

## Concepts of Invention and the Patent Controversy in Victorian Britain

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In 1827 Samuel Crompton, inventor of the spinning mule, died impoverished and was buried in an unmarked grave. In 1833 Richard Trevithick, pioneer of high-pressure steam and the locomotive, was spared the indignity of a pauper's funeral only by the generosity of his fellow workmen. Yet in 1859 Crompton was not only celebrated in a full-length biography, but his biographer, Gilbert French, also raised a subscription of £200 for a monument over his grave in Bolton churchyard and a further £2,000 for a copper-bronze statue, formally presented to Bolton town council, with much pomp and circumstance, in 1862. And in 1883, by public subscription, a Trevithick memorial window was installed in the north aisle of Westminster Abbey, and a Trevithick engineering scholarship was endowed at Owens College, Manchester.<sup>1</sup> The heroic inventor penetrated yet further into the cloisters of academe. Christ's College, Cambridge, when glazing its new dining hall in 1879, chose to celebrate William Lee, the late-sixteenth-century inventor of the stocking-knitting frame. His precise academic pedigree is still disputed between Oxford and Cambridge, and it is not certain that he attended either.<sup>2</sup> Nonetheless, Christ's claimed Lee as its

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<sup>1</sup> Leslie Stephen (ed.), *Dictionary of National Biography* (London: Smith, Elder & Co., 1885–1903), “Samuel Crompton (1753–1827)”, “Richard Trevithick (1771–1833)”; Gilbert French, *The Life and Times of Samuel Crompton, Inventor of the Spinning Machine Called the Mule* (London and Manchester, 1859); Michael E. Rose, “Samuel Crompton (1753–1827), inventor of the spinning mule: a reconsideration”, *Transactions of the Lancashire and Cheshire Antiquarian Society* (1965), 75: 11–32.

<sup>2</sup> Science Museum Library, London [SML], Bennet Woodcroft MSS, Z27/B, ff. 227, 229; and see below, note 5.

own, so there he stands, holding a model of the knitting frame, amidst the statesmen and assorted intellectuals who fill the other panes. These are probably the most spectacular instances of a phenomenon that marks out the second half of the nineteenth century as an exceptional period when inventors, most of them long dead and neglected in their lifetimes, were elevated to heroic status.

Invention had remained a largely anonymous enterprise before the mid-nineteenth century. The merits of rival claimants to priority of invention had been disputed in industrial histories, such as Baines's *History of the Cotton Manufacture in Great Britain* (1835) and Ure's *The Cotton Manufacture of Great Britain* (1836), which pursued the often vituperative debate over Richard Arkwright's reputation.<sup>3</sup> Arkwright and James Brindley were deemed worthy of a chapter each in a Smilesean anticipation, Richard Davenport's *Lives of Individuals Who Raised Themselves from Poverty to Eminence or Fortune* (a title with rather less panache than *Self Help*), but little was made of their respective inventions; both, as heroes "in an existential struggle with nature", attracted the brief notice of Thomas Carlyle in the early 1840s.<sup>4</sup> The tale of William Lee's invention had entered the folklore of the East Midlands hosiery districts and was repeated, with variations of emphasis and embroidery, by local historians during the eighteenth and nineteenth centuries; in 1847 he became the subject of a romantic genre painting.<sup>5</sup>

With the exceptions of James Watt and Edward Jenner, however, no British inventor or engineer had been the individual subject of a monograph before the

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<sup>3</sup> Edward Baines, Jr., *History of the Cotton Manufacture in Great Britain* (London, 1835); Andrew Ure, *The Cotton Manufacture of Great Britain* (2 vols., London, 1836). For a full account of this debate, see David J. Jeremy, "British and American entrepreneurial values in the early nineteenth century: a parting of the ways?", in R.A. Burchell (ed.), *The End of Anglo-America. Historical Essays in the Study of Cultural Divergence* (Manchester and New York: Manchester University Press, 1991), pp. 34–9. For similar disputes over James Watt, see Hugh Torrens, "Jonathan Hornblower (1753–1815) and the steam engine: a historiographic analysis", in Denis Smith (ed.), *Perceptions of Great Engineers. Fact and Fantasy* (London: The Science Museum, 1994), pp. 23–34.

<sup>4</sup> Richard Alfred Davenport, *Lives of Individuals Who Raised Themselves from Poverty to Eminence or Fortune* (London: Thomas Tegg, 1841); Carlyle is quoted in Simon Dentith, "Samuel Smiles and the nineteenth-century novel", in Smith (ed.), *Perceptions of Great Engineers*, pp. 52–3.

<sup>5</sup> Felkin's *History of the Machine-wrought Hosiery and Lace Manufactures*, ed. S.D. Chapman (Newton Abbot: David & Charles, 1967), pp. 26–38, 51; James H. Quilter and John Chamberlain, *Frame-work Knitting and Hosiery Manufacture* (3 vols., Leicester: "Hosiery Trade Journal", 1911), vol. 1, p. 2.

