



“O wad some pow’r the giftie gie us!” Scottish people are over-represented among innovators Britain’s industrial revolution and in its surrounding scientific breakthroughs

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Abstract

The Industrial Revolution occurred between approximately 1700 and 1900, with its origins in England. It coincided with and fueled many ground-breaking scientific innovations. However, historians have suggested that the Scots made a disproportionate contribution to this process, both in terms of technical and broader scientific innovation. Drawing on an already-published convergent bibliographical analysis of technological accomplishment, we test whether this is the case. We find that the Scots indeed made a more significant contribution than the English to the Industrial Revolution and its surrounding scientific accomplishments.

Keywords Industrial revolution · Science · Technology · Genius · Scottish

1 Introduction

The Industrial Revolution occurred in Europe between approximately 1750 and 1850. The First Industrial Revolution ended in the mid-nineteenth century and was characterised by a shift in the use of machines for textile production, chemical manufacturing, increased iron production, and the increased utilisation of steam power. The Second Industrial Revolution, which occurred in the second half of the nineteenth century, was characterised by rapid scientific advancements and a significant increase in mass production. Both of these revolutions ultimately led to significantly increased living standards, even though, as they commenced and people were pushed into dense and insanitary conditions, living standards initially declined. It is generally agreed that the First Industrial Revolution commenced around 1760, although it was preceded by the Agricultural Revolution, which began approximately 1700 and, in a sense, laid the groundwork for the Industrial Revolution (Allen, 2009; Hahn, 2020; Overton, 1996). This itself was preceded by the broader Scientific Revolution which

took place between roughly the mid-sixteenth and the late seventeenth centuries.

In both cases, these Industrial Revolutions began in England before spreading to the rest of the UK and thence to Continental Europe (Mokyr, 2009). However, a number of qualitative studies have remarked on what they regard as the disproportionate contribution of Scots to these processes (Pittock, 2022, p.257; Stephens, 1999, p.74; Curran, 1988, p.142). Others have averred that Scots were disproportionately influential in terms of the scientific discoveries that took place during this period (Devine, 2012a; Herman, 2001). In 1800, in the middle of the Industrial Revolution, the population of England was approximately 9 million, while the population of Scotland was just 1.6 million (Wrigley & Schofield, 1981). Even by the 1930s, Scotland’s population was roughly 10% that of its southern neighbour (Flinn, 1977). Further, it has been argued that the steam engine was central to the Industrial Revolution and though this was invented by an Englishman, Robert Trevithick (1771–1833), it was a Scotsman, James Watt (1736–1819), who developed the steam engine in a particularly useful direction (e.g. Russell, 2014).

As far as we are aware, nobody has yet statistically tested the hypothesis that Scots are over-represented in terms of the geniuses (the major innovators, those who ground-breaking discoveries, see Dutton & Charlton, 2015) of the Industrial Revolution, nor whether they were over-represented in terms

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Table 1 Numbers of total and eminent individuals for each country and time interval, their proportions, and the results of X^2 goodness-of-fit tests

Time period	Number of eminent individuals		Population (mn)		Proportion (per mn and century)		X^2	P
	England	Scotland	England	Scotland	England	Scotland		
1700–1899	133	43	29.92	4.39	6.00	10.97	21.35	<.00001
1700–1799	38	13	6.479	1.232	5.99	10.52	2.99	>.05
1800–1899	95	30	17.497	3.293	6.01	11.42	6.42	<.05
1700–1749	12	1	5.450	1.200	4.40	1.67	–	–
1750–1799	26	12	6.857	1.265	7.58	18.97	7.18	<.01
1800–1849	47	13	12.290	1.960	7.65	13.27	4.07	<.05
1850–1899	48	17	22.004	3.550	4.36	9.58	7.82	<.01

Population estimates are compiled from three sources, defined in the text. Proportion of eminent individuals is calculated per century, so half-century estimates are multiplied by 2. Whole-century estimates are the averages of half-century estimates, and whole-period estimates are the averages of century estimates, thereby controlling for the non-linearly increasing population figures. Non-adjusted estimates were quite similar at 4.45/9.79 (England/Scotland) for the whole period, 5.87/10.55 for 1700–1799, and 5.43/9.11 for 1800–1899. Except for 1700–1749, all expected frequencies were larger than 5, which is one assumption for the X^2 test

of surrounding scientific accomplishments. In this study, we propose to test this hypothesis. We employed these chronological parameters because these are the approximate span of the Industrial Revolution.

