

Moral geometry in Restoration Ireland: Samuel Foley's 'Computatio universalis' (1684) and the science of colonisation

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ABSTRACT. *Despite the importance of the new science in the colonisation of Stuart Ireland, and the many Irish links to major figures in the Scientific Revolution, these connections remain relatively little studied outside of major episodes such as the Down Survey. This article examines a much smaller project, the 'Computatio Universalis' (1684) of Church of Ireland clergyman (later bishop of Down and Connor) Samuel Foley (1655–1695). Submitted to the Dublin Philosophical Society in 1684 as an attempt to 'to demonstrate a universal standard' of value, Foley's project was in fact a guide to the achievement of 'happiness' through the careful stewardship of time and wealth. Foley's project recalls earlier Christian humanist and Protestant concern with stewardship, however, and also reflects seventeenth-century economic writers' and moral reformers' concern with avoiding idleness. In the context of Restoration Ireland, however, it can also be seen more specifically as a project harnessing new methods of quantification for the cultural maintenance of a ruling Protestant elite historically threatened by degeneration in a colonial setting, as well as a reflection of Protestant anxieties about the Catholic church's control over time.*

The English colonisation of Ireland after the 1641 rebellion was more intimately connected to the Scientific Revolution than any other episode in the history of British, and arguably European, imperial expansion.¹ Not only

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¹ Whether, in what senses, or at what points early-modern Ireland is best understood as a colony rather than a kingdom, or a province, is a matter of continuing debate. That the English state and most English Protestants (including those in Ireland who came to see themselves as 'Irish' Protestants) saw 'plantation' as a colonial effort – both in the literal sense that it involved the creation, defence, and expansion of 'colonies' of settlers and in the larger, more distinctively modern sense that it implied the subordination of Gaelic laws and customs, Irish Catholic interests, and Irish land and resources to broadly English imperatives (except where these clashed with those of the Protestant elite in Ireland itself) – admits of little doubt. These views were particularly effective in shaping Irish society and politics in the second half of the seventeenth century, and it is in this light that the terminology of colonialism is used here. Compare Nicholas Canny, *Kingdom and colony: Ireland in the Atlantic world, 1560–1800* (Baltimore, 1988); S. J. Connolly, *Religion, law and power: the making of Protestant Ireland, 1660–1760* (Cambridge, 1992), pp 103–43;

did the Cromwellian re-conquest and the Restoration settlement coincide chronologically with the institutionalisation of experimental science in England (capped by the formation of the Royal Society of London in 1660); not only were some of the same people intimately involved in both processes simultaneously; but, from Cromwell's time onward, scientific efforts played crucial roles in both the discourse and the practice of Irish settlement, which in turn influenced the shape of specific kinds of scientific endeavour. Only a few historians have given these connections much attention.² Nevertheless, they are evidenced by numerous, well-documented Interregnum and Restoration scientific-*cum*-political projects. Yet as this article argues by looking through the lens of a little known essay, Samuel Foley's 1684 'Computatio Universalis', such projects not only suggest incipiently 'modern' linkages between science and empire, but also suggest that projecting in the context of established colonial settlement allowed (or perhaps forced) new applications of science to retain and rework much older moral agendas.

The densest and most important set of connections between science and colonisation in Ireland involves the Hartlib circle, an influential group of scientific 'projectors' that included several future fellows of the Royal Society as well as some future founders of the Dublin Philosophical Society.³ Hartlib's network generated various Irish schemes from the 1640s onward, gaining pace once Cromwell re-established English control in 1649–51 before ending, abruptly, with the Restoration.⁴ In 1652, for example, Hartlib published *Irelands naturall history*, a work that combined observations of nature with a 'politick' concern for pacifying an 'vnsettled' and rebellious island.⁵ Another of Hartlib's protégés, the alchemist and army surgeon Benjamin Worsley, pursued medicine, surveying, and agricultural improvements in wartime and Cromwellian Ireland, rising to the post of surveyor-general before being displaced by another Hartlibian medical man, William Petty.⁶ Worsley's

Toby Barnard, 'Historiographical review: farewell to old Ireland' in *Hist. Jn.*, xxxvi, no. 4 (Dec. 1993), pp 909–28; Jane Ohlmeyer (ed.), *Political thought in seventeenth-century Ireland: kingdom or colony* (Cambridge, 2000); Jane Ohlmeyer, *Making Ireland English: the Irish aristocracy in the seventeenth century* (New Haven, 2012), pp 336–57.

² The only systematic study of the role of science in the colonisation of Ireland over the long term is Patrick Carroll, *Science, culture, and modern state-formation* (Berkeley, 2006). For the seventeenth century in particular, see also K. Theodore Hoppen, *The common scientist in the seventeenth century: a study of the Dublin Philosophical Society, 1683–1708* (Charlottesville, VA, 1970); Charles Webster, *The great instauration: science, medicine and reform, 1626–1660* (London, 1975), pp 420–46; T. C. Barnard, *Cromwellian Ireland* (2nd ed., Oxford, 2000), pp 213–48; idem, 'The Hartlib circle and the cult and culture of improvement in Ireland' in Mark Greengrass, Michael Leslie, and Timothy Raylor (eds), *Samuel Hartlib and the universal reformation: studies in intellectual communication* (Cambridge, 1994), pp 281–97; Thomas Leng, *Benjamin Worsley (1618–1677): trade, interest and the spirit in revolutionary England* (Woodbridge, 2008), pp 80–117.

³ See Webster, *Great instauration*; Greengrass et al. (eds), *Samuel Hartlib*.

⁴ Barnard, 'Hartlib circle'.

⁵ Gerard Boate, *Irelands naturall history* (London, 1652); Robert Child to Samuel Hartlib, 29 Aug. 1652, in *The Hartlib papers*, ed. M. Greengrass, M. Leslie and M. Hannon (Sheffield, 2013), 15/5/14a (available online: www.hrionline.ac.uk/hartlib) (23 Oct. 2014) [cited hereafter as *H.P.*].

⁶ Leng, *Benjamin Worsley*, pp 13–94.

alchemical concerns and Petty's experimental interests each overlapped with those of yet another of Hartlib's associates, Robert Boyle – apostle of experimental science, sometime intelligencer on Irish matters, promoter of the Irish-language bible, and younger son of the land-grabbing earl of Cork.⁷ These are the most important names, but other schemes designed to improve Ireland – and to use Irish resources for improvements elsewhere – pepper Hartlib's voluminous archive.