1850s.<sup>6</sup> In 1845 Crompton's grandson wrote to Lord Brougham to request that he include his grandfather in the new biographical dictionary being published under Brougham's auspices. A similar request to the editor of Rose's *Biographical Dictionary*, said Crompton, had been ignored, and literary men in general were unwilling "to consider particulars of the life of a man who left no writings behind him, who was a member of no scientific society and (which is the greatest failing in the eyes of Englishmen) who bequeathed no wealth to his family". Even eminent writers, he complained, were astonishingly ignorant about inventors: Alison, in his history of the French Revolution, had attributed the mule to Arkwright and the jenny to Cartwright.<sup>7</sup> The situation was well summarized by a reviewer of Smiles's *Industrial Biography* in 1863: "Mr Smiles rescues no name, but many histories, from oblivion. His heroes are known and gratefully remembered for the benefits they have conferred on mankind, but our knowledge of our benefactors has hitherto been mostly confined to our knowledge of the benefit".<sup>8</sup>

Crompton's complaints were soon addressed by the outpouring of hagiographic lives of inventors, commemorative plaques, and statues during the next few decades. Yet the heyday of the inventor was short-lived. He quickly returned to anonymity. By the time of Trevithick's exaltation in Westminster Abbey, in 1883, interest was beginning to wane. Successful inventors, engineers, and scientists of the later nineteenth century, such as Sir Charles Parsons, William Siemens, and Lord Kelvin, were recognized in their own time with honours from the state, the universities, and professional bodies, and, shortly thereafter, by that ultimate accolade — a place in the *Dictionary of National Biography*. But their posthumous popular fame is slight. It seems that everyone knows the name of

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<sup>6</sup> Watt had been celebrated in D.F.J. Arago, *Eloge historique de James Watt* (Paris, 1834), which was translated into English twice in 1839. For early biographical notices of Watt, see Torrens, "Jonathan Hornblower". Jenner's biography, by John Baron, was written at the request of his family: W.R. Lefanu, *A Bio-bibliography of Edward Jenner, 1749–1823* (London: Harvey & Blythe, 1951), p. 149; for earlier short notices and later biographies, see *ibid.*, pp. 143–50. Thomas Telford had been persuaded to write an autobiography, published posthumously as *The Life of Thomas Telford, Civil Engineer, written by Himself*, ed. John Rickman (London, 1838).

<sup>7</sup> University College, London [UCL], Brougham MSS 32,998. The references are to *A New General Biographical Dictionary, Projected and Partly Arranged by Hugh James Rose, B.D.* (12 vols., London, 1848); Sir Archibald Alison, *History of Europe during the French Revolution* (10 vols., Edinburgh: W. Blackwood; London: T. Cadell, 1833–42).

<sup>8</sup> *Edinburgh Daily Review*, reprinted in an advertisement for *Industrial Biography. Iron Workers and Tool Makers* (London, 1863), in the endpapers of Samuel Smiles, *Lives of the Engineers. The Locomotive. George and Robert Stephenson* (London: John Murray, 1877). Smiles himself, reviewing a new biography of Watt in 1858, commented on the dearth of biographies of "distinguished inventors": see *Quarterly Review* (1858), 104: 411–51, on p. 411.

the inventor of the separate condenser (even though most are vague about exactly *what* Watt invented); few, however, know the name of the steam turbine's inventor. The heroic account of invention had been securely established and earlier cohorts of inventors rescued (selectively) from obscurity; ironically, Parsons's generation was ignored by the popular biographers.

This neglect of the great figures of late-nineteenth and twentieth-century technology is not, however, my prime concern in this paper. Rather, my focus is on the third quarter of the nineteenth century, which, through its feverish interest, set the agenda for much subsequent history of technology in this country. Not only did it enshrine the pantheon of subjects for repeated biographical studies,<sup>9</sup> but it also established the biographical, heroic approach itself, which survives to this day in the popular literature and many school textbooks, although long demoted from the academic historiography.

## THE PATENT CONTROVERSY

This heroic approach has either been taken for granted, or assumed to be the singlehanded creation of Samuel Smiles. I shall argue, however, that the brief apotheosis of the inventor was largely the product of a fiercely fought defence of the patent system against a tenacious and articulate campaign for its abolition. Though primarily a battle between vested interests, couched in overwhelmingly pragmatic terms, the protagonists in this "patent controversy" drew on competing explanations of invention to lend some theoretical support to their respective campaigns.

By its very nature, the patent system rewarded *individual* achievement. Its supporters and beneficiaries had to profess the uniqueness of that achievement: they had to argue that without the creative abilities of a particular inventor the invention would never have been made, or, at the least, would have been long delayed. Therefore the inventor merited reward. Its detractors were obliged to play down the role of the individual inventor. They argued that social and economic needs prompted the invention of technological solutions, that invention was incremental, and that the frequent simultaneity of inventions demonstrated their case.<sup>10</sup> While today our intellectual sympathies may lie largely with the determinist arguments of the abolitionists, it is important to recognize that, then as now, their opponents enjoyed significant advantages in canvassing public support. Theirs potentially were the colourful stories of

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<sup>9</sup> R. Angus Buchanan, *The Engineers. A History of the Engineering Profession in Britain, 1780–1914* (London: Jessica Kingsley Publishers, 1989), pp. 16–19.

<sup>10</sup> For a compendium of abolitionist arguments, see [Robert McFie (ed.)], *Recent Discussions on the Abolition of Patents for Inventions in the United Kingdom, France, Germany, and the Netherlands* (London: Longmans, Green, Reader, and Dyer, 1869).

inspiration and of obstacles overcome by force of character. At their disposal were not only the Romantic cult of genius and heroism, but also the middle-class, commercial ethos that sought to establish the arts of peace above the atavism of war and conquest.<sup>11</sup> The time was ripe for a new set of heroes. In contrast, the abolitionists' case was likely to seem dry, unexciting — and even politically radical.

If the best tunes all belonged to one side, it was the patent controversy that prompted their composition. Before the 1850s, with one or two exceptions, inventors had not been recognized as popular heroes: invention had remained a largely anonymous activity. Moreover, theoretical debate concerning the nature of invention had been, to say the least, muted. It rarely arose outside the jousting of patent litigation, where both litigants and lawyers had to assume that invention deserved individual reward; the courts' task consisted only in adjudicating between rival claimants. However, the individualistic account of invention expounded in the heat of courtroom debate was slow to provide the underpinning of a full-blown heroic explanation. While the patent system implicitly endorsed and promoted an ideology of individualism, it was the threat to the system's existence in the third quarter of the nineteenth century that called forth a more explicit and much stronger account.<sup>12</sup> This heroic ideology elevated the successful inventor to a creative genius, insisting on a place for him in the national pantheon which had previously acclaimed only statesmen, admirals, generals, and major literary and intellectual figures — with, more recently, Edward Jenner and James Watt, being the exceptions.