2 Method

In his book *Human Accomplishment*, Murray (2003) employed convergent bibliography to establish the most salient figures in all significant areas of human achievement up until 1950. He presented tables of the most important statistics, their nation of origin and the year in which their contribution took place. Here, we draw upon his technological index; his index relating to inventions. We also draw upon his other scientific indices. We focus specifically on contributions made between 1700 and 1899 by individuals of English or Scottish descent. Murray has calculated an index of significance for each of these individuals, with 100 being the most significant, allowing their contributions to be weighted.

To achieve comparable estimates of the number of eminent individuals, we need to control for the total number of individuals, as the population of England is many times larger than that of Scotland. To this end, we obtained population estimates from four complementary sources. For England, data for the whole period (1700–1899) could be obtained from the Bank of England.¹ For Scotland, data for 1855–1899 were obtained from the National Records of Scotland. For every tenth year, 1811–1851, data were sourced from Genuki, and for 1682 (serving as a proxy for

1700), 1755, and 1801, data were sourced from Wikipedia.² In this instance, we checked the sources and found that the numbers presented were indeed as they were stated in the sources.

3 Results

The data sourced from Murray (2003) consists of the name and nationality of the individual, the year of their contribution, and their index of eminence. This index ranges from the least (1) to the most (100) significant within each domain of achievement. A list of these data is found in the Appendix, comprising 177 individuals from the domains astronomy, chemistry, earth sciences, medicine, physics, and technical inventors.

We first consider whether Scotsmen are overrepresented amongst these eminent individuals by computing their proportion of the total population per century. These estimates are presented in columns 6–7 of Table 1, indicating that the value for Scotsmen is approximately twice that of Englishmen, except for the 50-year period from 1700 to 1750, during which only one Scot was listed.³ The population figures are listed in columns 4–5, and consist of the averages across each time interval. We then tested this effect with X^2 goodness-of-fit tests, the input being the frequencies of eminent individuals and total individuals in each country. We do this for three different partitions of the 200-year time period to assess consistency across time, namely the whole period and each 100- and 50-year interval. The X^2 results are presented

¹ <https://www.bankofengland.co.uk/statistics/research-datasets>

² https://en.wikipedia.org/wiki/Demographic_history_of_Scotland

³ Note: the values for half-centuries are multiplied by two in order to make them comparable to those for centuries.



in columns 8–9, indicating that all country differences are statistically significant, except for the intervals 1700–1750 and 1700–1799. This seems to be due to there being only one Scot in the first 50 years.

We secondly assess if there is any difference in the average eminence of individuals from each country. Table 2 lists the means and standard deviations of the index provided by Murray (2003), along with the *t*-statistic, for the same time intervals as before.

The larger the time intervals, the smaller the Index difference, and the country differences for the shorter time intervals exhibit no consistent trend. With *SDs* of the same magnitude as the means, none of the differences reach statistical significance, according to one-tailed *t*-tests. Clearly, there is no indication that Scotsmen are more eminent than Englishmen.

Third and finally, we consider whether there are any differences between domains of eminence in the tendency for there to be more eminent Scotsmen. It turns out that several domains have very few (1–3) Scotsmen (astronomy, biology, and physics) and that no domains, except inventions, could be subjected to χ^2 tests because the expected frequencies were less than 5. Considering only the proportions of the population across the full 200-year time period, we find significant variation, ranging from 0.13 to 0.85 for Englishmen and 0.11 to 1.48 for Scotsmen, with no apparent consistent trend between the countries. Note that the reason these are much smaller than in the previous analyses is simply that there are far fewer individuals within each domain than aggregated across them. One way to further reduce the data is to compute the Scottish-to-English ratio, which varied from 0.54 (meaning that Scots are underrepresented) for astronomy and biology, to 6.81 for Earth sciences. Inventions, the only domain that could be subjected to a χ^2 test, exhibited a χ^2 of 3.24, which is just short of being significant at a critical value of 3.84 for $\alpha=0.05$. Thus, we cannot draw any conclusions about domain differences, due to the small *Ns*.

4 Discussion

We have found a significant difference between the English and the Scots in terms of their contributions to the Industrial Revolution and to the surrounding scientific achievements. The Scottish contribution, for most of the period under analysis, was double that of the English contribution, when measured by per capita geniuses. Scottish contributors, however, were no more eminent than English ones, there were simply more of them per capita.

