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William Stanley Jevons, Fellow of the Philosophical Society of New South Wales, 1856–1859

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Abstract

This paper attempts to accomplish three things: to report on Jevons' activities while in Sydney, specifically with the Philosophical Society; to argue that his activities in Sydney led directly to his work in economic theory and application on his return to England; and to underline Jevons' achievements in independently pioneering what is now known as "neo-classical" microeconomics, along with writers in France and Austria. It complements Castles' 2004 address (Castles, 2016).

Introduction

William Stanley Jevons was born in Liverpool on September 1, 1835. His father, Thomas Jevons, was an iron merchant and engineer who constructed one of the first iron boats. His maternal grandfather was the historian William Roscoe. Aged 16, he entered University College, London, and studied chemistry and botany. In 1853, before graduating, he accepted a well-paid post as assayer at the new Sydney Mint on Macquarie Street, possibly as a consequence of his father's business having collapsed. He arrived in Melbourne on September 24, 1854, and in Sydney soon after.

He threw himself into the intellectual life of the colony: he collected and studied local plants; he documented the geology of the Hawkesbury basin; he wrote the first study of Australasian weather patterns; he researched the formation of clouds; he made pioneering "social surveys" of Sydney and Goulburn; he debated the economics of railway construction and land allocation in the pages of the newspapers.[1]

It is recorded that Jevons attended meetings of the Philosophical Society on the following dates: 13 June 1856, 8 July 1857, and 9 December 1857, and later in the monthly *Sydney Magazine of Science and Arts*; photographs of his were included in a Photographic Exhibition of the Philosophical Society at the Australian Library on 19 December 1859, although he had left Australia months previously, returning to England via North America.

While in Sydney Jevons kept a detailed journal and diaries, and sent regular letters to his cousin, his sisters, his brother, and his father, describing the environment, his activities, his ideas, and innermost thoughts. These have since been published, first, by his widow, in 1886, and, then, in several volumes, by the Royal Economic Society, in 1973−81.

[1] He was not above sending the odd riddle to the papers: "Why ought the officers of the Mint to be prosecuted for treason? Because they are constantly engaged in carrying out a design upon the sovereign. — J. Jevons, Royal Mint." *Sydney Morning Herald*, 20 Jan. 1859, p. 5.

Consequently, we have a reasonable idea of the development of his intellectual life during his Sydney sojourn.

So what influence did his time in Sydney have on Jevons' thinking, and what role did it play in bringing his ideas to fruition? In fact, Jevons said later that nearly all his ideas came to him during the period he spent in Sydney. The new colonial city certainly gave him the time, the money and the intellectual freedom to undertake work in a wide range of areas: meteorology, photography, geography, geology, botany and natural science and a social survey of the city itself.

From Black (1973), we know that on June 25, 1854, he writes, "... though I have got a pretty complete set of common chemical Apparatus and chemicals, I feel as if I should take more to Geology & botany, though I don't at all intend to stick to Science above everything else all my life" (Black, p. 78). On October 31, 1855, he talks of intending to compile and send "Meteorological Reports to some paper" (Black, p. 198); the first such published report appeared in the *Empire* on 3 September 1856.

On July 19, 1856, the *Sydney Morning Herald* published his first letter on "the science of economy," about the need for profitability in railway construction (Black, pp. 235). This was in reaction to the Governor's declaration "that a railway need not necessarily be capable of paying any profits, since indirect benefits to the population may repay its costs." (Black, p. 265). Sir William Denison had been an officer in the Royal Engineers.

On October 21, 1856, Jevons writes that "a Scientific education is one of the best things possible ... It tends to give your opinions and thoughts a sort of *certainty*, *force*, and *clearness* which forms an excellent foundation for other sorts of knowledge less precisely determined and established" (Black, p. 244). Apart from his meteorological work, he was very interested in botany, music, and the theatre.

On April 4, 1857, Jevons writes "I have been much occupied lately with a new Subject viz, Political Economy, which seems to mostly suit my exact method of thought." (Black, p. 280). He had read Smith's *Wealth of Nations*, as well as more recent books, and had just published a letter in the *Empire* "on some questions of Economy here" (against protection) and followed that with a letter on the need for "wise regulations on the sale or distribution of unoccupied lands of the colony, and of a right policy in the formation of railways" (Black, pp. 282). On June 17, he writes "the subject I have been most of all concerned in for the last six months is Political Economy," having read books by Smith, Chambers, Martineau, Mill, Whately, and Chaning. (Black, p. 292).[2]

In a letter of February 28, 1858, Jevons expounds to his sister: "*Economy*, scientifically speaking, is a very contracted science; it is in fact a sort of vague mathematics which calculates the causes and effects of man's industry, and shows how it may best be applied. ... I have an idea ... that my insight into the foundations and nature of the knowledge of man is deeper than that of most men or writers ... To extend and perfect the abstract or the detailed and practical knowledge of man and society is perhaps the most useful and necessary work in which any one can now engage. There are plenty of people engaged with physical science, and practical science and arts may be left to look after themselves, but thoroughly to understand the principles of society appears to me now to be the most cogent business." (Black, pp. 321).