I shall briefly describe the “patent controversy”, before proceeding to outline the rival explanations of invention advanced by the two camps. I shall argue that the success of the campaign to defend the patent system, enhanced by the popularization of heroic inventors, has obscured from view a resilient discourse of determinism. This deterministic account of discovery and invention was prevalent until the eighteenth century but thereafter largely lost ground to more individualistic versions until “rediscovered” and promoted in this century by Ogborn and Thomas, Gilfillan, and other members of the Chicago School.<sup>13</sup> Though submerged, it was not defunct, and its challenge also provoked a more thoughtful response from some proponents of the “heroic” case.

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<sup>11</sup> Stefan Collini, Donald Winch, and John Burrow (eds.), *That Noble Science of Politics. A Study in Nineteenth Century Intellectual History* (Cambridge: Cambridge University Press, 1983), pp. 27–8; A.O.J. Cockshut, *Truth to Life. The Art of Biography in the Nineteenth Century* (London: Collins, 1974), p. 122; Arnold Thackray, “Natural knowledge in cultural context: the Manchester model”, *American Historical Review* (1974), 79: 672–709.

<sup>12</sup> Discussion of inventiveness was absent from debates surrounding the reform of the patent system in the 1820s and 1830s: see, for example, *Hansard*, XV (1826), cols. 70–6; XXI (1829), cols. 598–608.

<sup>13</sup> See the bibliography in S. Colum Gilfillan, *Inventing the Ship* (Chicago: Follett Publishing Co., 1935), pp. 165–75.

First, to consider the patent controversy, distilling here the lucid account by Moureen Coulter in her recent book, *Property in Ideas*.<sup>14</sup> The patent system that had emerged since the seventeenth century was reformed by the Patent Amendment Act of 1852. This simplified and cheapened the procedure for obtaining a patent, satisfying many of the objections voiced by patentees and their supporters during the previous half century. However, it also stirred up a hornet's nest of opposition that called into question the system's very existence during the next thirty years. The issues were debated in both the national and the technical press and through a host of institutions, from local Chambers of Commerce and Mechanics' Institutes to national bodies, such as the Royal Society of Arts and the Institutions of Mechanical and Civil Engineers. Coulter has counted at least eighteen monographs defending the patent system published between 1862 and 1877. The abolitionists secured a Royal Commission in 1862 and agitated their way through another Select Committee and a host of parliamentary debates, but by the late 1870s, their star was waning.<sup>15</sup> They had been unable to win over any national body to their cause, prompting such bodies instead to lobby for further reforms to the system, many of which were enshrined in the 1883 Act, which hammered the final, patent nail into the abolitionists' coffin.

The parliamentary select committee which investigated the workings of the patent system in 1851 had heard thirty-three witnesses, of whom only eight recommended its abolition. The impact of the abolitionists was, however, much greater than their numbers alone suggest. First, they included such major figures as Isambard Kingdom Brunel and William Armstrong, both highly respected and inventive engineers, and William Cubitt, the President of the Institution of Civil Engineers. Secondly, Lord Granville, the select committee's chairman, when presenting its recommendations for the Patent Amendment Act in 1851, startled parliament by confessing that he had been convinced by the abolitionists' arguments: "the whole system", he announced, "was unadvisable to the public, disadvantageous to inventors, and wrong in principle".<sup>16</sup> Thirdly, the 1852 Act spawned a vociferous vested interest for abolition among the sugar manufacturers. By excluding the colonies from the purview of British patents, the Act threatened sugar refiners with the payment of royalties from which their Caribbean competitors would be exempted. Abolition became virtually a

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<sup>14</sup> Moureen Coulter, *Property in Ideas. The Patent Question in Mid-Victorian Britain* (Kirksville, Mo.: Thomas Jefferson Press, 1992). See also F. Machlop and E. Penrose, "The patent controversy in the nineteenth century", *Journal of Economic History* (1950), 10: 1-29; Victor M. Batzel, "Legal monopoly in Liberal England: the patent controversy in the mid-nineteenth century", *Business History* (1980), 22: 189-202.

<sup>15</sup> *Royal Commission to Inquire into the Working of the Law Relating to Letters Patent for Inventions*, British Parliamentary Papers, [hereafter P.P.] 1864, XXIX; *Select Committee on the Law and Practice of Grants of Letters Patent for Inventions*, P.P., 1871, X, and 1872, XI.

<sup>16</sup> *Hansard*, 3rd ser. CXVIII (1851), col. 16.

personal crusade for Robert McFie, the Liverpool sugar refiner, to the point of his entering national politics in its pursuit; elected in 1868, he lost no opportunity to argue the abolitionists' case for the next six years.<sup>17</sup>

However, there were many more who had a vested interest in the retention of the patent system, not least thousands of patentees (their number trebling in the wake of the 1852 Act) and the many manufacturers who had bought, and were operating, patented inventions. There was also a small but articulate body of professional patent agents and barristers specializing in patent litigation.<sup>18</sup> And, at the head of the newly formed Patent Office was Bennet Woodcroft, a man whose role in championing the cause of inventors and patentees was, it appears, pivotal. Woodcroft was tireless in campaigning for a better deal for patentees, maintaining the pressure after 1852 both for still cheaper patents and for better facilities at the Patent Office: the discomforts of the search room were notorious, meriting its nickname, "the drain pipe".<sup>19</sup> Another, most influential champion of the patent system was Henry, Lord Brougham, the prominent Whig politician, advocate of educational and legal reform, and first president from 1857 of the Social Science Association, a man without any vested interest, but with a long history of campaigning for reform of the system to benefit patentees. Brougham's concerns paralleled those of Woodcroft; he had been closely involved in securing posthumous, national recognition for James Watt.<sup>20</sup>