More importantly, Hartlibian projects shaped colonial Ireland. By far the biggest of these, in this regard, was William Petty's 'Down Survey' of confiscated Irish Catholic land – an unprecedented exercise in state-backed empirical, and imperial, science.⁸ Petty gave English soldiers a crash-course in surveying, issued them with instruments assembled from mass-produced, interchangeable parts, and then sent them roving across the landscape, identifying, measuring and classifying the land as they went. Collating the information they gathered, which was set down according to standardised written guidelines, Petty produced in a few short years the first scientific survey of any European nation.⁹ The consequent expropriation of Irish land – which had been two-thirds Catholic in 1641 but would be over two-thirds Protestant by the end of the Restoration – sustained a colonial order, tied to an ideology of technical as well as cultural 'improvement', that lasted more than a century.¹⁰ It is no exaggeration to say that Petty's survey remade Ireland.

⁷ On Cork, see Nicholas Canny, *The upstart earl: a study of the social and mental world of Richard Boyle, first earl of Cork, 1566–1643* (Cambridge, 1982); on Boyle, Michael Hunter, *Boyle: between God and science* (New Haven, 2010) and idem, 'Robert Boyle, Narcissus Marsh, and the Anglo-Irish intellectual scene in the late seventeenth century' in Muriel McCarthy and Ann Simmons (eds), *The making of Marsh's Library: learning, politics, and religion in Ireland, 1650–1750* (Dublin, 2004), pp 51–75. Thomas Duddy has argued for Boyle's inclusion in the historical canon of 'Irish thought' on the grounds that his material wealth derived from Irish estates. This strikes me as eccentric; a similar line of reasoning might make John Stuart Mill an 'Indian' thinker. But it nevertheless highlights the colonial context for Boyle's liberty to engage in experimental work. See Thomas Duddy, *A history of Irish thought* (London, 2002), pp 45–81. Though he spent only about two years of his life in Ireland, Boyle did inform Hartlib on matters Irish and occasionally drew on his own father's papers in so doing; see Samuel Hartlib, *Ephemerides*, 1648, part 1 (Jan.–June), *H.P.* 31/22/2b; *Ephemerides*, 1654, part 2 (24 Apr.–4 Aug.), *H.P.* 29/4/21b; *Ephemerides*, 1655, part 2 (Feb.–21 Apr.), *H.P.* 29/5/16a.

⁸ William Petty, *History of the Cromwellian survey of Ireland, A.D. 1655–6, commonly called 'the Down Survey'*, ed. Thomas Aiskew Larcom (Dublin, 1851).

⁹ The initial survey of lands intended for the army took place in 1654–6; a survey of land intended for distribution to London 'adventurers' (who had financed the invasion) followed in 1658–9. Y. M. Goblet, *La transformation de le géographie politique de l'Irlande dans les cartes et essais anthropogéographiques de Sir William Petty* (2 vols, Nancy, 1930), i, pp iii–iv; Irma Corcoran, *Thomas Holme, 1624–1695: surveyor general of Pennsylvania* (Philadelphia, 1992), pp 40–3; William J. Smyth, *Map-making, landscapes and memory: a geography of colonial and early-modern Ireland, c.1530–1750* (Cork, 2006), pp 23–4, 166–97. But compare J. H. Andrews, *Shapes of Ireland: maps and their makers, 1564–1839* (Dublin, 1997), pp 118–46.

¹⁰ Kevin McKenny, 'The Restoration land settlement in Ireland: a statistical interpretation' in Coleman A. Dennehy (ed.), *Restoration Ireland: always settling and never settled* (Aldershot, 2008), pp 35–52. On the discourse and practices of improvement in Britain and Ireland, see Paul Slack, *From Reformation to improvement: public welfare in*

A somewhat different link between science and colonial rule in Ireland marks another project of Petty's, hatched in the 1670s under the rubric of 'political arithmetic' and aiming at 'the transmutation of the Irish into English'.¹¹ Though the scheme's dimensions shifted over time, the core idea was a programme of forced migration targeting young, marriageable women: Irish women would be dispersed across England and trained in 'English manners and huswifery'; English women would be shipped in as replacements, married to Irish men, and set up in English-style houses where they would raise Anglophone and Anglophile children. Petty's optimism about the plan seemed misplaced to many even at the time. But what matters here is that, like the eminently successful Down Survey, the transmutation scheme applied quantitative, empirical methodology to problems of colonial settlement. Transferring Francis Bacon's emphasis on material transformation to the social realm, these projects reworked the land and the bodies of the colonised. Though Petty's project remained a paper reverie, programmes of planned migration calibrated to suit elite or metropolitan political and economic agendas would colour Ireland's later history, and that of the European imperial world generally.¹² Applied to populations, quantitative science became a tool of empire; indeed, empire and early social science were mutually constitutive.

This paper concerns another, later scheme: the 1684 'Computatio universalis' of Church of Ireland clergyman Samuel Foley.¹³ Like Petty and Boyle, Foley belonged to Ireland's Protestant elite. With Petty, he helped found the Dublin Philosophical Society, a younger sibling to the Royal Society

early modern England (Oxford, 1999) and idem, *The invention of improvement: information and material progress in seventeenth-century England* (Oxford, 2015); David Dickson, *Old world colony: Cork and South Munster, 1630–1830* (Cork, 2005), pp 170–214; Toby Barnard, *Improving Ireland? Projectors, prophets and profiteers, 1641–1786* (Dublin, 2008); James Livesey, *Civil society and empire: Ireland and Scotland in the eighteenth-century Atlantic world* (New Haven, 2009), pp 54–89.

¹¹ See: Ted McCormick, *William Petty and the ambitions of political arithmetic* (Oxford, 2009).

¹² The major eighteenth-century example, of course, is the transatlantic slave trade. For other examples see Patrick J. Duffy (ed.), *To and from Ireland: planned migration schemes, c.1600–2000* (Dublin, 2004); Emma Christopher, Cassandra Pybus and Marcus Rediker (eds), *Many Middle Passages: forced migration and the making of the modern world* (Berkeley, 2007).

