Mario Bunge: Physicist, Philosopher, Champion of Science, and Citizen of the World (1919-2020)

Mario Bunge, the centenarian Argentine/Canadian physicist/philosopher passed away in the loving company of his wife Marta and children Eric and Silvia on 24th February 2020 in Montreal.

Bunge, five years ago, wrote a 500-page autobiography HERE. By drawing upon his prodigious memory for decades-old readings, events and conversations, it laid out in fascinating detail his personal, family, cultural and scholarly life. The *Memoir* is enormously educative and a delight to read. It has 1,200 entries in its Name Index. He manages to say something insightful about the life and work of nearly every person mentioned in the Index. It is a 'Who's Who?' of modern South American, Anglo-American, and European physics and philosophy. The book with ample quotations is reviewed HERE. A 30-page account of Bunge's life, achievements and central philosophical positions can be read HERE. His scientific, philosophical, social and educational positions are elaborated and appraised in a recent 41-chapter *Festschrift* HERE.

In 70 books (including many translations and revised editions) and 540 articles , written over an 80-year span, he made substantial contributions to physics, philosophy of physics, metaphysics, methodology and philosophy of science, philosophy of mathematics, philosophy of psychology, philosophy of social science, philosophy of biology, philosophy of technology, moral philosophy, social and political philosophy, medical philosophy, criminology, legal philosophy and education HERE. At age 98 he published on the philosophical, specifically ontological, implications of the discovery of Einstein's postulated gravitational waves HERE.

In terms of breadth, depth and coherence of scholarship Bunge was a standout in 20th century scientific and philosophical communities. He was a Renaissance scholar, a Citizen of the World; a convinced universalist who thought that not only were there truths in science, but also truths in ethics and politics which could be identified and defended. And although these truths were formulated within cultures having certain linguistic, mathematical, political and technical components, the truth of the formulations was independent of their parental culture.

Bunge rejected all popular multi-science options. Sciences were good, bad or bogus; addition of a national, racial, religious or political appellation – Christian, Nazi, Soviet, Maoist, Aboriginal, Islamic, Chinese, Maori, Indigenous - serves an anthropological, cultural or sociological purpose, but the appellation does not confer special tests or exemptions for truth claims. All of these cultural enterprises contain truths and useful procedures, but this does not convert the enterprise into modern science. He vigorously defended the legitimacy and utility of the concept of pseudoscience. It was not just a rhetorical slogan, it was central to his life-long critique of Freudianism and psychoanalysis, and later critiques of parapsychology, rational-choice theory and alternative medicines HERE.

Bunge was born in Buenos Aires on September 21, 1919. His father Augusto Bunge was a medical doctor and for 20 years the sole Socialist member of Argentina's parliament. His mother Mariechen was a German-educated nurse. They wanted their son to be 'a citizen of the world'; to not be defined and limited by the haphazard geography of his birth. In this they assuredly succeeded.

From an early age he was set a demanding regime of reading literature in six languages: Spanish, English, French, Italian, German and Latin, with Chinese read in translation. His parents' socialist-cosmopolitanism formed Mario's character and outlook. His early multi-lingualism was of inestimable benefit to his education, allowing him to read the classic and the best modern authors of science, philosophy and literature in their own words. It also freed him from dependence on commercial, political, religious and ideological judgements about what books would be translated and published in Argentina.

From the beginning he was concerned with education. In his mid-20s, whilst a physics and mathematics undergraduate student at *Universidad Nacional de La Plata*, he founded a Workers School (the *Universidad Obrera Argentina*). A fellow teacher was Arturo Frondizi a future President of Argentina. During this time, he wrote his first book, *Temas de Educación Popular* (Bunge 1943), dealing with the principles and practice of workers education. Under pressure

from the Argentina Communist Party and the Catholic Church, the government closed the school in 1943 when 1,000 students were enrolled. Neither reactionary bodies could tolerate independent centres for adult education, thinking and research.

Bunge graduated in physics from La Plata in 1942. In 1943 he started to work on problems of nuclear and atomic physics under the guidance of Guido Beck an Austrian refugee who had been an assistant of Heisenberg in Leipzig. Beck was the inventor of the layer model of the atomic nucleus, the first to propose the existence of the positron, and pioneered the study of beta decay. He thanks Beck for 'teaching me not to allow politics to get in the way of my science' (Bunge 1991, p.524). In the mid-1940s he had published on this topic in *Nature* and *The Physical Review*.