Woodcroft, however, strove to raise the status of inventors as a whole and to revive the memory of many who were dead and forgotten. He combed the country for portraits to establish a projected National Portrait Gallery of Inventors and for machinery and models with which to furnish the Museum of Patents (inconveniently situated at South Kensington, a long walk from the Patent Office in Chancery Lane). He encouraged living inventors to have their portraits painted for the collection and to have their biographies written.<sup>21</sup> With help from Woodcroft, John Timbs produced in 1860 the first composite biography of inventors, "from Archimedes to Isambard Kingdom Brunel" (its emphasis, however, being overwhelmingly modern and British!), which praised the achievements of individual "genius". Its general tenor may be deduced from a passage in the preface: "In tracing the fortunes of inventors and discoverers, it is painful to note how many have become 'martyrs of science'; a phrase ... which, there is reason to hope, will at no very distant time be inapplicable. A

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<sup>17</sup> *Dictionary of National Biography*, 3rd Supplement, "Robert Andrew McFie (1811–1893)".

<sup>18</sup> H.I. Dutton, *The Patent System and Inventive Activity During the Industrial Revolution, 1750–1852* (Manchester: Manchester University Press, 1984), pp. 34–56, 86–100.

<sup>19</sup> *Ibid.*, frontispiece.

<sup>20</sup> UCL, Brougham MSS, correspondence with James Watt, Jr., and with numerous inventors and patentees concerning reform of the patent system or seeking his assistance.

<sup>21</sup> SML, Bennet Woodcroft MSS, Z27B, ff. 329, 511.

brighter era is at hand".<sup>22</sup> Timbs commended the recent honouring of Jenner by a statue in Trafalgar Square, London, and of George Stephenson in Liverpool and London, at the same time as he deplored the delays in such tributes occasioned by earlier national ingratitude.<sup>23</sup> Woodcroft also hoped to stimulate both civic authorities and individuals throughout the country to rediscover and celebrate local inventors. In 1863, for example, he tried to shame the Lancashire town of Bury into celebrating John Kay, inventor of the flying shuttle, by pointing to Bolton's recent commemoration of Samuel Crompton, and to shame Britain as a whole by reference to France's elaborate honouring of Jacquard.<sup>24</sup>

Ideally, one would quote explicit evidence from Woodcroft's correspondence of his having adopted a conscious policy to help defend the patent system by lionizing inventors. If he ever did consciously adopt such a stratagem, the correspondence is silent, though it should be remarked that two potentially pertinent volumes relating to the 1850s are missing from the Science Museum Library's collection. The evidence admittedly remains circumstantial, and alternative explanations are conceivable for the mid-century's unprecedented, yet brief, flowering of interest in inventors. The euphoria generated by the Great Exhibition and the personal interest of Prince Albert in matters scientific and technical would obviously be explanatory contenders. We might also remark the rising interest in biography as a literary and historical genre, and in particular "the scholarly historical interest in the heroes of the scientific revolution that began to emerge in Britain during the early decades of the nineteenth century".<sup>25</sup>

Whether or not he consciously intended a public relations campaign in defence of the patent system, Woodcroft's efforts certainly promoted the cause. For nearly thirty years he corresponded with an expanding network of patrons, artists, engineers, and biographers (including Samuel Smiles),<sup>26</sup> stoking their enthusiasm to celebrate the virtues of a forgotten generation of inventors; this at a time when his newly created Patent Office was under threat of abolition and desperately in need of better accommodation. He may have tapped a sense of guilt, lurking beneath the triumphalism of the Great Exhibition, that the

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<sup>22</sup> John Timbs, *Stories of Inventors and Discoverers in Science and the Useful Arts* (London, 1860), pp. v, xii; SML, Bennet Woodcroft MSS, Z27B, f. 246.

<sup>23</sup> Timbs, *Stories*, pp. 130–1, 299.

<sup>24</sup> Bennet Woodcroft, F.R.S., *Brief Biographies of Inventors of Machines for the Manufacture of Textile Fabrics* (London, 1863), pp. 6, 29–31.

<sup>25</sup> Richard Yeo, "Genius, method, and morality: images of Newton in Britain, 1760–1860", *Science in Context* (1988), 2: 257–84 (258, 259–60, 265–7). See also Cockshut, *Truth to Life*, p. 11; A.N.L. Munby, *The History and Bibliography of Science in England. The First Phase, 1837–1845* (Berkeley, CA: University of California Press, 1968).

<sup>26</sup> SML, Bennet Woodcroft MSS, Z27A, f.197; *Select Committee on the Patent Office Library and Museum*, P.P., 1864, XII, p. 19.



progenitors of Britain's wealth and power had been shabbily treated. "What did the public do for inventors?", declaimed Dr Walkley, M.P., in 1851. "They often treated them with scandalous neglect. What was done for Harvey or for Jenner, of his own profession? Jenner's family were absolutely in want; there were no monuments to his memory, and his name was almost unknown in this country".<sup>27</sup> This was a singularly poor example to choose, Jenner being better rewarded and commemorated than most, but the general point was sound.