¹³ The paper is printed in K. Theodore Hoppen (ed.), *Papers of the Dublin Philosophical Society, 1683–1709* (2 vols, I.M.C., Dublin, 2008) (cited hereafter as *P.D.P.S.*), i, 170–9, and the original is in the British Library (B.L., Add. MS 4811, ff 31–5). Hoppen gives details of three further manuscript copies, including a transcription by John Aubrey. After having been read in Dublin, the paper was sent to the Oxford Philosophical Society (where it was read on 13 Oct. 1685) and the Royal Society (read on 9 Dec. 1685). See R. T. Gunther, *Early science in Oxford* (15 vols, Oxford, 1920–1968), iv, 162, xii, 146; Foley's cover letter and a copy of the 'Computatio' are in the Royal Society Library (R.S.L., Early Letters, EL/F2/1–1a). Though it never appeared in the *Philosophical Transactions*, it was anonymously printed, prefaced by Foley's covering letter to the Royal Society, by James Moxon (son of Royal Society printer and fellow, Joseph Moxon) in 1697; see [Samuel Foley], *Computatio universalis seu logica rerum* (London, 1697). No previous commentator appears to have noticed this edition.

of London, which lasted from 1683 to 1709.¹⁴ There the obvious resemblances end. Petty was born to a Hampshire clothier; he became famous as a physician and then rich thanks to his survey. A self-made man, he was also a not notably pious defender of religious toleration. Foley, thirty-two years younger, was the Irish-born son of a wealthy gentleman; a firm defender of the established church, he ended his career as bishop of Down and Connor. In scientific matters, moreover, Foley was an amateur; aside from the ‘Computatio’ his communications to the Dublin Philosophical Society comprised a handful of detailed but rather anodyne natural-historical observations: descriptions of the Giant’s Causeway, a paper on formed stones or fossils, and an ‘anatomy of a large garden bean’.¹⁵ Yet it will be argued here that the ‘Computatio’ was, no less than earlier and grander projects, an application of science to problems of colonial rule. Where others manipulated the land and bodies of the colonised, however, Foley pursued a programme of elite self-regulation through the quantitative stewardship of wealth and time. Foley’s use of quantification thus highlights connections between natural and social inquiry as well as ties of much longer standing, in a specifically Irish context, between individual self-government and the maintenance of a colonial elite.

The full title of the paper read to the Dublin Society on 9 June 1684 was ‘Computatio universalis seu logica rerum: being an essay attempting in the geometrical method to demonstrate a universal standard whereby one may judge of the real value of everything in the world’. Petty liked it, and from its title one is tempted to assume that this reflected sympathy with Foley’s pursuit of a fundamental measure of value, something Petty himself had attempted in his economic writings of the 1660s, or else with the idea of ‘Geometrical Justice’, which he had hinted at in a mixed mathematical work of 1674.¹⁶ While Petty fretted over the relationship between land and labour with reference to policy, however, Foley took a very different tack. His design, he wrote, was ‘to put men into a right method of good husbandry, and by showing them how to compute their time and riches, and to compare them with other things, to assist them to procure as much happiness as is procurable by them.’¹⁷ If Petty saw calculation as a tool for states, Foley presented it as a means of individual self-government, aiming not at power or profit but at happiness.

The path to happiness was an exhaustive and inventive method of accounting for time, which Foley elaborated in a series of definitions, postulates, axioms, propositions, and problems. He defined his project in terms of the amount of time fully within an individual subject’s control – that

¹⁴ For more biographical details, see entries in the *Oxford Dictionary of National Biography* and the *Dictionary of Irish Biography*; see also Hoppen, *Common scientist*, pp 38–9, 122–3.

¹⁵ *P.D.P.S.*, i, 166–70, 179–88. The paper ‘Of formed stones’ (*P.D.P.S.*, i, 179–83) shows familiarity with the views of Robert Hooke, Martin Lister, Robert Plot, and John Ray (all fellows of the Royal Society), as well as their Danish contemporary Nicolas Steno.

¹⁶ St George Ashe to William Musgrave, 22 Sept. 1685, in *P.D.P.S.*, ii, 587; William Petty, *A treatise of taxes and contributions* (London, 1662), pp 20–8; idem, *The discourse made before the Royal Society the 26th of November 1674. Concerning the use of duplicate proportion in sundry important particulars* (London, 1674), sig. A10v–A12r.

¹⁷ *P.D.P.S.*, i, 170.

is, the number of uncommitted waking hours a fully rational man (for man it was) could expect to have at his disposal over the course of a normal life. Foley's definitions of wealth and happiness referred back to this fundamental constraint: wealth, for instance, was what a man was 'master of' in this period, while happiness comprised 'all the ease and satisfactions and pleasures' he could voluntarily stuff into it.¹⁸ A man was wise or foolish in direct proportion to his resolution to maximise the happiness he could attain within the time allotted, given the resources at hand.

Benjamin Franklin might have stopped there, but Foley realised that concrete solutions required postulating 'some determinate number of years' as 'the age of man', and 'some determinate sum of money' as his estate.¹⁹ Here, the figures Foley supposed brought the intended audience for this moral science much more sharply into focus. First, Foley stipulated an average lifespan of 64.²⁰ He then subtracted time not under the individual's control: sleep (estimated at 18 years, 4 months); childhood before the age of reason (9 years); weekly and daily devotions (3 years, 8 months, 15 days and 13 hours); and illness ('at least' 11 months, 14 days and 11 hours). This left 32 years, or exactly half a life, as a man's true 'time'.²¹ As to estate, Foley imagined his evidently landed subject to enjoy 'an estate of inheritance of £120 per annum', or – subtracting the expenses of childhood, charity, sickness, food, lodging, and clothes – a total usable estate of £4940.²² These two figures determined the potential value of this man's happiness; wisdom was the skill to realise that potential.

Just as revealing were the particular 'pleasures and satisfactions' that Foley thought suitable to 'the different stages and periods of a man's life'; for though he allowed for differences of taste, neither the material requirements nor the overall content of happiness were subjective matters. Transposing more or less traditional divisions of life into his moral geometry, Foley assigned specific occupations to five distinct periods. The years from 9 to 16 should be spent in school (a time apparently devoid of other 'pleasures'); those from 16 to 25 in further learning, travel, and miscellaneous 'pleasures and exercises.' From 25 to 36 the wise man pursued, besides unspecified 'pleasures suitable', 'courtships'. Between 36 and 49 his focus should shift to 'Honours' and 'preferments', and the fifth and final period would hopefully produce 'Increasing of riches, power, and interest'.²³ Life's task was thus apportioning time and estate appropriately over each period, spending neither too long nor too much on the concerns of one age to the detriment of the others.

What Foley initially presented as a moral geometry of individual happiness – the title evoked Descartes's notion of a *mathesis universalis*, and the

¹⁸ Ibid.

