of the Royal Society in 1680. Boyle

²³ See Jacob, *Robert Boyle, op. cit.* (note 2), 133–44, esp. pp. 141–3; Boyle, *Works*, ed. Thomas Birch (2nd edn; 6 vols., London, 1772), 2: 392ff.; [Sir Peter Pett], *A Discourse Concerning Liberty of Conscience* (London, 1661), a work displaying the rather secularist view of religious commitment also seen in Pett's *The Happy Future State of England* (London, 1688). On Pett, see especially Mark Goldie, 'Sir Peter Pett, sceptical Toryism and the science of toleration in the 1680s', *Stud. Church Hist.*, 1984, 21: 247–73.

²⁴ Jacob, *Robert Boyle, op. cit.* (note 2), 164–76, esp. 172. For the alternative interpretation see particularly Eamon Duffy, 'Valentine Greatrakes, the Irish stroker: miracle, science and orthodoxy in Restoration England', *Stud. Church Hist.*, 1981, 17: 251–73, esp. p. 269; see also N. H. Steneck and Barbara Kaplan, 'Greatrakes the stroker', *ISIS*, 1982, 73: 161–85. For further criticism of Jacob's views, see my *Establishing the New Science: The Experience of the Early Royal Society* (Woodbridge, 1989), ch. 2, and 'Science and heterodoxy: an early modern problem reconsidered', in D. C. Lindberg and R. S. Westman (eds.), *Reappraisals of the Scientific Revolution* (Cambridge, 1990), 437–60.

²⁵ Shapin and Schaffer, *op. cit.* (note 3), 314 and ch. 7; Boyle, *op. cit.* (note 23), 1: lx.

was elected to the Council and nominated for the presidency on St Andrew's Day that year, but, after a typical period of prevarication during which he attended at least one meeting, on 18 December he wrote to Robert Hooke, then Secretary, declining the office.²⁶ Boyle gave as the reason for his refusal of the honour his 'great (and perhaps peculiar) tenderness in point of oaths', language strongly reminiscent of the casuistical material already surveyed.

His exact motives are unclear, though a brief sketch of the context may go some way towards clarifying them. Oaths were controversial in seventeenth-century England, for two reasons: one because of those who took them too seriously, the other due to those who did not take them seriously enough. To deal with the latter first, there was much concern at the time that oaths were being trivialized by their casual use: indeed, Boyle himself had written a treatise on this subject in the late 1640s which was published after his death, his *Free Discourse against Customary Swearing*. In it, he gave a series of arguments against such use of oaths in fashionable circles, echoing the views of many at the time that it was because oaths were so serious a matter – religious acts in which God was invoked as a witness – that their abuse was so offensive: 'the Lord will not hold him guiltless that taketh his name in vain', in the words of the Ten Commandments (*Exodus*, 20.7).²⁷

On the other side there were some who thought that oaths established such a sacred obligation that they were reluctant to use them at all: this was a point of view for which there was some scriptural support, including a passage from the Sermon on the Mount which could be seen as outlawing oaths altogether (*Matthew*, 5.34), though it was more commonly interpreted at the time as referring only to vain swearing.²⁸ The most notorious of such refusers of oaths were the Quakers, who took the view that men should be of such integrity that their affirmation should be dependable without the need for additional sanctions of this kind. Such a position was widely regarded at the time as seditious: for instance, in a book published in 1662, Bishop John Gauden attacked those people 'who refuse all *legal Oathes*, upon *scruples of Conscience*, and so threaten either to subvert our *Laws*, or to obstruct all *judicial proceedings*'. Though Gauden applauded the Quakers for their abhorrence of profane and trivial swearing, he considered them superstitious in their rejection of the practice altogether.²⁹

Boyle's views seem to have had something in common with those of the Quakers. Indeed, it is conceivably significant that Gauden dedicated to him the very attack on Quaker attitudes that I have just quoted, since Boyle was not a particularly common dedicatee of non-scientific books.³⁰ Unlike the Quakers, Boyle did not wholly reject

²⁶ Thomas Birch, *The History of the Royal Society* (4 vols., London, 1756–7), 4: 58, 60; Boyle, *op. cit.* (note 23), 1: cxix.

