

## Oxford Dictionary of National Biography

**Playfair, William** (1759-1823), *inventor of statistical graphs and writer on political economy*

by Ian Spence

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**Playfair, William** (1759-1823), inventor of statistical graphs and writer on political economy, was born on 22 September 1759 at the manse, Liff, near Dundee, the fifth of eight children of the Revd James Playfair (1712–1772), of the parish of Liff and Benvie, and Margaret Young (1719/20–1805). Much of his early education was the responsibility of his brother John Playfair (1748-1819), who was later to become professor of mathematics and natural philosophy at Edinburgh University. William married Mary Morris, probably in 1779, and they had two sons and three daughters between 1780 and 1792.

In 1786 and 1801, Playfair invented three fundamental forms of statistical graph—the time-series line graph, the bar chart, and the pie chart—and he did so without significant precursors. Hence he is the creator of all the basic styles of graph with the exception of the scatterplot, which did not appear until the end of the nineteenth century. A few examples of line graphs precede Playfair, but these are mostly representations of theoretical functions with data superimposed and are conspicuous by their isolation. His contributions to the development of statistical graphics remain his life's signal accomplishment. Although this work was received with indifference, he rightly never faltered in his conviction that he had found the best way to display empirical data. In the two centuries since, there has been no appreciable improvement on his designs.

Playfair was uniquely prepared by education and circumstances for these innovations. He was apprenticed (1774–7) under Andrew Meikle, millwright to the Rennie family, at the Houston Mill on the Phantassie estate, near East Linton. The fourth son of the family, John Rennie, was a fellow engineer-in-training. Thereafter, Playfair was taken on by Boulton and Watt in Birmingham, spending much of his tenure (1777–81) working in James Watt's house at Harper's Hill, preparing and copying drawings of the steam engines. Playfair idolized his master and wrote of him (1819) with admiration on Watt's death.

Playfair was acquainted with the members of the Lunar Society, including Joseph

Priestley, whose chronological diagrams inspired the bar chart, and James Keir. Playfair and Keir were associates in the company formed to market Watt's copying machine, but this venture had little success. Between 1781 and 1785 Playfair applied for and obtained four patents for working metals, elaborations of the methods previously developed at the Soho manufactory of Boulton and Watt. Keir disputed the originality, believing that his own ideas had been appropriated, and there was an acrimonious breach. Towards the end of 1781 Playfair left Boulton and Watt with William Wilson, a co-worker, to set up as silversmiths and platemakers in Marylebone, Middlesex. The partnership did not prosper; large debts were run up and the enterprise foundered. An often-to-be-repeated pattern of grand purpose, conflict with others, suspicion of wrongdoing, and ultimate business failure was thus established.

Playfair started to write about economics in the *Regulation of the Interest of Money* (1785); he wrote both for gain and from conviction. His several subsequent books and pamphlets on economics include one of the first critical editions (1805) of Adam Smith's *Wealth of Nations*. It contained sharp criticism of Smith's ideas together with supplementary material to bring the work up to date, but this edition was not well received.

Although a preliminary manuscript circulated privately in the previous year, Playfair's *Commercial and Political Atlas* of 1786 was the first publication to contain statistical charts. The *Atlas* was devoted to an examination of English trade during the eighteenth century. Though modelled on the familiar geographical atlas, it contained no maps. It was unusual in format: the layout was landscape and the charts were mostly foldouts, two to three times larger than the volume itself. In the charts, Playfair plotted pounds sterling against time in forty-four time-series line graphs. The book also contained a solitary bar chart, an oddity made necessary because he did not have sufficient data to construct a line graph. Ironically, this was the only graph not to include time as a dimension despite the inspiration of Priestley's (1765) chronological charts. Playfair sought forgiveness for the shortcoming: 'This Chart ... does not comprehend any portion of time, and it is much inferior in utility to those that do' (Playfair, *Atlas*, 101).

The graphs in the *Atlas* differ little from those in use today: hachure, shading, colour coding, and grids with major and minor divisions were employed. The charts were used to depict actual, missing, and hypothetical data, the various forms being differentiated by the kind of line used, solid or broken. In addition to functional variation, many charts emphasized area, indicating accumulated or total amounts. All included a descriptive title in the body of the chart and labelling of the axes. The first and second editions contained the numerical data—inserted at James Watt's urging—but by the third edition Playfair had sufficient confidence to discard the

tables. As he certainly did in later publications, Playfair probably engraved the lines on the copper printing plates himself, drawing on his experience as an engineer.