¹⁹ Ibid., i, 171.

²⁰ The source of which is unclear; it may reflect the common notion of climacteric years marking transitions from one stage of life to another (the 'grand climacteric' was generally reckoned to be the sixty-third year). See Keith Thomas, *Religion and the decline of magic: studies in popular beliefs in sixteenth- and seventeenth-century England* (Oxford, 1997), pp 616–17.

²¹ *P.D.P.S.*, i, 172. I am grateful to my colleague, Norman Ingram, for the observation that the period allowed for devotions is roughly a tithe of the total amount of free time.

²² Ibid., i, 172–3.

²³ Ibid., i, 171.

presentation was reminiscent of Hobbes – thus emerged in use as a prescriptive guide to the life-cycle of a much more specific class.²⁴ The annual income of £120 Foley assumed was modest by aristocratic standards, but it was far from ordinary: the yearly stipend for a small ecclesiastical living in later seventeenth-century Ireland was closer to £30, while Toby Barnard describes an income of £40 as ‘a monetary qualification for gentility’.²⁵ Nor would men engaged in labour or trade have nearly so much of their waking life to themselves as Foley’s idea of happiness demanded. Inasmuch as rational calculation and freedom of action as well as substantial amounts of free time and disposable income were required for happiness, then, this was a science whose audience was leisured, propertied, adult and male. Reading the ‘Computatio’ in an Irish context and measuring Foley’s idea of happiness – which included honours, preferment, power and interest – against legal constraints on property, settlement and office-holding further limits that audience to the conforming Protestant elite.

But was there a specifically Irish, or colonial, context for the ‘Computatio’? In a narrow sense, of course, there clearly was: the security of the elite to which Foley belonged, and that of the church he served, ultimately rested on a still relatively recent English conquest and settlement. Both, further, would soon require yet another military invasion from England between 1689 and 1692 to assure their continuation – despite Foley’s fleeting efforts in 1688 to market himself as a potential guarantor of Irish Protestant loyalty to James II’s cause.²⁶ The Dublin Philosophical Society itself – overwhelmingly Protestant and tight-knit in its membership, even by the standards of the time – was one manifestation of this colonial elite’s attempt to construct an associational culture, partly in emulation of English developments (most obviously the Royal Society), and partly with a view to facilitating the knowledge and exploitation of Irish resources; the society furnished both a venue for discussions of improvement and a model for later ascendancy institutions.²⁷

²⁴ Descartes proposed a *mathesis universalis* in rule four of his *Rules for the direction of the mind* (composed c.1628); see René Descartes, *The philosophical writings of Descartes*, ed. and trans. John Cottingham, Robert Stoothoff, and Dugald Murdoch (2 vols, Cambridge, 1985), i, 19. There he describes mathematics as essentially concerned with ‘questions of order or measure’, and *mathesis universalis* as a ‘general science’ of order and measure ‘irrespective of the subject-matter’. By analogy, *computatio universalis* would be a generalised practice of calculation. Hobbes observed in the epistle dedicatory to *De cive* (1642) that ‘whatever distinguishes the modern world from the barbarity of the past ... is almost wholly the gift of *Geometry*’, and that ‘If the moral Philosophers had done their job with equal success, I do not know what greater contribution human industry could have made to human happiness.’ Thomas Hobbes, *On the citizen*, ed. and trans. Richard Tuck and Michael Silverthorne (Cambridge, 1998), pp 4–5.

²⁵ Toby Barnard, *A new anatomy of Ireland: the Irish Protestants, 1649–1770* (New Haven, 2003), p. 59.

²⁶ Samuel Foley to Robert Foley, 4 Oct. 1688, (B.L., Add. MS 63093, ff 1–4).

²⁷ James Kelly and Martyn J. Powell, ‘Introduction’ in James Kelly and Martyn J. Powell (eds), *Clubs and societies in eighteenth-century Ireland* (Dublin, 2010), pp 25–8. See Patrick Walsh, ‘Club life in late seventeenth- and early eighteenth-century Ireland: in search of an associational world, c.1680–c.1730’ and Toby Barnard, ‘The Dublin Society and other improving societies, 1731–1785’, both in Kelly & Powell (eds), *Clubs*

At the very least, then, Foley's project emanated from a distinctly Irish colonial social and political milieu.

On the other hand, Foley signalled no overtly colonial purpose either in the text of the 'Computatio' or in the cover letter that accompanied it to the Royal Society, where it was read in December 1685 (having been read in Oxford two months earlier). To the contrary, the letter spoke only of 'how the Common concerns of mankind would look in a Geometrical Dresse' and even invited 'others of a more happy genius', presumably in London or elsewhere, to push the idea farther.²⁸ If one can judge the project's reception from its circulation and publication history, there is little to suggest that English readers understood it as anything other than an idiosyncratic exercise in mixed mathematics. Indeed, it was neither the first attempt to apply the idea of *mathesis universalis* to moral philosophy nor the deepest – though in its form and brevity it may have been the most practice-oriented.²⁹ Despite some suggestion that it should, the 'Computatio' never appeared in the *Philosophical Transactions*.³⁰ It was, however, printed posthumously – and without Foley's name – in 1697 by James Moxon, son and heir of the scientific printer and sometime fellow of the Royal Society, Joseph Moxon.³¹ The younger Moxon said nothing that survives about how or why the edition came about, but he printed several other works of mixed mathematics and mechanics at around the same time, so it seems logical to conclude that Foley's work fit that profile.³²

If Foley's project was in principle universal, however, so was Petty's political arithmetic; that does not explain why he created it when and where he did, or what specific problems he meant it to solve. Similarly, although Foley's definitions might in principle be applied to much lesser amounts of time and wealth than those he stipulated in his example, it has been noted above that his account of the specific occupations suitable to each age of man were fixed parts of his scheme rather than values assigned to variables: they were evidently inflexible. Even setting the details of time and income aside, in other words, there can be little doubt that the subject Foley envisioned – an educated subject able to travel, pursue honours and preferment, and enjoy hunting and hawking – was a member of the elite. And the elite Foley knew best, and to which he presented his work first, was Ireland's. As I shall argue below, there are other reasons for thinking that Foley had Irish problems in mind; but his own situation furnishes at least circumstantial evidence.

and societies, pp 36–49 and 53–88 respectively. But Hoppen, *Common scientist*, downplays the colonial import of the Dublin Philosophical Society.