We might expect Scots to have made a disproportionate contribution for a number of reasons, that imply that the Scots might be expected to have elevated intelligence (problem-solving ability) compared to the English. Additionally, it is often argued that literacy and general education were strongly elevated in Scotland compared to England as a consequence of Calvinist influence, whereby it was considered extremely important to be able to read the Bible (Ward, 2006). However, detailed analyses have found that, overall, this is a national myth. Scotland was not more literate than England during our period of analysis or prior to it (Houston, 1985, p.35). That said, many other factors, such as the highly impactful Scottish Enlightenment and the fact that three of the four Scottish universities in the nineteenth century focused on science, bringing in the most intelligent English students, whereas the three English universities had religious entry requirements and focused on Theology, would imply that the Scots, at that time, may have had elevated intelligence compared to the English (Horner, 1993, p.171; Broadie, 2001; Stone, 2019).

Also, in other countries where there is regional variance in Christian religiosity, such as the Netherlands, the Calvinists have been found to be, on average, more intelligent than followers of other denominations (Dutton et al., 2020). It is unclear why this is so. It may be that, as Calvinism is strongly rooted in a highly systematic theology in which adherents must read the Bible themselves, it is more attractive to people with higher intelligence. Intellectual curiosity is associated with intelligence, meaning we would expect

Table 2 Mean Index as a function of country and time interval, their *SDs*, and the corresponding *t* statistic, as well as critical values for a one-tailed *t*-test with $\alpha=0.05$

Time period	<i>M</i> (Index)		<i>SD</i> (Index)		<i>Df</i>	<i>T</i>	<i>t_{crit}</i>
	England	Scotland	England	Scotland			
1700–1899	17.33	18.51	17.29	23.09	57.9	0.309	2.021
1700–1799	16.61	25.46	18.65	30.52	15.1	0.986	1.753
1800–1899	17.62	15.50	16.76	18.86	44.5	0.551	1.684
1700–1749	20.53	6.00	25.18	0.00	–	–	–
1750–1799	14.65	27.03	14.58	31.28	13.26	1.312	1.771
1800–1849	18.77	19.46	16.03	26.26	14.65	0.089	1.761
1850–1899	16.58	12.47	17.55	10.26	48.10	1.169	2.021

N are found in Table 1



the more intelligent to adopt the newer religion, as has been found in several countries, such as South Korea (te Nijenhuis et al., 2021). Anglicanism, by contrast, is effectively a synthesis of Protestantism and Catholicism, with a Calvinist wing and an Anglo-Catholic wing (Randall, 2005). In addition, there is evidence that the predisposition for being religious is partly genetic and that, until the Industrial Revolution, it was being selected for alongside pro-social personality and intelligence as part of a general fitness factor (Dutton, 2023; Dutton & Madison, 2018). Studies have shown that religiousness is weakly negatively correlated with intelligence; however, this relationship may be significantly culturally mediated, as it is no longer the case in the most recent samples (Dutton & Van der Linden, 2017). For all these reasons, we would expect Scots, during the period under analysis, to be more intelligent than the English.

In terms of possible explanations for this likely elevated intelligence, Scotland is ecologically harsher than England, and so, following Cold Winters Theory, we might expect more intense selection for intelligence (Lynn & Vanhanen, 2012). It is possible that Scotland's relative poverty and rural nature compared to England at the time may help explain why it fails to outperform England even further in terms of scientific contributions. Its rugged geography meant transportation was relatively poor, it was geographically farther from trade centres, and the land was less fertile (Devine, 2012b); people may have been too "up against it" to risk innovation.

Only in the case of inventions did Scotland come close to having geniuses who were significantly more eminent than the Englishmen in this category, which may be partly explained by the enormous significance of James Watt's steam engine. The Scots' contributions were also skewed in favour of technology and earth sciences. There are a number of possible reasons for this. The Scottish Enlightenment was strongly focused on empiricism, most notably in the philosophy of David Hume, and practicality, as embodied in the "Common Sense Philosophy" of Thomas Reid. In other words, the Scottish Enlightenment was oriented towards useful knowledge. The function of human enquiry, for many of these thinkers, was to improve the world (Bow, 2018). This may itself have reflected a Calvinist focus on practical knowledge (Davie, 1961), possibly because Calvinists believe in predestination and they, therefore, may believe that economic success proves that God has blessed them,

meaning that they are part of the elect (Weber, 2001). Of course, this raises the question of why the Scots adopted Calvinism, whereas the English did not. It may also be that a poorer country would, for that reason alone, be more focused on directly useful and practical concerns, whereas wealth would provide the buffer necessary to dabble in issues of a more theoretical and less quotidian nature.