²⁷ Boyle, *op. cit.* (note 23), 6: 1ff, p. 4. Compare, for example, Robert Sanderson, *De Juramento* (London, 1647; Eng. trans., London, 1655), esp. pp. 259–63. It is probably significant that it was Sanderson's *De Juramento* that first attracted Boyle's attention to him (Walton, *op. cit.* (note 20), 399, 423).

²⁸ See, for instance, the sermons recorded in E. S. de Beer (ed.), *The Diary of John Evelyn* (6 vols., Oxford, 1955), 4: 385, v. 423–4.

²⁹ John Gauden, *A Discourse concerning Publick Oaths* (London, 1662), sig. a3v, 17–18 and *passim*. On Quaker attitudes, see Richard Bauman, *Let your Words be Few* (Cambridge, 1983), ch. 7.

³⁰ For a list of works dedicated to Boyle, see J. F. Fulton, *A Bibliography of the Honourable Robert Boyle* (2nd edn, Oxford, 1961), 155–70.

oath-taking: indeed, in his *Discourse*, he had specifically distanced himself from those 'that indiscriminately condemn all oaths as absolutely and indispensably prohibited and abolished by the gospel'.³¹ But he does seem to have felt abnormal scruples about taking oaths which were not strictly necessary, or which he had any reason to think that he might not be able to fulfil. One of the major issues raised in his casuistical interviews with Stillingfleet and Burnet was the extent to which he was bound by promises that he had made which might be to his disadvantage, while, in the autobiographical notes that he dictated to Burnet, Boyle recorded how 'He made no Vowes not knowing how his Circumstances might change but usually gave the 20th' (i.e., presumably, a twentieth part of his income).³²

It is arguably in this context that one should read his attitude in 1680. It had been laid down in the Society's charter that, prior to taking office, the President should swear 'a corporal oath well and faithfully to execute his office' in front of the Lord Chancellor of the realm. This took the following form:

I . . . do promise to deal faithfully and honestly in all things belonging to the trust committed to me as President of this Royal Society, during my employment in that capacity. So help me God!³³

Possibly, Boyle may have worried whether it was wise to guarantee to fulfil the obligations of this quite onerous office in so solemn a way – though it should be noted that this had apparently not prevented him accepting a comparable oath as a member of the Society's Council seven years previously, in 1673.³⁴

More important is the fact that by 1680 the President of the Royal Society had to take the oaths prescribed by the Test Act of 1673 (at least, if it had not hitherto been clear that this applied to the President of the Royal Society, this was something that Boyle clarified by consulting no fewer than three lawyers, all of whom assured him that the act *did* affect him, as he explained in his letter to Hooke of 18 December). The Test Act insisted 'That all and every person or persons, as well Peeres as Commoners that shall beare any Office or Offices Civill or Military or shall receive any Pay, Salary, Fee or Wages by reason of any Patent of Grant from his Majestie or shall have Command or Place of Trust from, or under his Majestie' should take the oaths of supremacy and allegiance and receive the sacrament according to the usage of the Church of England.³⁵ Since Boyle specifically refers to oaths as the problem, it cannot have been taking the sacrament that caused him anxiety, while there is no reason to think that he disagreed with the content of the oaths that the act prescribed: both recited standard loyalist, anti-Catholic sentiments. Rather, it seems clear that it was the very issue of whether he should take such oaths at all that concerned him.

Ancillary evidence on this point comes from a letter from Henry Miles to Thomas

³¹ Boyle, *op. cit.* (note 23), 6: 26. This is described as 'that plausible error of our modern *Anabaptists*'.

³² British Library Add. MS 4229, fol. 60.

³³ *The Record of the Royal Society of London* (4th edn, London, 1940), 228, 253.

³⁴ Birch, *op. cit.* (note 26), 3: 114. Compare *The Record, op. cit.* (note 33), 229, 254.

³⁵ 25 Charles II, c. 2; cf. also 30 Charles II. stat. 1, c. 1: *Statutes of the Realm* (London, 1819), 5: 782–5, 894–6. For the oaths of supremacy and allegiance, see *ibid.*, 4: 352, 1074. For a manuscript version of part of these oaths in the hand of Sir Robert Southwell, referring to William and Mary, see Royal Society Domestic Manuscripts 5, fol. 30.