There followed a decade of graduate studies, research, teaching, political upheavals and being jailed briefly in 1951 for 'illegal' union activity. In this period he published a 20-page paper in *Science & Society* on 'What is Chance?' that contains the philosophical roots of his much-contested renunciation of the 'misuse' of Bayesian probability theory in scientific decision making HERE.

Bunge was granted his PhD in physics in 1952 for a dissertation on the kinematics of the relativistic electron. This was published as a book in 1960. He wrote: 'My doctoral diploma did me no good, because it was not accompanied by the Peronist party card without which I could not even get a job as a dogcatcher' (Bunge 2016, p.89).

At this time, Bunge began what would be decades of writing on a defining problem: namely refuting the orthodox, non-realist, positivist interpretation of quantum physics proposed by the dominant and dominating Copenhagen School. Briefly he thought he could collaborate with David Bohm, another quantum and political dissident, and travelled to Brazil in 1953 to do so. There was no collaboration.

Bunge was stunned that Bohm had produced a philosophical muddle mixing three mutually independent categories: realism, causality and classicism (Bunge 2016, p.92). And worst was to follow when Bohm embraced Hegel (in English translation), idealist holism, and went on international lecture tours sponsored by the Hare Krishna sect. The whole experience reinforced his contention that good science and good philosophy are interdependent, and consequently that bad philosophy results in poor science. The Bohm experience lay behind his 1961 paper on 'Cosmology and Magic' where he pointed to the philosophical problems of then 'new' steady-state cosmology which for Bunge solved a riddle by creating a mystery' HERE.

For many, Bunge's realist interpretation of quantum mechanics was his major contribution to modern physics. In 2003 he surveyed the arguments in his 'Twenty-Five Centuries of Quantum Physics: From Pythagoras to Us, and from Subjectivism to Realism' HERE. In a journal double-issue, ten physicists and philosophers laid out and appraised his 'signature' account of quantum mechanics, with Bunge replying HERE.

Bunge held chairs in physics and philosophy at the University of Buenos Aires and *Universidad Nacional de La Plata*. His appointments and funding rose and fell with changes in Peronist and military governments.

Bunge made his international philosophical debut at age 37 years at the 1956 Inter-American Philosophical Congress in Santiago, Chile. Willard Van Orman Quine, in his *Autobiography*, mentions attending this congress, and the only thing about the congress that he thought worth recording was:

> The star of the philosophical congress was Mario Bunge, an energetic and articulate young Argentinian of broad background and broad, if headstrong, intellectual concerns. He seemed to feel that the burden of bringing South America up to a northern scientific and intellectual level rested on his shoulders. He intervened eloquently in the discussion of almost every paper. (Quine 1985, p.266)

Bunge's first major book in philosophy was his 1959 *Causality: The Place of the Causal Principle in Modern Science* (Bunge 1959). The book, endorsed by Quine, was an instant success and put Bunge, and Latin American philosophy of science, firmly on the international map. It came out of the philosophical 'left field': it was, at the time, among the few books written by Latin American philosophers of science to receive international recognition. The work was translated and published in German, Hungarian, Italian, Japanese, Polish, Russian and Spanish editions. When the Russian edition arrived in Buenos Aires, the police wanted explanations. Twenty years later, a third, revised edition was published as a Dover paperback, *Causality and Modern Science* (Bunge 1979).

That the arguments of this ground-breaking, detailed anti-Aristotelian, contra-empiricist, and scientifically-informed book are ignored in major contemporary surveys and handbooks on the philosophy of causation is a matter for sociologists of philosophy to investigate.

In 1962 the Argentine generals threw out President Frondizi and instituted tighter and tighter control over universities, prompting Mario and Marta to leave Argentina and pursue their research careers elsewhere. Applications for philosophy chairs in England went nowhere. He was told by one esteemed

university: ‘we prefer to hire our own even when unpublished’ (Bunge 2016 p.155). Needless to say this left a lasting impression on him.

But the USA came to the rescue. In January 1963 he was offered and took a temporary position in philosophy at University of Texas, Austin. It was a great contrast to everything hitherto in his working life: ‘I found myself immediately surrounded by philosophers, biologists, anthropologists, and historians who were active in research and who looked to me to debate philosophical problems’ (Bunge 2016, p. 158). The same lively and congenial experiences followed with short-term appointments at University of Delaware, University of Pennsylvania and Temple University before his appointment as professor of philosophy at McGill University in Montreal in 1966 where he remained to the end.