²⁸ Samuel Foley to the Royal Society, [c. 22 Sept. 1685] (R.S.L., EL/F2/1). The letter is printed in *P.D.P.S.*, ii, 587–8 (the date is Hoppen's suggestion).

²⁹ See Jon Parkin, *Science, religion and politics in Restoration England: Richard Cumberland's De Legibus naturae* (Woodbridge, 1999), p. 151.

³⁰ See St George Ashe to William Musgrave, 22 Sept. 1685, in *P.D.P.S.*, ii, 587, n. 1.

³¹ [Samuel Foley], *Computatio universalis*.

³² These included Venterus Mandey and James Moxon, *Mechanick-powers: or the mystery of nature and art unvail'd* (London, 1696); Roger Palmer, earl of Castlemaine, *The English globe* (2nd ed., London, 1696); René Descartes, *The use of the geometrical playing-cards, as also a discourse of the mechanick powers* (London, 1697); Joseph Moxon, *Mechanick dialling* (London, 1697); idem, *A tutor to astronomy and geography* (5th ed., London, 1698); Thomas Savery, *Navigation improv'd* (London, 1698).

If it is plausible that Foley should have written with his own sort of people in mind, the obvious question is what he thought his moral geometry might do for, or to, them – not just as individuals but also as a class. Unfortunately, he left behind no substantial archive that might offer an explicit answer; other than his few papers for the Dublin Philosophical Society, a handful of letters, a fragment of a diary and a few printed sermons are almost all that survive. Nor, aside from Petty's apparent approval (reported only at second hand), did Foley's project elicit much comment from those who heard or read of it. His few surviving sermons thus furnish the most helpful material available for assessing the place of the 'Computatio' in relation to his own and his contemporaries' outlook on Irish matters. Two in particular, one delivered in Dublin in 1683, the year before the 'Computatio' was read, and the other in 1695, following Foley's elevation to the see of Down and Connor, give some insight into the role Foley might have envisioned for a mathematical moral science in the context of a colonial, Protestant landowning elite.

Foley preached the first sermon to an assembly of clergymen on the occasion of Archbishop Marsh of Dublin's primary visitation.³³ His scriptural text was 1 Timothy 4:16: 'Take heed unto thy Self, and to thy Doctrine'; speaking in the wake of the Popish Plot and Exclusion Crisis, Foley counselled moderation and instructed clergy on the conduct and demeanour suitable to their situation. He began by explicating what it meant to 'take heed': to give one's mind wholly to something. This implied – and citations from ancient Stoics (as described in Plutarch) and modern humanists (Beza, Erasmus, Grotius) confirmed – a responsibility to consider only those objects worthy of such attention.³⁴ For the clergy, the first object of concern should be 'That our Lives be holy and vertuous, and our Behaviour innocent and blameless'.³⁵ There were two reasons for this, both relating to the priest's social station. First, Foley argued that given both the nature of their profession and in particular the time this placed at their disposal, clergymen were 'obliged to a greater proportion of Piety and Vertue than other men'.³⁶ Second, the exemplary role assigned to them meant that failure to live good lives would not only invalidate their own efforts but also lead others astray.

The 'ill Effects' of 'bad Lives' thus went beyond matters of private morality to social stability and even external security.³⁷ Addressing the threat of religious scepticism, Foley warned that any breach of clerical decorum invited the criticism that 'all Religion is but a mear Cheat, and a sort of Engin to keep the World in Order'.³⁸ But he then combed Britain's distant colonial history – that is, its history as a *target* of conquest and colonisation – for more striking, and perhaps more pertinent, examples of the disastrous consequences of an ill-governed clergy: the Saxon incursions of the fifth century, the desolation and depopulation of Northumbria by the Danes in the ninth, and the Norman conquest of England in the eleventh could all be blamed at least in part on 'the Vanity, Lewdness, and Debauchery of their Priests'.³⁹ To any Protestant

³³ Samuel Foley, *A Sermon preached at the primary visitation of his grace Francis Lord Arch-Bishop of Dublin* (London, 1683).

³⁴ *Ibid.*, pp 2–4.

³⁵ *Ibid.*, p. 5.

³⁶ *Ibid.*

³⁷ *Ibid.*, pp 5–11.

³⁸ *Ibid.*, p. 8.

³⁹ *Ibid.*, p. 11.

audience in Restoration Ireland, mindful of 1641 and even now 'surrounded with multitudes of Enemies', as Foley put it, more recent experiences and more immediate threats would have been only too obvious.⁴⁰

Foley then turned to the clergy's preaching mission. Here, mirroring the arguments of contemporary Baconians against scholasticism, he asserted the primacy of 'matters which immediately tend to Practice', or '*Moral Doctrines*', as against the 'meerly Speculative' concerns of 'some *School-men*'.⁴¹ While he made no direct appeal to modern natural philosophy, he did approvingly quote the Stoic philosopher Seneca's description of philosophy as a guide for life focused on 'things' rather than 'words', a contrast central to Royal Society propaganda as well as to earlier Hartlibian educational reforms.⁴² (Seneca had also argued, as Foley's 'Computatio' presumed, that 'Each period of life has its own constitution'.)⁴³ Foley's advice to clergymen to avoid high-flown language, abstruse debates and the invocation of textual authorities, and instead to 'speak sober, strong, plain, and useful Sence', similarly echoed contemporaneous justifications of experimental method.⁴⁴ Like the truths of nature, those of scripture were best communicated in a straightforward manner, with reference to experience rather than learned authority, and with practical ends in view.

The second sermon was *An exhortation to the inhabitants of Down and Connor, concerning the religious education of their children*, printed not long before Foley's death in 1695.⁴⁵ Though the audience had changed, self-regulation, social utility and the responsibility of those with time and resources to set an example remained central, and echoes of scientific and improvement discourse still sounded. Foley preached the cultivation of practical skills and

⁴⁰ Ibid., p. 25.

⁴¹ Ibid., p. 13.