Despite isolated critical favour, this foray into publishing and economics earned Playfair neither riches nor reputation and he left for Paris in 1787. English industry and commerce were in the vanguard and Playfair believed that he would be well placed to profit in a France striving to industrialize. His new aim was to establish a rolling mill in the style of Boulton and Watt. Although Louis XVI himself approved the plan, nothing came of it, and Playfair abandoned engineering for the world of enterprise.

Playfair entered into a partnership with Joel Barlow, lawyer, sometime poet, and Parisian representative of the American Scioto Land Company. The bungled efforts of the Scioto partners to make their fortunes and to establish a colony of French settlers on the Ohio River in 1789–91 is a fascinating episode in early American history, the full story of which will probably never be told. The enterprise involved distinguished figures of the American War of Independence and Playfair's participation is a quirk of history. Suspected of embezzlement in the collapse, he was subsequently involved in other legal entanglements before leaving France shortly before the terror of 1793.

Playfair spent the years between 1793 and 1814 in London, with occasional trips to the continent. He attempted to emulate the freewheeling schemes he had seen succeed in revolutionary Paris, but without success. Playfair narrowly escaped prosecution by the Bank of England in 1797 in connection with a bank that he and Jan Caspar Hartsinck had established. He continued to write, his eventual output numbering over one hundred books and pamphlets. He co-edited a daily paper, *The Tomahawk*, that lasted but 113 issues, and also a weekly, *Anticipation*, that endured no longer. He inevitably fell back on engineering, working as a gun-carriage maker, and supplemented his income by dubious means. One swindle led to conviction at the court of king's bench in 1805.

During this period, Playfair published several tracts that included graphs, the most notable being *Lineal Arithmetic* (1798) and *Decline and Fall of Powerful and Wealthy Nations* (1805). In the *Statistical Breviary* (1801), he introduced the circle diagram and pie chart that used area to represent the relative sizes of geographical regions. In 1809–11 he published his massive *British Family Antiquity* (9 vols.), which contained illustrations and chronological diagrams; hopes of money were clearly the driving force.

Playfair's charts were not readily accepted, especially in Britain. This may be ascribed to a resistance to illustration in scientific writing, technical difficulties of

production and publication, and concerns regarding accuracy that were not eased by Playfair's occasional carelessness and his less than reputable personal standing. He was received more kindly in Germany and France, gaining widespread approval, from the professional geographer Alexander von Humboldt to the amateur Louis XVI, in whose opinion the charts 'spoke all languages and were very clear and easily understood' (Playfair, unpublished MS, 1822–3). The charts started to catch on in Britain, by reverse diffusion, more than fifty years after their conception there. Yet, even as late as the early twentieth century, Playfair's role in the invention of statistical graphs was little known.

Playfair returned to France after the restoration of the Bourbon monarchy but his proneness to disputation soon made him unwelcome and he moved back to London. In his remaining years, he seems to have lost enthusiasm and energy for the 'grand scheme'. Life cannot have been easy for one accustomed to seeing large sums come and go in the speculations of his middle years. In 1816 he descended to extortion when he attempted to broker the sale, to Lord Archibald Douglas, of papers alleged to relate to the Douglas cause of half a century earlier. The documents almost certainly never existed and the blackmail did not succeed. In the same year, he used a similar tactic to procure a 'loan' from his fellow former apprentice John Rennie, by this time celebrated for Waterloo Bridge and other familiar constructions.

Playfair's final years saw a renewed interest in economics and his last publications include several charts, including some exceptional examples. His interest in agricultural matters was the stimulus for the last two works (1821, 1822) that examined the difficulties experienced by English farmers in the early nineteenth century. William Playfair died in poverty on 11 February 1823 at Covent Garden, London, probably at 43 Bedford Street. He was survived by his wife and four of his children, one of whom, Andrew William, had emigrated to Canada where he became prominent in the military and was successful in private business, founding the town of Playfairville, Ontario, not far from Ottawa. Andrew William persuaded his elder brother and sister, John and Elizabeth, to join him in Canada and their descendants have since prospered and spread throughout the dominion.

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