Birch, enclosing 'a Copy of a Q[ue]ry] drawn up as if intended to be proposd to a Council for his Opinion concerning the necessity of taking the Test to qualifie him to Governor of the Corpor[ation] for propag[ating] of [the] Gospel in America', which he had found among Boyle's papers (though it is no longer extant). This read as follows:

Q. whether the governour of a Company for management of a Charity (being a protestant) and acting by the rules of their Majesties Church, having nothing from their said majesties nor any salary & fee, or reward from them, or any other, and chosen by thirteen members of the said Company from time to time, be liable to take the tests, enjoyed by the late act for preventing dangers which may happen from popish recusants.³⁶

It was presumably a similar question which Boyle asked his legal advisors in connection with the Royal Society presidency, and, being advised in the affirmative, decided against holding the office.

An interesting analogue to Boyle's scruples is provided by a case reported by Boyle's friend, the famous Presbyterian divine, Richard Baxter. This involved a prominent West Country politician, Thomas Bampfield, Speaker in Richard Cromwell's parliament, whom Baxter considered a 'prudent holy Man'. In Baxter's words:

He is a Man of most exemplary Sincerity and Conscientiousness: He never took the Covenant, nor any other Oath in his Life, till he was a Member of the Parliament that brought in the King, and then he was put upon taking the Oath of Supremacy, which I had much ado (being my dear and much valued Friend) to perswade him to, so fearful was he of Oaths, or any thing that was doubtful and like to sin.

Subsequently, in connection with the Indemnity Bill of 1660, Bampfield opposed the imposition of the oaths of allegiance and supremacy on those who wanted to benefit from it, 'for then you press persons for the saving of their lives and estates to damn their souls'.³⁷ In Bampfield's anxieties, we see a close parallel to the likely feelings of Boyle.

Though Boyle's motives over the presidency have to be left a little indefinite, what is crucial is that in this instance Boyle's conscience made him act in a manner which it is very difficult to see as socially functional. One of the charges against the Quakers was that, however good their intentions, their rejection of oath-taking was subversive because of the indispensable role of oaths in underwriting social relations. John Tillotson, for instance, argued that the way in which the Quakers 'called in question the lawfulness of all Oaths' was 'to the great mischief and disturbance of humane Society'.³⁸ Perhaps no-one would have dared to make the same accusation against as

³⁶ Miles to Birch, 10 August 1743, British Library Add MS 4314, fols. 88v-9. A word is deleted before 'any salary'. Further evidence concerning Boyle's attitude is available from the 'oath' of secrecy that he imposed on his laboratory assistants (see Hunter, *op. cit.* (note 6), 406) which took the form: 'this I promise in the faith of a Christian, witnes my hand' (Royal Society MS 189, fol. 13).

³⁷ Richard Baxter, *Reliquiae Baxterianae*, ed. Matthew Sylvester (London, 1696), 1: 432 (I am indebted to John Spurr for this reference); B. D. Henning, *The House of Commons 1660-90* (3 vols., London, 1983), 1: 586.

³⁸ John Tillotson, *The Lawfulness, and Obligation of Oaths* (London, 1681), 8 and *passim*. See also Christopher Hill, *Society and Puritanism in Pre-Revolutionary England* (London, 1964), ch. 11, though Hill's overall interpretation is questionable; he also gives both Boyle's name and the date of publication of his *Customary Swearing* incorrectly (p. 412).

illustrious a person as Boyle (unless this was the point that Gauden was tentatively making by dedicating his book to him). But Boyle's conscience here *did* make him implicitly seditious by contemporary standards: that is to say, if his primary criterion had been social stability, he would not have gone down a path which was potentially disruptive according to the perceptions of the time. Such evidence is wholly at odds with a simplistically functionalist reading of Boyle.