Physicists have acknowledged the impact of Bunge’s work. In 1989 the *American Journal of Physics* asked its multi-thousand readers to vote for their favourite papers from the journal, from its founding in 1933 to 1989. In the resulting 1991 list of most memorable papers, alongside classics from Nobel Prize winners and luminaries such as Bridgman, Compton, Dyson, Fermi, Kuhn, Schwinger, Wheeler, and Wigner, was Bunge's 1956 ‘Survey of the Interpretations of Quantum Mechanics’. In 1993, the journal repeated the exercise, asking readers for the most influential papers in the journal’s first 60 years. In this list, Bunge’s 1966 paper — ‘Mach's Critique of Newtonian Mechanics’ — took its place alongside his 1956 article. This recognition of a philosopher/physicist by the world’s largest body of physics teachers and researchers is noteworthy.

Also noteworthy is that Bunge is one of only two philosophers listed in the American Association for the Advancement of Science (AAAS) Hall of Fame. The other is Bunge’s boyhood hero, Bertrand Russell.

Susan Haack lamented of contemporary philosophy that: ‘Our discipline becomes every day more specialized, more fragmented into cliques, niches, cartels, and fiefdoms, and more determinedly forgetful of its own history’ (2016). Through his long-life Bunge stood against every narrowing and narrow-minded tendency that Haack lamented.

Bunge was a systematist for whom the natural and social worlds were causally interconnected and so knowledge of those worlds needed to be interconnected; there could be no isolated or orphan disciplines. His philosophical system is laid out in detail in his monumental eight-volume *Treatise on Basic Philosophy* (1974-1989). In a 2012 journal special issue, group of economists, sociologists,

mathematicians, philosophers and cognitive scientists evaluated his systematicity as applied to their own disciplines HERE.

Bunge believed that the lessons learnt from the hard-won successes of natural science should be applied to social science; that the inquiry template forged by the best of natural science can and should be applied to the social and psychological worlds. This is the 18th century Enlightenment position. He was an unashamed defender of scientism though a critic of all ill-informed, shallow, reductionist pseudo-scientisms HERE.

Bunge's intellectual position can be more deeply appreciated when viewed alongside that of Abner Shimony (1928-2015) another stand-out philosopher/physicist who shared Bunge's concern for intellectual coherence and systematisation, and also Bunge's Enlightenment convictions and optimistic fallibilism about science and knowledge of the world HERE.

Bunge had a life-long commitment not just to research, but also to the social and cultural responsibility of academics; he was never seduced by the 'Ivory Tower' option, comfortable though it would have been at many stages of his life. He was a Public Intellectual, dramatically so in the Spanish world.

It was natural that he address the question of science and religion and did so in a long, detailed, closely argued essay co-authored with the German philosopher Martin Mahner HERE. The essay was responded to by six theologians, philosophers and educators, with Bunge and Mahner responding HERE. The whole exchange manifests the importance of clarity, relevant knowledge, and personal respect for the advancement of understanding.

The unifying thread of Bunge's life and research is the constant and vigorous advancement of the Enlightenment project that brings science and philosophy together for the advancement of human welfare. He expended the same energy on criticism of cultural and academic movements that deny or devalue the core principles of the project: naturalism; the search for objective, trans-personal, non-subjective truth; the universality of science; the value of rationality; and respect for individuals.

Bunge's passing is a loss for his family and the scholarly world. Hopefully some in the succeeding generations of philosophers, physicists and educators will be inspired to emulate his example of a wide-ranging, in-depth, cosmopolitan approach to the advancement of knowledge and the formation of a more just and equitable society. He embodies the best, and more, of the liberal education ideal.

Mario had countless dear friends throughout the world. Hundreds are named and their views elaborated upon in his *Autobiography*. It was my own privilege and pleasure to have known Mario for just the last 25 years of his life. As with nearly all who met and engaged with him, the experience was intellectually and personally enriching.

The source of the unlikely interaction of an Australian science educator with a renowned physicist/philosopher can be found in the 1968 completion of a compulsory course on philosophy of education in a University of Sydney teacher-education degree. There are some general lessons about the value of philosophy in science teaching training that can be learnt from this experience HERE.

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