⁴² Ibid., p. 12. The contrast in Seneca, *Epistulae morales ad Lucilium*, xvi.3 is between 'verbis' and 'rebus', which modern translations sometimes render as 'words' and 'facts'; 'words' and 'things' is equally plausible and would have had an obvious resonance for Foley's audience. See Seneca, *Ad Lucilium epistulae morales*, trans. Richard M. Gummere (3 vols, Cambridge, MA, 1917), i, 105; Seneca, *Letters from a stoic*, ed. and trans. Robin Campbell (London, 1969), p. 64. Abraham Cowley, an early supporter of the Royal Society, included Seneca among the list of authors on nature to be read in his own ideal college for experimental learning (which would focus on 'Things as well as Words'); Abraham Cowley, *A proposition for the advancement of experimental philosophy* (London, 1661), pp 43, 46. On the broader point see also Joseph Glanvill, *Plus ultra: or the progress and advancement of knowledge since the days of Aristotle* (London, 1668), p. 89, and Petty's earlier proposal for 'ergastula literaria' in William Petty, *The advice of W. P. to Mr. Samuel Hartlib for the advancement of some particular parts of learning* (London, 1648), pp 3–4. For the Stoic outlook on which Foley draws, see Pierre Hadot, *Philosophy as a way of life: spiritual exercises from Socrates to Foucault*, ed. Arnold I. Davidson and trans. Michael Chase (Oxford, 1995), pp 82–6.

⁴³ Quoted in Genevieve Lloyd, *Providence lost* (Cambridge, MA, 2008), p. 93.

⁴⁴ Foley, *Sermon*, p. 18. Compare for example Thomas Sprat, *The history of the Royal-Society of London, for the improving of natural knowledge* (London, 1667), pp 111–13. Sprat himself (p. 371, erroneously paginated as '363' in the first edition) presented the Royal Society and the Church of England as engines of parallel reformations, 'the one having compass'd it in *Religion*, the other purposing it in *Philosophy*'.

⁴⁵ Samuel Foley, *An exhortation to the inhabitants of Down and Connor, concerning the religious education of their children in general; and particularly in order to their being confirmed* (Dublin, 1695).

moral habits in children, alongside – indeed, above – the improvement of estates for their inheritance. And just as the clergy had more opportunity for moral reflection and thus a greater obligation to live exemplary lives, so those with means had the duty ‘to reform the World’ by educating their children to be ‘useful and happy’ and by modelling good habits themselves.⁴⁶ These included time management. Foley inveighed against ‘keeping ill hours’ as inimical to bodily health and happiness.⁴⁷ Day or night, meanwhile, idleness was an open door to libertinism and atheism. Men were given time not merely to pass but to employ, and like unimproved land, wasted time did not lie empty but bred weeds, enemies to virtue and order.⁴⁸ It also risked divine censure. The antediluvian patriarchs’ longevity reflected ‘their great piety and goodness’; after the Flood, ‘the age of men was shortned, for their sins’.⁴⁹ Improving time was as much a religious as a moral, social and political duty. Its neglect could have disastrous consequences in each of these realms.

The evidentiary import of all this for interpreting the ‘Computatio’ is circumstantial, but it is nevertheless indicative of the role that moral geometry might play in the Restoration Irish context from which Foley’s project emerged. In this context, Foley’s sermons suggest that an educated, conforming Protestant elite bore the responsibility not only for its own self-preservation and the effective maintenance of English rule but also for setting a moral example for the rest of the population – including nonconformists and the less well off, but perhaps also the Catholic majority that surrounded and threatened them all. Foley apparently conceived this collective moral responsibility, further, as directly proportional to the relative material advantages – the wealth and the time – that the conforming elite enjoyed. If this elite was indeed the intended audience for the ‘Computatio’, then that project looks like a fairly straightforward attempt to operationalise the moral programme Foley outlined in his sermons by means of a new, practical, philosophical technology. This technology would then become a sustaining feature of a renewed colonial moral order.

Of course, Foley’s concern with the stewardship of wealth and time was far from unique. In fact, both his concern with education and exemplarity and his recourse to Stoics like Seneca and moderns such as Erasmus, put Foley’s moral outlook close to what Margo Todd has identified as a Christian humanist tradition of moral reformism.⁵⁰ In this line of thought, which Todd further sees as connecting northern humanism with the ‘puritanism’ of the Hartlib circle, careful discrimination in the apportionment of charity (counterpoised to an indiscriminate liberality associated with the medieval church and the theology of works) is but the most obvious instance of a more general concern with the responsible, rational management of time and estate. Indeed, Foley’s own puritan relations in England exemplified these concerns, and had moreover climbed by their own industry (in ironworking, mining and related manufactures) to landed status, with estates in Worcestershire, Herefordshire,

⁴⁶ Ibid., p. 7. This duty did not extend here, at least, to the direct government of other people’s children, as with the later charity-school movement. See note 63 below.

⁴⁷ Ibid., p. 16.

⁴⁸ Ibid., p. 26.

⁴⁹ Ibid., p. 19.

⁵⁰ Margo Todd, *Christian humanism and the Puritan social order* (Cambridge, 1987), *passim*.

and Staffordshire.⁵¹ Yet while Foley's emphasis on management or stewardship is of a piece with this tradition, and his yoking of scientific method to moral reform at least compatible with it, the nature and purposes of his project diverge from Todd's 'Puritan' moral tradition (as well as from the Calvinist ethic made famous by Max Weber) in striking ways. Crucially, what Foley proposed was not a universal pattern of stringent piety; it was an elite programme of worldly self-cultivation.

The difference is readily apparent if we set Foley's project alongside an earlier Anglo-Irish essay on the management of time, from a pen associated both with the Hartlib circle and with the Royal Society. In 'Of Time and Idleness', completed before January 1650, Robert Boyle had emphasised that time, like money, was not merely given to be spent but to be 'improved'; unlike money, on the other hand, it could neither be deposited for later use nor recovered once lost. As Foley later would, Boyle advocated both a 'calling' suitable to one's station and the acquisition of practical skills as antidotes to idleness. And most suggestively, Boyle also proposed a science of time management – or, as he put it, 'a way, how by a handsom contrivance, these vnegarded scraps of Time, may be improved to some Profitable vse'.⁵² But he meant by this a template for directing one's thoughts, not planning one's life. Though technically of aristocratic stock, further, Boyle was far too pious to condone the sorts of gentlemanly 'pleasures' Bishop Foley made space for: 'innocent diversions, conversation, balls, plays, drinking, gaming, hunting, hawking, and the like.'⁵³ What a waste of time!

