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William Stanley Jevons and the Making of Modern Economics, by Harro Maas. Cambridge University Press, 2005, xxii+330 pages.

Harro Maas's book on Jevons is an extremely impressive piece of scholarship – one more than deserving of the Joseph J. Spengler Book Award it recently received from the History of Economics Society. It is well researched, engagingly written, and overall very persuasive.

The book is not a biography of Jevons in the traditional, birth to grave, sense. Maas draws heavily on Jevons's intellectual and social context, but it would not be fair to call the book science studies, since it has neither the site-specific focus of micro-constructivist studies nor the interest-based explanatory strategy of more macro-sociological studies. If it must be labeled, I would call it historical epistemology – an effort to understand how and why Jevons came to consider certain theoretical propositions to be knowledge as a result of his particular personal experiences and general intellectual context.

The central thesis is that Jevons's approach to economic theory – both in his landmark *Theory of Political Economy* (TPE) and in other, more applied, research on various economic subjects – was based on at least four, fundamentally intertwined, commitments. First, a nineteenth-century British notion of mathematics: an applied-scientific notion that tied mathematics inexorably to practical, particularly physics-based, problems. Second, a statistical conception of scientific explananda – where the phenomena to be explained, and the scientific laws that provide the explanations, concern averages and not specific individual events or observations. Third, a commitment to mechanical analogy as an adequate, perhaps the only adequate, scientific mode of understanding. To build a mechanical model, or to capture the essential characteristics of some phenomenon in such a model, was, for Jevons, sufficient for rational intelligibility. Finally, and the point that seems to receive the most attention from the author, Jevons's belief in the substantive identity of the sciences of mind (moral science) and the sciences of matter (physical science). For Jevons, human consciousness was subject to the same type of scientific inquiry that characterized the physical sciences: 'There was no longer any *categorical* distinction...between mind and machines' (p. 138). This view distinguished Jevons from those like John Stuart Mill who endorsed a science of mind, but maintained that such a science would

be fundamentally different from physical science; as well as those like William Whewell who argued that no science of mind was possible at all.

Maas's explanation for Jevons's acceptance of these various interwoven positions is rich and many-faceted. It is based in part on Jevons's assimilation of certain ideas that were 'in the air' at the time and common to many late nineteenth-century British scholars – the blurring of mind and matter by Victorian psychophysiology (and the commensurate decline of associationist psychology), the development of formal logic by George Boole, and the impact of Charles Babbage's calculating machine – but it also depended on a number of individual-specific factors such as Jevons's stint as a gold assayer in Australia, the fact that he was a student of Augustus De Morgan, and his personal talent for hands-on experimental science. These and other factors came together to imbue Jevons with a fundamentally mathematical and mechanical view of scientific intelligibility (in general and in the science of political economy in particular).

One of the many impressive things about the book is the amount of attention the author gives to Jevons's lesser-known non-economic works: particularly his research on cloud formation. As Maas tells the story, Jevons's cloud studies – conducted during his time in Australia and published in 1857–58 – stand as a methodological exemplar for his view of science and thus his later economic theory.

his experimentally produced clouds should be taken as average values that captured the essential characteristics of their unstable natural counterparts. The index of truth for these experiments was twofold. First, the experimental results should 'mimic' nature's complexity – but this was only so for the informed eye that understood the causal mechanism embodied in the experimental results. Second, the ultimate criterion of truth was a mathematical rendering of the experimental results – that is, a mathematical function makes the mechanism explicit of the production of the experimental observations. . . . Jevons approached political economy in this same spirit. (pp. 94–95)

A second exceptional feature of the book is the amount of care and detail the author exhibits when the subject is *not* directly William Stanley Jevons. One expects careful scholarship and clarity of writing on Jevons in a book about Jevons, but Maas extends it to the entire cast of characters: Babbage, Bain, Cairnes, De Morgan, Jennings, Mill, Ruskin, Whewell, and others. I would particularly call attention to the excellent discussion of Mill and Cairnes – two names that appear frequently in the literature on the history and philosophy of economics, but often with less than perfect fidelity. Maas makes it quite clear that Mill ended up with his particular methodological position (like so many things in his life) by trying 'to have it both ways' (p. 178) – the desire to have both a *science* of human action and also *free will* (and the associated separate domain of human consciousness).

Jevons, like many of his contemporaries, simply dropped the metaphysics of free will from the list of things that successful human science needed to support.

Since I generally found Maas's interpretation of Jevons to be well documented and convincing, I have little critical to say about the book. The only criticism that I wish to raise here concerns the presentation of the argument in the penultimate chapter (chapter ten). For most readers this is the most important chapter, since it is the most sustained discussion of Jevons's main contribution to economic theory: his theory of value and exchange in TPE (*Theory of Political Economy*).

The interpretation that Maas provides in Chapter 10 is quite radical (in the sense that it argues that Jevons held a much more radical view than traditionally attributed to him). He argues that Jevons modeled his theory of exchange on the concept of the *mechanical balance*. Now on first gloss that may not sound very radical, but given the particular way that Jevons used the adjective *mechanical*, it actually is. Mechanical in this sense means *caused by mechanical forces* (and therefore not a matter of choice). As Maas explains, Jeremy Bentham and most others who use pleasures and pains to explain human behavior, do so on the basis of a combination of calculation and choice. The standard argument is that agents actually make such calculations (implicitly or explicitly) – and that is why it serves so effectively to predict and explain human behavior – but clearly they *could have done otherwise* ('we only adhere to the rules 'if we wish'' p. 273).