This leaves important unanswered questions which, hopefully, future researchers may address. Most obviously, even if the average intelligence of the Scots and the English was significantly different in 1700, were there differences in specific cognitive abilities, such as spatial or mathematical? According to a study published in 1979, Scottish intelligence is slightly lower than that of English, but this may not have been the case 300 years ago and, moreover, a significant reason for regional differences appears to be migration to the southeast of England since 1751 (Lynn, 1979). Such data should be examined in more detail to determine if there are differences between English and Scots in terms of narrow forms of intelligence.

Likewise, are there average personality differences between the English and the Scots, sufficient to have some explanatory power in terms of the achievement differences which we have highlighted? One study has found that, compared to the English, the Scots are more introverted, more agreeable, more conscientious and less neurotic (Rentfrow et al., 2015). However, this survey utilised samples that employed self-assessment personality instruments. These can be problematic when comparing different groups because they tend to compare themselves to those they know personally. For this reason, proxies for the Big five personality traits may be more useful. For example, the English suicide rate, age-controlled, as of 2023 is 14 per 100,000, whereas it is 10 per 100,000 in England (*National Records of Scotland*, 13th August 2024).⁴ This would imply higher Neuroticism in Scotland, at least on this sub-trait. Future research could collect a variety of proxies of this kind to assess possible personality differences between the two countries.

Appendix

See Table 3.

⁴ National Records of Scotland. (13th August 2024). Increase in deaths by suicide. https://www.nrscotland.gov.uk/latest-news/increase-in-deaths-by-suicide/?utm_source=chatgpt.com



Table 3 List of industrial innovations by Englishmen and Scotsmen, 1700–1899, drawing on Murray (2003)

Name	Year	Nationality	Index
Arkwright, Richard	1772	English	27
Armstrong, William	1850	English	10
Aspdin, Joseph	1839	English	11
Babbage, Charles	1832	English	33
Bell, Alexander	1887	Scottish*	25
Bell, Patrick	1839	Scottish*	11
Bessemer, Henry	1853	English	34
Boulton, Matthew	1768	English	17
Brunel, Isambard	1846	English	23
Cartwright, Edmund	1783	English	10
Cayley, George	1813	English	24
Cooke, William	1846	English	13
Cort, Henry	1780	English	14
Crompton, Samuel	1793	English	7
Crookes, William	1872	English	1
Cross, Charles	1895	English	12
Darby, Abraham	1717	English	18
Darby, Abraham III	1790	English	11
Davy, Humphrey	1818	English	18
Dewar, James	1882	Scottish*	13
Dolland, John	1746	English	1
Dunlop, John	1880	English	10
Faraday, Michael	1831	English	31
Fleming, John	1889	English	17
Fox Talbot, William	1840	English	16
Francis, James Bicheno	1855	English	8
Hadfield, Robert	1898	English	6
Hadley, John	1722	English	10
Hancock, Thomas	1826	English	9
Hargreaves, James	1760	English	10
Harrison, John	1733	English	18
Hornblower, Jonathan	1793	English	12
Hughes, David	1871	English	14
Huntsman, Benjamin	1744	English	11
Kay, John	1744	English	15
Lawes, John	1854	English	16
Lodge, Oliver	1891	English	10
Macmillan, Kirkpatrick	1839	Scottish*	7
Maskeleyne, Nevil	1772	English	6
Maudslay, Henry	1811	English	15
McAdam, John	1796	Scottish*	12
Meikle, Andrew	1783	Scottish*	9
Murdock, William	1794	Scottish*	24
Nasmyth, James	1848	Scottish*	13
Newcomen, Thomas	1703	English	33
Nicholson, William	1793	English	1
Parkes, Alexander	1853	English	17
Rankine, William	1860	Scottish*	4
Reynolds, Osborne	1882	English	1
Roebuck, John	1758	English	14
Smeaton, John	1764	English	37
Stephenson, George	1821	English	30
Strutt, Jedediah	1764	English	8



Table 3 (continued)