Neither side in the debate was able to draw on an extensive or coherent body of thought concerning the nature of invention. There were a few relevant pamphlets, some short passages in books concerned with broader issues, and arguments advanced in the course of patent litigation, but there had been no previous public debates in which each side pressed the other to clarify and defend its premises.<sup>28</sup> It is evident when reading some late-eighteenth and early-nineteenth-century accounts of invention that their authors had not been required to give serious consideration to the role of the individual inventor. Unself-consciously, they might hint at both individualistic and deterministic ideologies. Gravenor Henson, for example, in 1831 could credit various inventors with "genius" or "ingenuity", and yet allow that "Nothing is more difficult than to decide with certainty, who is the real inventor of machinery, as, perhaps, there are several persons, at the same time, scheming and trying experiments, to accomplish a given end".<sup>29</sup> Even Arago, in his great encomium on the inventive "genius" of James Watt, gave an occasional role to "the mere spur of necessity; for 'necessity is the mother of invention'".<sup>30</sup> This ambiguity was a luxury not permitted to the generation after 1851, which appreciated the significance of this issue for the future of the patent system.

## THE DETERMINIST IDEOLOGY

The determinist argument advanced by the abolitionists will have a familiar ring. It emphasized the collaborative and incremental nature of invention. It claimed that those men generally thought of as major inventors were nothing more than the last

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<sup>27</sup> *Hansard*, 3rd ser. CXVIII (1851), col. 1548.

<sup>28</sup> Compare this with the fierce, contemporary debate in the historiography of science; see Yeo, "Genius, method, and morality", pp. 261, 267-78.

<sup>29</sup> Gravenor Henson, *The Civil, Political and Mechanical History of the Framework Knitters, in Europe and America* (Nottingham, 1831), ed. S.D. Chapman (Newton Abbot: David & Charles, 1970), pp. 276, 304, 331, 342.

<sup>30</sup> D.F.J. Arago, *Life of James Watt* [trans. Hyde Clark] (3rd edn., Edinburgh: A. & C. Black, 1839), p. 55.

links in the causal chain, putting the final piece into the jigsaw which others had almost completed. And if the particular individual had not been there to insert the last piece, somebody else would have been — perhaps not always at the same time, but before long. Moreover, once the final stage had been reached, there were usually many individuals seeking out the last piece of the puzzle, and so the race to the finish was often a close one.<sup>31</sup> In support of this argument, its proponents cited simultaneous inventions, as Ogborn and Thomas were to do in the 1920s,<sup>32</sup> though rarely did they offer any specific examples. Earl Granville told the House of Lords in 1851 that “the concurrence of similar inventions is very remarkable”. Lord Stanley, who had chaired the Royal Commission of 1862–4, also believed by 1869 that the patent system did “more harm than good”. Its essential flaw, he thought, lay in the difficulty of rewarding the right person, for “it might happen, and often did happen, that two or three, or even half-a-dozen men, quite independently of one another, would hit upon the same invention”.<sup>33</sup>

It followed that a sociological, rather than an individualistic, explanation was required: it was usually framed in terms of social “needs”. Though he may be suspected of inventing the proverb, the barrister John Coryton encapsulated this view in 1874 with the claim “it is an old saying, that ‘it is society that invents’”.<sup>34</sup> One member of his audience, Mr Anderson Rose, was moved to respond that “There was ... no such thing as invention; if the world wanted anything it came to the front in two or three places at once”.<sup>35</sup> The evidence of Sir William Armstrong, past president of the Institution of Mechanical Engineers, to the Royal Commission in 1863 made the whole business seem ridiculously easy: “As soon as a demand arises for any machine or implement or process, the means of satisfying that demand present themselves to very many persons at the same time”. Warming to his subject, Armstrong continued: “the great majority of inventions are the result of mere accident — if you let them alone they will turn up of themselves”.<sup>36</sup> It followed that the fourteen-year

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<sup>31</sup> *Hansard*, 3rd ser. CXVIII (1851), col. 14; CXCVI, col. 895.

<sup>32</sup> W.F. Ogborn and D. Thomas, “Are inventions inevitable? A note on social evolution”, *Political Science Quarterly* (1922), 37: 83–98.

<sup>33</sup> *Hansard*, 3rd ser. CXVIII (1851), col. 16; CXCVI (1869), cols. 904–5. See also J.E. Thorold Rogers, “On the rationale and working of the patent laws”, *Journal of the Statistical Society of London* (1863), 26: 121–42, on p. 125.

<sup>34</sup> John Coryton, “The policy of granting letters patent for invention, with observations on the working of the English law”, *Sessional Proceedings of the National Association for the Promotion of Social Science* (1873–4), 7: 163–90, on p. 168.

<sup>35</sup> *Ibid.*, pp. 186–7.

<sup>36</sup> *Report of the Commissioners appointed to Inquire into the Working of the Law Relating to Letters Patent for Inventions*, P.P., 1864, XXIX, pp. 414, 415. See also *Hansard*, 3rd ser. CXCVI (1869), col. 895.

patent monopoly was much too great and too exclusive a prize to award the one who only happened to breast the finishing tape first — and in such an easy race! Probably the most cogent explanation of simultaneity came from Isambard Kingdom Brunel, reflecting in 1851 on his own experience; he emphasized, above demand, the cumulative supply of knowledge available in the public realm and the systemic nature of technology which directed inventors' efforts to what Thomas Hughes has termed "critical problems".<sup>37</sup> Brunel commented:

I believe that the most useful and novel inventions and improvements of the present day are mere progressive steps in a highly wrought and highly advanced system, suggested by, and dependent on, other previous steps, their whole value and the means of their application probably dependent on the success of some or many other inventions, some old, some new. I think also that really good improvements are not the result of inspiration; they are not, strictly speaking, inventions, but more or less the results of an observing mind, brought to bear upon circumstances as they arise, with an intimate knowledge of what already has been done, or what might now be done, by means of the present improved state of things, and that in most cases they result from a demand which circumstances happen to create.<sup>38</sup>

The abolitionist argument had to deny a natural right to property in invention, and therefore to refute the associated point that a patent of invention was analogous to copyright in a book or work of art. It was a case that followed naturally from the simultaneity argument: books and works of art were clearly unique, creative acts, whereas if many minds could reach the "right" solution to a technical conundrum there could be no claim to uniqueness nor any entitlement to property in the solution. "Copyright applied to a creation", Sir Roundell Palmer (another "convert" since 1851) told the Commons in 1869. "But in the case of invention and discoveries, the facts with which they were concerned lay in nature itself, and all mankind who were engaged in pursuits which gave them an interest in the investigation for practical purposes of the laws of nature had an equal right of access to the knowledge and the practical applications of those laws".<sup>39</sup>

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<sup>37</sup> Thomas Hughes, "The dynamics of technological change: salients, critical problems, and industrial revolutions", in Giovanni Dosi, Renato Giannetti, and Pier Angelo Toninelli (eds.), *Technology and Enterprise in a Historical Perspective* (Oxford: Clarendon Press, 1992), pp. 97–118.