Maas provides a nice discussion of Benjamin Franklin's 'moral or prudential algebra' to clarify the difference between such 'choice' and Jevons's explanation of exchange. Franklin laid out a list of 'pros' and 'cons' (benefits and costs) in two columns and then 'prudently' made his decision on the basis of the net benefit. Such decision making may be prudent (or rational), and it certainly allows the behavior to be explained in terms of pleasures and pains, but the action is *not mechanical*; it is volitional. A mechanical balance does not reach equilibrium in this way; it is governed by mechanical *forces* and thus cannot do otherwise. Maas argues that this – the mechanical, not the volitional – is the way that Jevons employed feelings of pleasure and pain in the explanation of market exchange.

Franklin provided a prescriptive routine to aid judgement, not a mechanism that establishes equilibrium in accordance with mechanical principles. . . . To provide a mechanism, it is not sufficient to consider feelings of pleasure and pain, like Bentham, as quantities, capable of *more or less*, and therefore susceptible to 'scientific' – that is, mathematical – treatment. Rather, pleasure and pain have to be considered not just as numbers, but as forces that move the will automatically, just like forces that move the balance. (p. 273)

When one combines this mechanical view of human action with the fact that prices were fixed in Jevons's analysis ('It is well-known that Jevons's mechanics only worked for a fixed ratio of exchange' p. 275) one gets a

picture that is very different from the standard image of prices emerging from the free choices of a large number of rational self-interested agents.

Thus according to Maas's interpretation, Jevons's theory of exchange involved no price adjustment and the economic agents made no choices – action was the result of 'man's physiology – as natural forces instead of motives' (p. 274). This is indeed the '*mechanics of utility and self-interest*' (p. 275) with the emphasis on the *mechanics*, but it also makes Jevons quite radical; this is certainly not the standard view of Jevons or of early British neoclassicism in general. On the other hand, it is a view of human action that comes very close to certain positions in contemporary philosophy of mind (eliminative materialism) and also the new field of neuroeconomics.

So what is the problem? What is my criticism of Maas's discussion in chapter ten? Is it that I think Jevons's did not hold such a mechanical view? No, that is not the problem; as I said, the author's argument is quite persuasive. Is it that I think he should have done a better job reconciling his interpretation with developments such as eliminative materialism or neuroeconomics? No, reconciliation with such recent developments – though fascinating and hopefully something the author will pursue in future research – is a topic that goes well beyond a book on Jevons.

My criticism is simply that after making the case for Jevons's fully mechanical view of human action, Maas really doesn't do much with it. The last few pages of Chapter 10 and the conclusion do little to explain why Jevons has not traditionally been interpreted in this way. Or why, if he did in fact have such a view, he has long been considered one of the fathers of the neoclassical theory of rational *choice*. It is important to note that neoclassical economics – in the history of economic thought, in the hearts and minds of practicing economists, and in textbooks – is a *choice* theory; it involves rational agents choosing to do things (not chemicals in their brain and body reacting) and it has been extremely important to the success of neoclassicism that it be interpreted in that way. If agents in competitive markets do not make choices, those actions are not free, and the most important (implicitly moral) difference between markets and other ways of organizing economic activity goes out the window. If Maas is correct, Jevons had no choice theory and thus no defense of 'free' market action. He had a physiological theory of human movements. The profession accepted Jevons's mathematics, but not his notion of the mechanical agent. It seems reasonable to say that if the profession had realized that *in order to have a mathematical economic science* it would be necessary to adopt a mechanical view devoid of choice and agency (Jevons's view) then the profession would never have elevated Jevons's work in the way that it did. I am not suggesting that Maas should have addressed all of the various implications of Jevons's mechanical view on the reception of his thought or the evolution of neoclassical economics, but it would be nice to have at least some discussion of these issues. In fact, at the end of the book we get just the opposite. For example, we are told:

'These accomplishments fundamentally changed the outlook of economics on both the theoretical and practical planes' (p. 277). No, it didn't, because the 'outlook' of economics is not mechanical in Jevons's sense. If he changed the discipline, it was because the discipline misunderstood him.

'It became equally feasible to consider human deliberation in relation to price formation in terms of the calculus' (p. 277). What 'deliberation'? Chemical processes do not 'deliberate.' What 'price formation'? There is no 'price formation' in Jevons.

'As a consequence, the image of economics, that is, its tools and methods of investigation, changed distinctly and irrevocably' (p. 289). Yes, the theory changed and in particular became far more mathematical as Jevons recommended. But not for Jevons's reasons. And if Jevons's reasons had been understood, or viewed as necessary for the effective use of those mathematical tools, the tools may not have been adopted.

The bottom line here is that Maas has told a very persuasive story about Jevons, but it is a story that opens up a number of new, and extremely fascinating, lines of inquiry. It is not reasonable to expect the author to address all of the various issues thrown up by his interpretation, but it would be useful to see some hint of the various possibilities.

Although I believe this criticism is valid, I do not want to close on a negative note. *William Stanley Jevons and the Making of Modern Economics* is an extremely interesting and important book. In the end my criticism is only that the author should make it more clear that he recognizes exactly how interesting and important it actually is.

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Population Issues in Social Choice Theory, Welfare Economics, and Ethics, by Charles Blackorby, Walter Bossert, and David Donaldson. Cambridge University Press, 2005, viii+369 pages.

One of the most important issues in welfare economics and ethics is how to value changes in the population. There has been a large amount of work in philosophy on this topic, but relatively little in economics. In philosophy, the contributions of Jan Narveson, Derek Parfit, and John Broome stand out. In economics, the field has largely been dominated by the contributions of Charles Blackorby, Walter Bossert, and David Donaldson.

Over the years they have produced a significant number of papers, most of which are summarized in this book. In their writings, they have typically addressed an audience of technical economists. However, in this