Name	Year	Nationality	Index
Swan, Joseph	1868	English	24
Thomson, James	1862	Scottish*	4
Thomson, William	1864	Scottish*	29
Trevithick, Richard	1811	English	29
Tull, Jethro	1714	English	17
Watt, James	1776	Scottish*	100
Wedgwood, Josiah	1770	English	11
Wheatstone, Charles	1842	English	32
Whitworth, Joseph	1843	English	14
Wilkinson, John	1846	English	32
Young, James	1862	Scottish*	10
<i>Astronomy</i>			
Adams, John+	1859	English	16
Airy, George	1841	English	1
Baily, Francis	1814	English	6
Bradley, James	1733	English	14
Carrington, Richard	1866	English	11
De La Rue, Warren	1859	English	11
Henderson, Thomas	1838	Scottish	12
Herschel, John	1832	English	27
Huggins, William	1864	English	37
Lassell, William	1839	English	21
Lockyer, Joseph	1876	English	15
Maskelyne, Nevil+	1772	English	2
Michell, John	1764	English	2
Wright, Thomas	1751	English	4
<i>Biology</i>			
Brown, Robert	1813	Scottish*	23
Buckland, William	1824	English	11
Carlisle, Anthony	1808	English	16
Darwin, Charles	1849	English	100
Forbes, Edward	1854	English	18
Galton, Francis	1862	English	27
Huxley, Thomas	1865	English	22
Lister, Joseph	1826	English	1
Owen, Richard	1844	English	23
Prout, William	1825	English	16
Sherrington, Charles	1897	English	18
Wallace, Alfred	1863	English	34
<i>Chemistry</i>			
Abel+	1867	English	1
Black	1768	Scottish*	33
Couper	1871	Scottish*	5
Crookes+	1872	English	30
Cross+	1895	English	1
Cullen	1750	Scottish*	1
Dalton	1806	English	38
Daniel	1830	English	1
Davy, E	1825	English	1
Davy, H+	1818	English	46
Dewar+	1882	Scottish*	14
Draper	1851	English	2
Fox Talbot+	1840	English	1



Table 3 (continued)

Name	Year	Nationality	Index
Frankland	1865	English	3
Graham	1845	English*	13
Gregor	1801	English	4
Grove	1851	English	1
Hatchett	1805	English	5
Henry	1814	English	5
Macintosh	1806	Scottish*	1
Newlands	1877	English	7
Perkin	1878	English	7
Priestly	1773	English	49
Ramsay	1892	Scottish*	31
Roscoe	1873	English	2
Rutherford	1779	Scottish*	5
Swinburne	1898	Scottish*	1
Tennant	1801	English	14
Waterston	1851	Scottish*	2
Williamson	1864	English	3
Wollaston	1806	English	22
Young+	1862	Scottish	1
<i>Earth Sciences</i>			
Ewing	1895	Scottish*	8
Hall	1801	Scottish*	16
Hutton	1766	Scottish*	77
Lyell	1837	Scottish*	100
Maclure	1803	Scottish*	6
Mallett+	1850	English	4
Mantell	1830	English	13
Milne	1899	English	14
Murchison	1832	Scottish*	40
Nicol	1808	Scottish*	2
Rennell	1782	English	4
Sedgwick+	1825	English	31
Smith, William	1809	English	55
Sorby	1866	English	4
Thomson, Charles	1870	Scottish*	5
Woodward, John	1705	English	1
<i>Physics</i>			
Brewster	1821	Scottish*	6
Canton	1758	English	1
Cavendish	1771	English	57
Faraday+	1831	English	86
Gray	1706	English	15
Hauksbee	1706	English	14
Heaviside	1890	English	1
Joule	1858	English	40
Lodge+	1891	English	1
Strutt	1882	English	27
Sturgeon	1823	English	8
Thomson, J.J	1896	English	51
Thomson, W	1854	Scottish*	27
Watson, W.+	1755	Scottish*	1
Wheatstone+	1842	English	10



Table 3 (continued)

Name	Year	Nationality	Index
<i>Medicine</i>			
Addison	1833	E	22
Beddoes	1800	E	17
Bell, C+	1814	S*	16
Bright	1829	E	21
Darwin, E	1771	E	6
Garrod	1897	E	3
Hodgkin, T	1838	E	10
Hunter	1768	S*	34
Jackson, J	1875	E	13
Jenner	1789	E	32
Lind	1756	S*	23
Lister+	1867	E	43
Manson	1884	S*	14
Parkinson	1795	E	10
Pott	1754	E	7
Pringle	1747	S*	6
Ross	1897	E	20
Sharpey-Shaper	1890	E	2
Simpson	1851	S*	19
Snow	1853	E	28
Watson, T	1832	E	2
Whytt	1754	S*	6
Withering	1781	E	22

Asterisk indicates that they are Scottish

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Declarations

Conflict of interest We declare no conflict of interest.