<sup>38</sup> Isambard Brunel, *The Life of Isambard Kingdom Brunel, Civil Engineer* (London: Longman & Co., 1870), p. 492. See also J. Stirling, "Patent right", in [McFie], *Recent Discussions*, p. 119.

<sup>39</sup> *Hansard*, 3rd ser. CXCVI (1869), col. 898.

From this there developed a common abolitionist argument which conflated scientific and technological achievement in a platonistic conception: laws of nature and new technologies were both waiting “out there” to be unearthed; persistent investigators would discover a pre-existent truth or the ideal form of a technical solution. And where the two were not conflated, invention tended to be downgraded to that mere “application of science” which is all too familiar. In neither case could it be right that the first discoverer or adopter should appropriate what belonged to all. John Coryton told his (largely unsympathetic) audience at the National Association for the Promotion of Social Science in 1874 that “Discoveries of great principles are almost confined to men of scientific occupations. Such men — patient and unselfish workers, of whom Faraday may be taken as a type — are ... [the] true improvers of our manufactures. It is to their researches, in the vast majority of cases, that the patentee is indebted for the invention of which he has obtained the exclusive use”.<sup>40</sup> In Coryton’s view, the selfless, collaborative scientist strives and discovers; the grasping patentee, skimming off the cream, applies and appropriates. The stereotypes live on.

What was the source of these deterministic views? They represent the secular legacy of the providentialist account of invention which had held sway until the eighteenth century.<sup>41</sup> Renaissance neo-platonists suggested there was a stock of inventions to be released and materialized at appropriate times, provided humankind made an effort to discover them — implying both need and desert. The word “invention” was used in a way closer to its classical root, in the sense of uncovering something which had been there all the time, on a par with new lands or planets. In his Boyle lecture of 1712, William Derham depicted the inventor as subject “to the agency or influence of the spirit of God”, acting as God’s agent “to employ the several creatures; to make use of the various materials; to manage the grand business”. Some things, flight for example, remained unachieved, said Derham, “because the infinitely wise Creator and Ruler of the World has been pleased to lock up these things from man’s understanding and invention, for some reason best known to himself, or because they might be of ill consequence, and dangerous amongst men”.<sup>42</sup> On the other hand, as many Protestants argued, the timely invention of printing had

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<sup>40</sup> Coryton, “The policy”, p. 172. See also Sir William Armstrong, “Address of the President”, *Proceedings of the Institution of Mechanical Engineers* (1861), 110–19, on p. 119.

<sup>41</sup> For a fuller discussion of this background, see Christine MacLeod, *Inventing the Industrial Revolution. The English Patent System, 1660–1800* (Cambridge: Cambridge University Press, 1988), chapter 11.

<sup>42</sup> William Derham, *Physico-theology: or, a Demonstration of the Being and Attributes of God from His Works of Creation* (London: W. Innys, 1713), pp. 306–9. For Derham, see W. Coleman, “Providence, capitalism and environmental degradation: English apologetics in an era of economic revolution”, *Journal of the History of Ideas* (1976), 37: 27–44, especially p. 32.

been part of God's preparations for the Reformation.<sup>43</sup> When Lord Camden, in 1774, railed against the notion of property in ideas, he still depicted successful inventors as the servants of Providence. "Those great men, those favoured mortals, those sublime spirits, who share that ray of divinity which we call genius, are entrusted by Providence with the delegated power of imparting to their fellow creatures that instruction which heaven meant for universal benefit".<sup>44</sup> Nineteenth-century commentators voiced a secularized Providence. In 1854 the words of an anonymous reviewer in *The Economist* suggest a conception which is more teleological than sociological: "Scientific discoveries and the arts built on them are neither made fortuitously nor by man's design; they are a regular and progressive development which no conduct of the human understanding — though care in this respect may make individuals good, knowing, and wise — could ever bring about".<sup>45</sup>

But the true inheritors of the determinist tradition were to be found among the political radicals, many of them sharing a Nonconformist religious background. Joseph Priestley, in his egalitarian providentialism, even had the temerity in 1767 to question Isaac Newton's claims to "genius", preferring a Baconian emphasis on the democratic pursuit of knowledge: talk of genius obscured the real nature of scientific discovery in which "patience and industry" were paramount and could be "equalled by many persons".<sup>46</sup> Robert Owen notoriously preached the influence of environment on character: "the character of man is formed *for* him and not *by* him".<sup>47</sup>

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<sup>43</sup> [J. Asgill], *An Essay for the Press* (London: A. Baldwin, 1712), p. 4; [Matthew Tindal], *An Essay Concerning the Power of the Magistrate, and the Rights of Mankind, in Matters of Religion* (London: Andrew Bell, 1697), p. 184; [Matthew Tindal?], *A Letter to a Member of Parliament, shewing, that a Restraint Press is Inconsistent with the Protestant Religion, and Dangerous to the Liberties of the Nation* (London, 1698), pp. 11, 22. My thanks to Mark Goldie for these references.