Closer in situation and arguably in spirit to Foley were English economic writers. For many of these, idleness was as much a social and geopolitical as an individual problem, which a combination of industry, social policy and educational reform might solve. For many of them, too, Ireland was an area of particular interest and frustration: a place where personal habits, cultural integrity, and the security of the state were visibly bound together, and where new technologies of reform might find profitable use. In a work written in 1601 but reprinted in 1664, on the eve of the Second Anglo–Dutch War, John Keymor contrasted the tireless industry of Dutch fishermen with the English and Irish, who sold their fish and then repaired 'to the Alehouse, drinking day and night, till all be spent, and they in debt, and can be no longer trusted, and then to Sea again for more'.⁵⁴ In his 1668 *Brief observations concerning trade*, East India Company author Josiah Child linked Dutch habits directly to childhood education in mathematics, which 'improve[s] the Rational Faculties' and 'inclines those that are expert in it to thriftiness and good Husbandry'.⁵⁵ Roger Coke's 1671 *Reasons of the increase of the Dutch trade* made the same point.⁵⁶ And in 1673 William Temple published both his

⁵¹ M. B. Rowlands, 'Foley family (*per. c.* 1620–1716)', in *Oxford D.N.B.*

⁵² Boyle, 'Of time and idleness' in *idem, Early essays and ethics of Robert Boyle*, ed. John T. Harwood (Carbondale, IL, 1991), pp 237–48; quotations at pp 237, 241, 244. See Boyle, 'The doctrine of thinking' in *ibid.*, pp 185–202.

⁵³ Foley, 'Computatio', p. 171. Cf. Boyle, 'Time', pp 238–40.

⁵⁴ John Keymor, *John Keymors observation made upon the Dutch fishing, about the year 1601* (London, 1664), p. 10.

⁵⁵ Josiah Child, *Brief observations concerning trade, and interest of money* (London, 1668), pp 4–5.

⁵⁶ Roger Coke, *Reasons of the increase of the Dutch trade* (London, 1671), p. 107.

detailed *Observations on the United Provinces* and a pamphlet *Essay on the advancement of trade in Ireland*, both of which took the natural origins and political cultivation of industrious habits – habits the Dutch had and the Irish lacked – as their central focus.⁵⁷

The most famous ‘economist’ of them all, William Petty, shared similar concerns. Yet he gave them a twist that at once casts Foley’s project in a more distinctly Irish and a less narrowly secular light. Like Temple, Petty explained Irish idleness in naturalistic rather than moral or ethnic terms; an underpopulated nation whose economic potential was warped by English protectionism could hope for little else. Still, Catholicism didn’t help. As Petty calculated in *The political anatomy of Ireland* (printed in 1690 but circulating in manuscript since the early 1670s), Catholic holy days meant that while Protestants in the country worked 300 days a year, Catholics worked for a mere 266. This was an economic problem. Combined with the considerable number of Catholic clergymen – who were not only unproductive but actually leeches off the labours of others – the cost was about £300,000 per annum.⁵⁸ But this was also a political problem. In a 1685 manuscript ‘Concerning Papists & Protestants’, Petty argued that papal authority over marriages and holidays effectively transferred control of the nation’s health and wealth to a hostile foreign power. Dietary regulations could ‘destroy the health & Gen[er]acion of Mankind’, while ‘forbidding Labour upon the daies which [the Pope] calls holy... can impoverish any Common-wealth’.⁵⁹ The moral regulation of time and expenditures was a double-edged sword.

In this light, Foley’s proposal can be read against the backdrop of several interrelated and chronologically overlapping metropolitan struggles. One, linked to the Restoration economic writing just surveyed – as well as to the Hartlibian improvement projects of the Interregnum – was a struggle for the economic development of Ireland in the context of an expanding English empire, on one hand, and English rivalries with the Dutch and the French, on the other. In this setting, the management of time and wealth could be understood as an economic prerogative of the state and an essential component of international competition. Yet here one must recall Foley’s focus not on profit but on happiness; though it might be regulated (and even valued in monetary terms) down to the minute, Foley’s time was *not* productive ‘work time’, but the opposite.⁶⁰ This was not, yet, a Protestant ethic that embraced the spirit of capitalism.

Another struggle, more prominent from the 1690s (when the ‘Computatio’ finally saw print) was the Low Church Anglican and moderate dissenting push for the moral reformation of the people at large, associated in particular with the emergence of various societies for the ‘reformation of manners’. A metropolitan programme that generated Irish imitations, this movement involved ordinary laymen in a systematic effort of self-regulation, communal

⁵⁷ William Temple, *Observations on the United Provinces of the Netherlands* (London, 1673); William Temple, *An essay on the advancement of trade in Ireland* (Dublin, 1673).

⁵⁸ William Petty, *The political anatomy of Ireland* (London, 1691), pp 118, 122.

⁵⁹ William Petty, ‘An appendix concerning papists & Protestants’, 1685 (B.L., Add. MS 72888, ff 18–20, at f.20r).

⁶⁰ Compare E. P. Thompson, ‘Time, work-discipline and industrial capitalism’, in idem, *Customs in common: studies in traditional popular culture* (New York, 1993), pp 352–403.

surveillance and policing, and public prosecution through the civil courts.⁶¹ In England, further, the societies' activities involved the use of rudimentary quantification – statistics on numbers of miscreants arrested and prosecuted were routinely annexed to the London Society for the Reformation of Manners's annual sermon – as a gauge of moral improvement.⁶² Yet here, too, Foley's 'Computatio' is a worse fit on close inspection than it initially might seem. The 'Computatio' was explicitly and exclusively a tool of self-cultivation and self-regulation; it might enshrine a set of common expectations, but these were presented as reflecting the details of individual lives and estates, and their pursuit was a matter of individual responsibility. Whatever Foley might have thought about the societies for the reformation of manners (he barely lived to see them) or later projects for social amelioration such as the charity school movement, the 'Computatio' was not an instrument for governing populations from above but a tool for elite cultivation from within.⁶³

A third and older struggle, however, seems more closely related both to Foley's concerns and to Ireland's problems. This was the confessional struggle between English and Roman churches for moral authority, for the power to instil patterns of secular behaviour and allegiance as well as doctrines of religious belief. This struggle had geopolitical and indeed bio-political dimensions. In Ireland, it was also inescapably bound up with a lengthy history of colonisation, a history in which the self-regulation of the Restoration Protestant elite – their maintenance of English morals, habits and patterns of life – bore a deep and specific meaning. The Old English, the Catholic predecessors of Boyle's, Foley's and Petty's Protestant elite, had failed in their civilising mission precisely by letting slip their identities and donning the habits – literally and figuratively – of the 'mere' Irish around them. They had thus, as countless authors put it, 'degenerated'.⁶⁴ Petty's

⁶¹ Toby Barnard, 'Reforming Irish manners: the religious societies in Dublin during the 1690s' in idem, *Irish Protestant ascents and descents, 1641–1770* (Dublin, 2004), pp 143–78.