References

- Allen, R. C. (2009). *The British industrial revolution in global perspective*. Cambridge University Press.
- Bow, C. (2018). *Common sense in the Scottish enlightenment*. Oxford University Press.
- Broadie, A. (2001). *The Scottish enlightenment*. Edinburgh: Birlinn.
- Curran, S. (1988). *Issues in science and education*. Parthenon.
- Davie, G. E. (1961). *The democratic intellect: Scotland and her universities in the nineteenth century*. Edinburgh University Press.
- Devine, T. M. (2012a). *To the ends of the earth: Scotland's global diaspora, 1750–2010*. Allen Lane.
- Devine, T. M. (2012b). *The Scottish nation: A modern history*. Penguin Books.
- Dutton, E. (2023). *Breeding the human herd: Eugenics, dysgenics and the future of the species*. Imperium Press.
- Dutton, E. & Charlton, B.G. (2015). *The Genius Famine*. Buckingham: University of Buckingham Press.
- Dutton, E., & Madison, G. (2018). Execution, violent punishment and selection for religiousness in medieval England. *Evolutionary Psychological Science*, 4, 83–89.
- Dutton, E., & Van der Linden, D. (2017). Why is intelligence negatively associated with religiousness? *Evolutionary Psychological Science*, 3, 392–403.
- Dutton, E., te Nijenhuis, J., Madison, G., Van der Linden, D., & Metzen, D. (2020). The myth of the stupid believer: The negative religiousness-IQ nexus is not on general intelligence (g). *Journal of Religion and Health*, 59, 1567–1579.
- Flinn, M. W. (1977). *Scottish population history from the seventeenth century to the 1930s*. Cambridge University Press.
- Hahn, B. (2020). *Technology in the industrial revolution*. Cambridge University Press.
- Herman, A. (2001). *The Scottish enlightenment: The Scots' invention of the modern world*. Fourth Estate.
- Horner, W. (1993). *Nineteenth-century Scottish rhetoric: The American connection*. Southern Illinois University Press.
- Houston, R. (1985). *Scottish literacy and Scottish identity, 1600–1800*. Cambridge University Press.
- Lynn, R. (1979). The social ecology of intelligence in the British Isles. *British Journal of Social and Clinical Psychology*, 18, 1–12.
- Lynn, R. (2012). *Intelligence: A unifying construct for the social sciences*. Ulster Institute for Social Research.
- Mokyr, J. (2009). *The enlightened economy: An economic history of Britain 1700–1850*. Yale University Press.



- Murray, C. (2003). *Human accomplishment: The pursuit of excellence in the arts and sciences, 800 BC to 1950*. HarperCollins.
- Overton, M. (1996). *Agricultural revolution in England: The transformation of the agrarian economy 1500–1850*. Cambridge University Press.
- Pittock, M. (2022). *Scotland: The global history, 1603 to present*. Yale University Press.
- Randall, K. (2005). *Evangelicals et cetera: Conflict and conviction in the Church of England's parties*. Ashgate.
- Rentfrow, P. J., Jokela, M., & Lamb, M. E. (2015). Regional personality differences in Great Britain. *PLoS ONE*, 10(3), e0122245.
- Russell, B. (2014). *James Watt: Making the world anew*. Reaktion Books.
- Stephens, W. (1999). *Education in Britain, 1750–1914*. Macmillan.
- Stone, L. (2019). The size and composition of the Oxford Student Body. In L. Stone (Ed.), *The university in society, Volume I: Oxford and Cambridge from the 14th to the early 19th Century* (pp. 1580–1909). Princeton University Press.
- te Nijenhuis, J., Dutton, E., Choi, K.-Y., Lee, J.-J., Seo, E.-H., Kim, H., & Lee, K.-H. (2021). Do elderly religious people in South Korea have lower mean IQ than elderly non-religious people? *Personality and Individual Differences*, 168, 110298.
- Ward, R. (2006). *Calvin and the Bible*. Westminster John Knox Press.
- Weber, M. (2001). *The Protestant ethic and the spirit of capitalism*. Routledge.
- Wrigley, E. A., & Schofield, R. S. (1981). *The population history of England 1541–1871: A reconstruction*. Cambridge University Press.

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