<sup>44</sup> William Cobbett (ed.), *The Parliamentary History of England from the Earliest Period to the Year 1803*, vols. 13–36, (London: Longman & Co., 1812–20), vol. 17, col. 999. For Camden, see *Dictionary of National Biography*, "Charles Pratt, 1st Earl Camden (1714–1794)".

<sup>45</sup> *The Economist*, 16 September 1854, p. 1021.

<sup>46</sup> Simon Schaffer, "Priestley and the politics of spirit", in R.G.W. Anderson and C. Lawrence (eds.), *Science, Medicine and Dissent. Joseph Priestley (1733–1804)* (London: The Science Museum, 1987), p. 45; J.G. McEvoy, "Electricity, knowledge and the nature of progress in Priestley's thought", *The British Journal for the History of Science* (1979), 12: 1–30, on p. 14; Yeo, "Genius, method, and morality", pp. 264–5.

<sup>47</sup> Quoted in Brinley Thomas, *The Industrial Revolution and the Atlantic Economy* (London: Routledge, 1993), p. 126. This was an axiom which Smiles explicitly repudiated, although he endorsed an anti-elitist notion of inventiveness. See Asa Briggs, *Victorian People* (Chicago: University of Chicago Press, 1970), p. 147; Yeo, "Genius, method, and morality", p. 267.

The most sustained account of invention which I have found in this period was by Thomas Hodgskin, the radical journalist who had a considerable influence on, among others, Karl Marx. Sharing with Priestley an egalitarian stance and a "belief in the existence of providential harmony in nature",<sup>48</sup> and with Owen the view that "every individual ... [is] fashioned by the time at which he lives, and by the society of which he is a member",<sup>49</sup> Hodgskin went on to elaborate a sophisticated rebuttal of inventive individualism and nascent heroism, in his *Popular Political Economy*, published in 1827. James Watt, argued Hodgskin, was simply born in the right time and place: his engine would have been "of no utility except in crowded countries, in which fuel is plentiful and manufactures established"; elsewhere "there would be no body to make or use it, no purpose to which it could be applied"; even in Britain a century earlier, both the incentive and the knowledge needed for its application would be lacking. Watt should be regarded, Hodgskin continued, simply "as one of those master-spirits who gather and concentrate within themselves some great but scattered truths, the consequences of numberless previous discoveries which, fortunately for them, are just dawning on society as they arrive at the age of reflection. They have the happy art to connect, by some little additional discovery of their own, the various truths lately brought into day".<sup>50</sup> The inventor was scarcely more than a puppet in the grand theatre of progress.

The extent to which the abolitionists campaigning in the third quarter of the nineteenth century drew on these earlier ideologies is unclear; I have found no direct references. However, deterministic explanations of invention, both secular and religious, were available to those, like Brunel, who for practical reasons wished to dispense with the patent system.

## THE HEROIC IDEOLOGY

For those who campaigned to retain the patent system, there were emerging alternative, individualistic explanations, as well, of course, as the individual attribution of inventions that the patent system itself had helped construct. By the late-eighteenth century, many of those who discussed invention were stressing the role of human creativity as an innate and individual attribute; the role played by God or Providence was increasingly limited to supplying the raw materials, including the laws of nature, from which the inventor would select in

<sup>48</sup> Elie Halevy, *Thomas Hodgskin*, trans A.J. Taylor (London: Ernest Benn, 1956), p. 36.

<sup>49</sup> Thomas Hodgskin, *Popular Political Economy. Four Lectures delivered at the London Mechanics' Institution* (London: printed for Charles Tait and William Tait, 1827), p. 87.

<sup>50</sup> *Ibid.*, pp. 87-8.

order to construct an infinity of inventions.<sup>51</sup> This was, for example, the picture drawn by the engineer, Joseph Bramah, when helping to contest Watt's patent in 1797: God "stocked the universal storehouse ... out of which the same creating will directs every man to go and take materials, fit in kind and quality, for the execution of his design". The overall design might still be God's, but invention was overwhelmingly the product of "efforts of the mind and understanding" to synthesize "new effects from the varied applications of the same cause".<sup>52</sup> This inventor was no puppet.

From such "efforts of the mind" might spring "a thumping child of my brain", as James Nasmyth dubbed his steam hammer.<sup>53</sup> Such "products of the intellect" and "children of the brain" were deemed by many after 1850 to be peculiarly the property of their mental parents. "A man has as perfect a right to ownership in the production of his own intellect as to any other property which he might be possessed of", asserted Mr Macgregor, M.P., in 1851.<sup>54</sup> Eleven years later another M.P., Vincent Scully, leapt to the system's defence with the opinion that "there was nothing so peculiarly the property of a man as the labour of his brains".<sup>55</sup> This claim to a natural right in intellectual property had been little advocated in Britain, unlike in France.<sup>56</sup> It owed its new popularity at mid century to the patent controversy. It was complementary to the view that great inventions were the creation of genius, of singularly able and *irreplaceable* intellects. But invention could not be *too* easy — even for great minds. That would concede a major point to those abolitionists who argued that patents were not needed as an incentive since most inventors could not help but invent. The

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<sup>51</sup> For similar views in the seventeenth and early eighteenth centuries, see MacLeod, *Inventing the Industrial Revolution*, pp. 203–4.

<sup>52</sup> Joseph Bramah, *A Letter to the Rt Hon Sir James Eyre, Lord Chief Justice of the Common Pleas; on the Subject of the Cause, Boulton & Watt v. Hornblower & Maberly: for Infringement on Mr Watt's Patent for an Improvement in the Steam engine* (London: John Stockdale, 1797), p. 77. See also Adam Smith, *Lectures on Jurisprudence*, ed. R.L. Meek, D.D. Raphael, and P.G. Stein (Oxford: Oxford University Press, 1978), p. 347; Dugald Stewart, *Lectures on Political Economy*, vol. 1, in Sir William Hamilton (ed.), *The Collected Works of Dugald Stewart* (11 vols., Edinburgh: Thomas Constable & Co.; London: Hamilton, Adams & Co., 1854–60), p. 196; *Observations on the Utility of Patents, and on the Sentiments of Lord Kenyon Respecting that Subject* (4th edn., London, 1791), p. 42.