Casuistry and natural philosophy

Boyle's scrupulosity also had implications for his intellectual activities. One example of this is Boyle's attitude to magic, which I have considered in detail elsewhere. This is illustrated by the autobiographical notes that he dictated to Gilbert Burnet, which may be supplemented by fragmentary survivals among his unpublished papers.³⁹ In recent years, we have become increasingly aware of the important contribution of ideas and information deriving from natural magic and alchemy to the thought of natural philosophers in this period. In Boyle's case, however, his moralistic attitudes made him much more alert than many contemporaries to the spiritual danger of the direct intercourse with the supernatural realm that he thought that magical practices entailed. The result was that he experienced scruples about activities of this kind, and the result may have been to limit his alchemical pursuits primarily to an attempt to verify empirically the process of transmutation. In contrast to Newton, whose profuse investigation of the mysteries of alchemy from the 1670s onwards has left so large a residue among his papers, Boyle's papers show little evidence of curiosity about such arcana. As a result, Boyle may have been deprived of fruitful insights into the operations of the natural world of a kind which recent scholarship has demonstrated that Newton derived from such sources.⁴⁰

Moving to other facets of Boyle's natural philosophy, a 'scrupulosity' which bears a close relationship to the attitudes shown in his casuistry is much in evidence. Thus the lawyer and writer, Roger North, used this very word to describe Boyle's medical concerns, writing how 'Once in the company of old Doctor Denton [i.e., William Denton, royal physician] I was fleering [i.e., jeering] at the infinite scrupulosity Mr Boyle used about preserving his health'. He thus echoed a letter from William Petty of 16 April 1653 in which he criticized Boyle for 'your apprehension of many diseases, and a continual fear, that you are always inclining or falling into one or the other', and for 'practising upon yourself with medicaments (though specificks) not sufficiently tried by those, that administer or advise them'.⁴¹ I am currently making a study of the issues surrounding Boyle's medical writings, but this valetudinarianism is a significant part of their background.

³⁹ See Hunter, *op. cit.* (note 6).

⁴⁰ Compare, for example, R. S. Westfall, 'Newton and alchemy', in Brian Vickers (ed.), *Occult and Scientific Mentalities in the Renaissance* (Cambridge, 1984), 315-35.

⁴¹ Roger North, *Lives of the Norths* ed. A. Jessopp (3 vols., London, 1890), 3: 146; Maddison, *op. cit.* (note 5), 80-1.

Perhaps more surprising is the connection which may be demonstrated between Boyle's 'scrupulosity' and his scientific work. The unremitting pursuit of exactitude that he displayed in the laboratory parallels the pains that he took in salving his conscience. Indeed, he used the same terminology in describing both. Thus he told Burnet, looking back over his scientific career, that 'He made Conscience of great exactnes in Experiments'.⁴² He also spoke of 'scruples' and 'scrupulosity' in an experimental context. This may be illustrated here by a single example, the description of his experiments concerning the apparent transmutation of water into earth in his *Origin of Forms and Qualities* (1666).⁴³ In this, these words occur again and again: thus he observed of the experiment 'that perhaps none but such a scrupulous person as I would think the prosecution of it other than superfluous'; subsequently, being forced to suspend operations 'before I had made half the trials I judged requisite in so nice a case, I have not yet laid aside all my scruples'; while within two paragraphs he is noting: 'Which scruple and some of the former I might have prevented, if I had had convenient metalline vessels wherein to make the distillations instead of glass ones'. Such talk of 'scruples' and 'scrupulosity' recurs throughout Boyle's published and unpublished writings on natural philosophy, and the significance of this has hitherto been overlooked. We tend to take Boyle's assiduity as an experimenter for granted, showing insufficient curiosity as to where these almost obsessive practices derived from. I would like to suggest that only one as assiduous in his spiritual exercises as Boyle would have thought it appropriate to employ such standards in the laboratory. Arguably it was his moralism which gave him the insistence on satisfying himself, if necessary going back over an issue time and time again, which is so typical of his science.

It could also be argued that Boyle's treatises owe something to the mental attitudes encouraged by casuistry. Even a casual survey of the literature of casuistry will illustrate how the casuistic approach was characterized by its constant effort to anticipate and deal with possible objections to an argument: an example is provided by Sanderson's lectures, the publication of which Boyle sponsored. There is an element of this in Boyle's scientific and philosophical writings: here too, there is an attempt to counter opposing views in anticipation in a manner that sometimes seems slightly artificial. Moreover if one studies the surviving drafts of Boyle's works, one can sometimes observe this taking shape, as, for example, in draft material for Boyle's *Free Enquiry into the Vulgarly Receiv'd Notion of Nature* (1686), which I am currently studying with Edward B. Davis. Here, a text which initially started in a relatively simple form became increasingly elaborate as more data was included to refute counter-arguments that occurred to Boyle during the course of composition. John Harwood has observed comparable characteristics in the early writings of Boyle which he has recently edited.⁴⁴

Casuistry may also throw light on the origins of one of the crucial methodological

⁴² British Library Add. MS 4229, fol. 60.