On June 9, 1858, he says: "Social science is the wide subject before me, and I have

[2] See also the Extracts from the Personal Diaries, R. D. C. Black (ed.), *Vol. VII*, 1981, pp. 115.

even had for many years the idea of a work on 'Towns & Cities,' to analyse their constitution, and causes, the relative character of their parts, & the relative character of particular cities & thus eventually lead to such knowledge of their nature & shall ensure their improvement, as any Scientific knowledge is eventually reduced to practice." (Black, pp. 327).

On August 4, 1858, Jevons says, "It seems to me that *Man* is a subject as little understood now as the Heavens (Astronomy) were by the Ancients. Within the last hundred years, sciences almost innumerable have sprung up, but mostly devoted to physical Nature. Comparatively few have perceived that Human Nature may also be the subject of a science. It is indeed a many-sided subject. Religion, metaphysics, ethics, jurisprudence, political economy, politics, & even, medicine, art, poetry and many other studies all have man for the subject. But the social condition of man as influenced by the many internal & external circumstances is perhaps an indefinite but a wide & rich field for future research." (Black, pp. 335).

In his penultimate letter from Sydney, on January 30, 1859, Jevons asks his sister, " … does it not strike you that just as in Physical Science there are general & profound principles deducible from a great number of physical phenomena, so in treating of Man or Society there must also be general principles and laws which underlie all the present discussions & partial arguments? ... Man is said to possess *free* will but however this may be, he is at least a phenomenon in which effect is always connected with *cause*. All the investigations of Social Science must proceed on the assumption that there are causes as make people good & bad, happy & miserable, rich & poor, as well as strong & feeble. It follows that each individual man must be a creature of *cause & effect*. ... To attempt to define the foundations of our knowledge of man, is surely a work worth a lifetime ..."

He socialised with members of the Philosophical Society: on 13 July 1857 he spent the day "taking a bush walk with the old Rev. Mr. Clarke, the geologist, afterwards dining with him, & Mrs. Clarke, and the two Miss Clarkes." (Black, p. 298). It was, ironically, W. B. Clarke, who, as president of the Society, urged it in a direction away from Jevons' emerging interests: for the next century it focussed very much on the physical sciences, largely excluding economics and other social sciences.

So he returned to England, completed his B.A. and M.A. degrees, and was elected to a chair as the professor of logic and mental and moral philosophy and Cobden professor of political economy at Owens College, Manchester, in 1866. Meanwhile, in Australia he was remembered as the inventor of a sun gauge (1857), and the author of a contentious study of clouds (1857) and of The Climatology of Australasia (1859), as well as being a pioneering photographer (Bourke, 1955). Later, the newspapers reported his analysis of gold prices (1863), and his influential book on the effects of the exhaustion of British coal mines (1866). Australian newspapers were, however, almost mute on his advances in theoretical economics.

On the basis of entries in Jevons' diary for 1860, La Nauze (1953) states that "young Jevons arrived on one identifiable day, February 19, 1860, at a comprehension of the *true Theory of Economy*." This is less than twelve months after his leaving Sydney. In a letter to his brother, he says that his theory is "so thorough-going and consistent, that I cannot now read other books on the subject without indignation. ... One of the most important axioms is, that as the quantity of any commodity, for instance, plain food, which a man has to consume, increases, so the utility

or benefit derived from last portion used decreases in degree." (H. Jevons, 1886, p. 151). This is decreasing marginal utility, as we now know it.

Jevons wrote up his theory of value in a paper for the British Association for the Advancement of Science in 1862, which was printed in 1866. There was little recognition in Britain, given the sway of John Stuart Mills' ideas. In his 1871 book he described his theory in greater depth.

In establishing his utility theory, Jevons' training in science and measurement was very important. The quantities in the theory (quantities, prices) could be exactly measured, although its maximand, utility, was subjective. "A unit of pleasure or of pain is difficult even to conceive; but it is the amount of these feelings which is continually prompting us to buying and selling, borrowing and lending, labouring and resting, producing and consuming; and it is from the quantitative effects of the feelings that we must estimate their comparative amounts. We can no more know or measure gravity in its own nature than we can measure a feeling; but, just as we measure gravity by its effects in the motion of a pendulum, so we may estimate the equality or inequality of feelings by the decisions of the human mind." (Jevons, 1871, p. 11).