⁶² Shelley Burt, 'The societies for the reformation of manners: between John Locke and the devil in Augustan England' in Roger D. Lund (ed.), *The margins of orthodoxy: heterodox writing and cultural response, 1660–1750* (Cambridge, 1995), pp 149–69, at p. 153. See also Shelley Burt, *Virtue transformed: political argument in England, 1688–1740* (Cambridge, 1992); W. M. Jacob, *Lay people and religion in the early eighteenth century* (Cambridge, 1996). On the provincial impact of the movement, particularly in giving clergymen a place in the discourse of improvement, see Livesey, *Civil society and empire*, pp 54–89, especially pp 81–2.

⁶³ On charity schools as means of governing the poor, see Donna T. Andrew, *Philanthropy and police: London charity in the eighteenth century* (Princeton, 1989); but cf. Jeremy Schmidt, 'Charity and the government of the poor in the English charity-school movement, circa 1700–1730' in *Journal of British Studies*, xlix, no. 4 (Oct. 2010), pp 774–800, which locates charity schools in an economy of paternal duty and Christian reciprocity that Foley would doubtless have recognised. On charity schools in Ireland, see Karen Sonnelitter, "'To unite our temporal and eternal interests": sermons and the charity-school movement in Ireland, 1689–1740' in *Eighteenth-Century Ireland/Iris an dá chultúr*, xxv (2010), pp 62–81. While Foley would have sympathised with their goals, his enterprise was a different one.

⁶⁴ On the theme of degeneration in the context of Irish plantation, see Nicholas Canny, *Making Ireland British, 1580–1650* (Oxford, 2001); John Patrick Montaña, *The roots of English colonialism in Ireland* (Cambridge, 2011).

transmutation scheme promised to prevent degeneration by inscribing English culture on the ‘white paper’ of Ireland’s newly conquered population. Foley’s ‘Computatio’, which stamped a lifelong plan of improvement on the blank slate of individual conscience, might do similar work by focusing upon the social stratum degeneration threatened most: the English Protestant ruling elite.

This leaves us to account for the differences between their principal objects: for while Petty worked on the level of state-directed social engineering, and others on agricultural improvements, manufacturing projects, or mercantile policy, Foley’s chosen medium for the promotion of reform was the conscience of a class of individuals.⁶⁵ This may in part have reflected his pastoral role. In this connection it is interesting to consider his adaptation of geometry to morals as an ecclesiastical counterpart to the adoption of mixed mathematics and quantification in other areas of politics and public life in the same era, from artillery and fortifications to surveying and taxation schemes, but including other moral and religious uses of numbers such as in the London Society for the Reformation of Manners’s sermons noted above. Rather than the state inheriting the pastoral power of the church, as secularisation narratives often have it, we here see state and church alike transformed by quantitative reasoning and the reconceptualisation of nature – including populations and their consciences – as a bundle of resources to be mastered and maximised.

Two further observations, however, suggest themselves. One is that the government of individual and collective time, and to a lesser extent the regulation of personal expenditure, had long been a preserve of the church.⁶⁶ Though Foley used the language of improvement, he not only distinguished between the improvement of an estate and that of a life but also indicated that economic and moral utilities might well clash. As long as human existence was structured around the individual milestones of birth, marriage and death and the collective trajectory that led from Creation through the Fall to the Last Judgment, the arbitration of time could never be a wholly secular concern. To the extent that the regulation of expenditure was bound up with Protestant revisions to the theology of works, the same might perhaps be said for the apportionment of disposable income. Real reformation, including the moral regeneration needed to stave off degeneration in Ireland, could not simply be imposed by the state, much less left to nature. Despite – or even because of – its failure to convert the Catholic Irish, the Church of Ireland had an essential role to play in English rule.

A second point is that in a sense Foley’s scheme, despite its mathematical dress, simply renewed a complaint as old as Irish plantation, namely that the planter elite was not doing its job, that a new start, a new method, and a new

⁶⁵ It is possible to overdraw this distinction. Even the most overt cases of intervention from above might have other dimensions. Hartlib, for example, saw the Down Survey as a means of educating soldiers in mathematics and hence of ‘improving’ their ‘numbers and hands’; it was with reference not to the land transfers the survey underwrote but to its improvement of these *agents* of colonisation that he spoke of Petty’s effort, in positive terms, as a ‘Political Contrivance’. See Hartlib, *Ephemerides*, 1655, part 4 (13 Aug.–31 Dec.), *H.P.* 29/5/43b.

⁶⁶ See Jacques Le Goff, ‘The time of purgatory (third to thirteenth century)’ in *idem*, *The medieval imagination*, trans. Arthur Goldhammer (Chicago, 1988), pp 67–77, at 75.

resolve were needed. Foley's imaginary future of happy, useful, exemplary Protestants bestowing time and money on the right objects, in the right amounts, and at the right moments may put us in mind of the bourgeois virtues and private moral accounting extolled by Benjamin Franklin.⁶⁷ Following Reinhart Koselleck's periodisation of the concept of progress, further, Foley's apparent attempt in the 'Computatio' to plan and shape future time around secular goals, linked as it was to a practical view of natural philosophy, looks precociously modern, as does, in more Foucauldian terms, its overt and putatively totalising regulation of life's various pleasures.⁶⁸ Yet as moral exemplars these imaginary Protestants were genealogically linked not only to Petty's add-water-and-stir colonial households but also, more directly, to the beacons of Protestant virtue and English civility envisioned by Elizabethan humanists such as Edmund Spenser. As far-fetched as Foley's newfangled geometrical language might seem, his utopianism was that of a larger and older, moral and colonial project.

⁶⁷ Franklin describes his 'Project of arriving at moral Perfection', which involved a tabulation of virtues to work on by days of the week, in part two of his *Autobiography*; see Benjamin Franklin, *The autobiography and other writings on politics, economics, and virtue*, ed. Alan Houston (Cambridge, 2004), pp 68–75.

⁶⁸ Reinhart Koselleck *The practice of conceptual history: timing history, spacing concepts*, trans. Todd Samuel Presner and others (Stanford, 2002), pp 218–35; Michel Foucault, *The will to knowledge: the history of sexuality, volume 1*, trans. Robert Hurley (London, 1978), pp 133–59.