<sup>53</sup> Samuel Smiles (ed.), *James Nasmyth, Engineer. An Autobiography* (London: John Murray, 1883), p. 247.

<sup>54</sup> *Hansard*, 3rd ser. CXVIII (1851), col. 1541.

<sup>55</sup> *Hansard*, 3rd ser. CLXVII (1862), col. 51. See also, A. Percy Sinnett, *Patent Rights. An Inquiry into their Nature* (London: James Ridgway, 1862), pp. 10–13.

<sup>56</sup> Dutton, *The Patent System*, pp. 17–18.

heroism of invention lay in the perseverance, the years of unremitting labour: this *combined* with a natural faculty for invention produced the great inventor.<sup>57</sup> It was such determination to succeed against the odds that explicitly marked out Smiles's heroes.<sup>58</sup>

It goes without saying that proponents of the heroic school denied demand-led or incremental explanations of invention. Henry Dircks, an engineer and author of the period's most sustained exposition of heroic views, *Inventors and Inventions* (1867), hopefully proclaimed: "That 'necessity is the mother of invention', is an aphorism that has long been exploded".<sup>59</sup> For Dircks, more elitist than Smiles, invention was totally unpredictable and often ahead of its time; only minor inventions or improvements occurred simultaneously. Inventiveness was a rare, personal quality: "Invention is not an art; it is a faculty of the mind more strongly developed in some men than in others, and is possessed by comparatively few in any great degree. No amount of acquired knowledge, no variety of scientific information, and no concentration of the mind on single subjects, would of themselves have any tendency to induce invention, in the absence of a natural ability that way".<sup>60</sup>

Possibly most difficult to refute was the disparaging charge made by Coryton, among others, that inventors merely applied the findings of scientific research. Responding directly to Coryton's paper in 1874, Thomas Webster, the patent agent, criticized him for "confusing discovery with invention.... The inventor takes the discovery and puts it to a practical use in the ordinary purposes of life. The labour of invention is immense".<sup>61</sup> Pushed by the abolitionists' arguments, their opponents followed through their own logic to produce more sophisticated accounts of invention. Some began to contend that there was more than one solution to every technical challenge and that good design had a role to play. John Howard, M.P. and agricultural machinery maker, defended the analogy between patents and copyright in 1869: "no two men ever wrote the same book at the same time, ... but he had frequently found that two authors writing almost simultaneously conveyed precisely the same ideas, though not in the same language. Exactly so, if two men invented similar machines simultaneously, it was never found they carried out their ideas precisely in the same mechanical way.... The inventor made use of the laws of

<sup>57</sup> For example, Sinnett, *Patent Rights*, p. 13; *Hansard*, 3rd ser. CXVIII (1851), cols. 1534–5, 1544; Thackray, "Natural knowledge", p. 687.

<sup>58</sup> For example, Samuel Smiles, *Men of Invention and Industry* (London: John Murray, 1884), pp. 57, 60, 72, 77. See also, Cockshut, *Truth to Life*, pp. 111–13.

<sup>59</sup> Henry Dircks, *Inventors and Inventions* (London: E. and F.N. Spon, 1867), p. 11. See also Woodcroft, *Brief Biographies*, p. 3.

<sup>60</sup> Dircks, *Inventors and Inventions*, pp. 7, 39–40.

<sup>61</sup> Coryton, "The policy", pp. 188–9.



nature just as the author of a book used the common language of mankind".<sup>62</sup> Here was the individualism of creativity being given a new twist.

## THE LEGACY

One may speculate anachronistically that if Thomas Hodgskin had still been alive, he might have retorted that the differences were not representations of individuality but, rather, were shaped by the varying social environments and interests of their inventors. But, of course, he was not and he could not. The patent system survived; an heroic ideology of invention prevailed; and the debate fizzled out. As the patent system itself had helped construct an individualistic understanding of invention, so the patent controversy, in overwhelming the determinist explanation, affirmed and buttressed that construction.

Academic interest in the subject began to revive in the inter-war period, primarily among American sociologists and psychologists who emphasized "the status of culture", the evolutionary nature of technological change, and the frequent simultaneity of inventions, discounting the role of individual inventors. "Contrary to popular impression", wrote Ogburn and Thomas in 1922, "Watt, great man though he was, does not seem to have been indispensable to the perfection of the steam engine".<sup>63</sup> To little avail: an heroic ideology continued — and continues — to inform the popular conception of invention and technological change; when the word "inventor" is uttered, the image of Watt and his kettle probably springs to most British minds (and Edison, to most American). This we largely owe to the celebration of inventors stimulated by the patent controversy.

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<sup>62</sup> *Hansard*, 3rd ser. CXCVI (1869), col. 912. See also *ibid.*, cols. 920–1. For the current renewed emphasis on design, as the major feature distinguishing technology from science, see Eugene S. Ferguson, *Engineering and the Mind's Eye* (Cambridge, Mass.: M.I.T. Press, 1992); Walter G. Vincenti, *What Engineers Know and How They Know It. Analytical Studies from Aeronautical History* (Baltimore, Md.: Johns Hopkins University Press, 1990).

<sup>63</sup> Ogborn and Thomas, "Are inventions inevitable?", p. 91. For similar attacks on "the traditional point of view", see W.F. Ogborn, "The great man versus social forces", *Social Forces* (1926), 5: 225–31 (225, 227); Gilfillan, *Inventing the Ship*, pp. ix, 3, 77–8.