⁴³ Boyle, *op. cit.* (note 23), 3: 102–9, pp. 105, 107.

⁴⁴ J. T. Harwood (ed.), *The Early Essays and Ethics of Robert Boyle* (Edwardsville and Carbondale, 1991), xliii and *passim*.

themes in Boyle's thought, his probabilism. The espousal of probabilist attitudes by Boyle and other late-seventeenth-century English scientists is commonplace, but the source of such attitudes is less clear. While some have postulated the influence of Gassendi and other continental philosophers, an alternative suggestion is that the roots of such a position is to be found in the approach of common lawyers.⁴⁵ It is worth pointing out here that the issue of whether certainty was either attainable or necessary was regularly discussed in the context of casuistry, and Boyle is as likely to have been familiar with such notions from his reading of casuistical literature as from the other sources that have been canvassed.⁴⁶ Moreover, that this approach had associations of this kind is suggested by a comment by Boyle's contact, the Oxford divine and natural philosopher, Robert Sharrock, who wrote in a letter to Boyle of 13 December 1661: 'And as to the Curableness of Cancers I have heard a story from a person of credit, & I long to heare it seconded, that so it may bee to mee (according to the Jesuiticall canon of judging) a doctrine of probability'.⁴⁷

This is speculative, but it suggests that, as an intellectual tradition, casuistry may prove more significant for Boyle's thought than has hitherto been acknowledged. More important is the moralism which made Boyle so passionately interested in cases of conscience in the first place, and which inculcated a similar intensity in his activity in other fields, not least his experimentation. A study of Boyle from this point of view provides a vivid, individual illustration of the role of the heightened religiosity of the Reformation era in forming the attitudes and approach of modern science.⁴⁸ Yet, if we appear to have here a clue to the source of Boyle's scientific originality, it is important to stress that these same attitudes were also responsible for a degree of conscientiousness which even Boyle's confessors apparently found tiresome, or his prevarication over the Royal Society presidency, thus illustrating the need to see the man as a whole in order to understand him. 'Dysfunctionalism' is a concept which may jar with some readers of this essay: but its intention is simply to illustrate the limitations of any interpretation of Boyle which picks and chooses among different facets of his life and thought, as is arguably the case with both the internalist and the social functionalist approaches to him. Only by seeing Boyle as a whole, taking the functional and the apparently 'dysfunctional' together, will we do justice to him; only thus will we do justice to the early modern culture from which he emanated.

⁴⁵ Sargent, *op. cit.* (note 1). See also Henry van Leeuwen, *The Problem of Certainty in English Thought, 1630-90* (The Hague, 1963) and Barbara Shapiro, *Probability and Certainty in Seventeenth-century England* (Princeton, 1983), esp. 37f.

⁴⁶ Margaret Sampson, 'Laxity and liberty in seventeenth-century English political thought', in Leites *op. cit.* (note 12), 72-118, esp. 78f; Shapiro, *op. cit.* (note 45), 37-8, 39, 69, 105-6. See also McAdoo, *op. cit.* (note 12), 88f.; Wood, *op. cit.* (note 12), 75f. For further discussion of this issue, see Ian Hacking, *The Emergence of Probability* (Cambridge, 1975), esp. 22f; D. L. Patcy, *Probability and Literary Form* (Cambridge, 1984), esp. 50f; and Sargent, *op. cit.* (note 1).

⁴⁷ Royal Society Boyle Letters, v. 51.

⁴⁸ I ended the version of this paper that I delivered at the Oxford conference with some semi-humorous remarks about the celebrated thesis expounded by Robert K. Merton in his 'Science, technology and society in seventeenth-century England', *Osiris*, 1938, 4: 360-632 (reprinted in book-form, New York, 1970). Suffice it here to note that it seems to me that the issue of the relationship of Puritanism to the rise of science merits fresh scrutiny along the lines sketched here for Boyle.