For Jevons, value was directly a function of utility. Perhaps I can illuminate how this notion was new in 1871 by an anecdote from 1961. I had just turned 15, the age in Victoria in those days when boys became men, at least as far as the barber was concerned: we were now, under the current price regulations, charged men's prices for our haircuts. I remember sitting in Mr. Merriman's chair and arguing with him that the prices should be reversed: cutting men's hair is easier than cutting boys' hair; men might begin to lose their hair as they age; the conversation with men is more interesting for the barber; and men sit still without wiggling. So men's haircuts should cost less, young Robert argued — in vain.

Turns out, although I didn't know it, that my argument was consistent with the classical theory of value (from before 1860), which states, roughly, that value, broadly speaking, derives from the labour used to produce the product, here the haircut: the cost to the barber of a man's haircut is less than a boy's, so the price charged should be lower.[3]

I had overlooked a development dating from Jevons' writings of the 1860s, in which he argued that the value (of the haircut) depends on the utility the customer associates with it. And men care more about their appearance than do boys, and moreover are able to pay more than boys can. So, on Jevons' theory of neoclassical value, men's haircuts should cost more than boys' do, so long as the barber is happy to cut at that price.

From his theory of utility and value, Jevons constructed a theory of exchange and a theory of labour supply and capital. Although he did not know it in 1862 or 1871, his utility theory was not the first, which he generously acknowledged in the preface to the second edition of his book (in 1879[4]). But many of his theoretical contributions, developed independently, were original, unassailable, and of great usefulness.[5]

Jevons' economic ideas continue to resonate. Two of his applied studies received much more attention at the time. His 1863

[3] My argument also echoed the "labour theory of value," used in Karl Marx's *Capital* (1867) in a misguided attempt to explain relative prices. Marx has been criticised for ignoring developments in economic theory, such as those of Jevons'.

[4] See http://oll.libertyfund.org/titles/jevons-the-theory-of-political-economy

[5] It must have been the *Zeitgeist*: two other men, Carl Menger (1840–1921), an Austrian, and Léon Walras (1834–1910), a Frenchman, published similar books in the 1870s. These three are the pioneers of the marginalist revolution of neo-classical microeconomics.

pamphlet on the price of gold made a remarkably accurate estimate of a 9 per cent fall in the value of gold between 1848 and 1860, a time when many gold mines had opened in California and Australia. In doing so, he virtually invented the technique for constructing price index numbers; John Maynard Keynes, a first-rate mathematician, stated that Jevons had "made as much progress in this brief pamphlet as has been made by all succeeding authors put together." (Keynes, 1936, p. 525.)[6]

In his influential 1865 book, *The Coal Question*, Jevons was pessimistic about Great Britain's future as its coal resources — the fuel of its industrial revolution — became economically exhausted. He argued that increased "economy" of coal use, by which he meant increased energy efficiency, would not delay this date. He concluded:

> It is wholly a confusion of ideas to suppose that the economical use of fuel is equivalent to a diminished consumption. The very contrary is the truth.

That is, he was arguing that increased energy efficiency "renders the employment of coal more profitable, and thus the present demand for coal is increased."

This is the so-called Jevons paradox: technological progress increases energy efficiency (reducing the amount necessary for any one use) but the rate of consumption of that fuel might rise because of the lower effective price and increased demand (the rebound effect). Which of these effects predominates continues to be a contentious issue, and the debate has even escaped from the pages of the learned journals. For instance, in 2010, an article in the *New Yorker* (Owen 2010) discussed the Jevons paradox, and there was a debate in the pages of the *New York Times* in 2012.[7] Castles (2016) overlooked this continuing influence of Jevons on economic thinking, 150 years after *Coal* was published.

In 1864 Jevons published a book based on George Boole's system of logic. In 1869 he built his "Logic Piano," a device for performing a function provided today by a truth table. He had essentially mechanized Boolean logic, a key aspect of contemporary computing; he was the first.[8] (Barrett and Connell, 2006). Later he became Professor of Economics at University College, London. In 1872 he became only the second economist to be elected as a Fellow of the Royal Society of London. His son, Herbert Stanley Jevons, published papers in this *Journal* in 1911 and 1912 on geology.

He was a true polymath. No other Fellow of our Royal Society or its antecedents (apart from Charles Darwin[9]) has had such an impact on the intellectual life of the world. Swimming in the English Channel on August 13, 1882, he drowned, aged 46. We should honour his memory.

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[6] Indeed, according to Harrod (1951, pp. 106), the 22-year-old Keynes, on first reading Jevons' work wrote, "I am convinced that he was one of the minds of the century."

[7] Indeed, there are over 2,200 articles/books in Google Scholar that include the phrase "Jevons Paradox."

[8] The original Jevons' Logic Machine is held at the Museum for the History of Science, Oxford.

[9] Kelly (2009) includes a copy of a letter from Darwin of Oct. 28, 1879, accepting his honorary membership of the Royal Society.

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