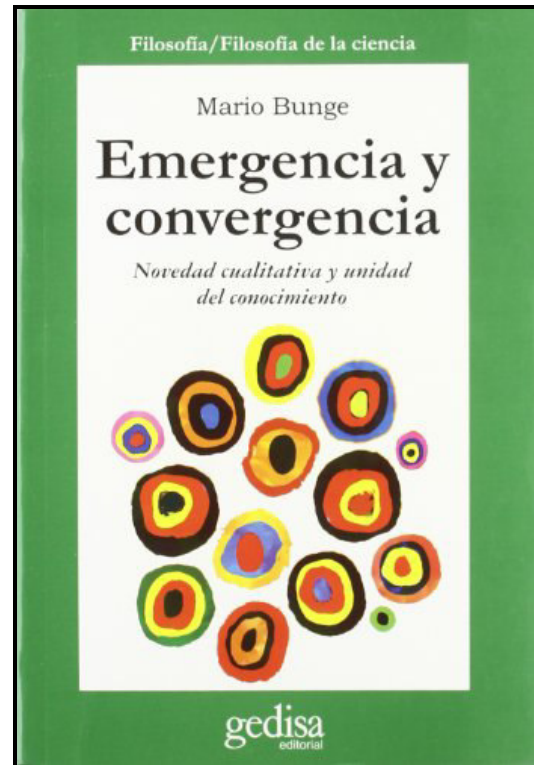
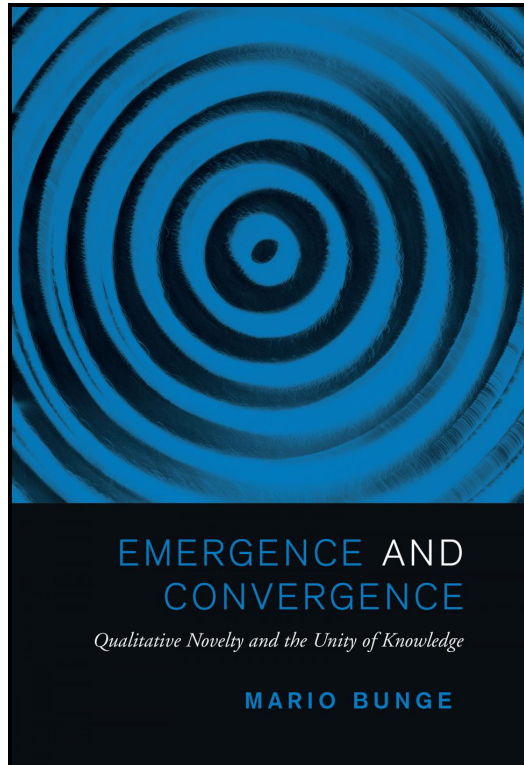


*Emergence and Convergence*  
*Qualitative Novelty and the Unity of Knowledge*  
Mario Bunge



**BUNGE, Mario, *Emergence and Convergence. Qualitative Novelty and the Unity of Knowledge*, Toronto: Toronto University Press, 2014 [2003], pp. xiv + 330 (Toronto Studies of Philosophy). ISBN 13: 978-14-4262-821-2 (paperback).**

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**About the book (from the publisher)**

Two problems continually arise in the sciences and humanities, according to Mario Bunge: parts and wholes and the origin of novelty. In *Emergence and Convergence*, he addresses these problems, as well as that of systems and their emergent properties, as exemplified by the synthesis of molecules, the creation of ideas, and social inventions.

Along the way, Bunge examines other topical problems, such as the search for the mechanisms underlying observable facts, the limitations of both individualism and holism, the reach of reduction, the abuses of Darwinism, the rational choice-hermeneutics feud, the modularity of the brain vs. the unity of the mind, the cluster of concepts around 'maybe,' the uselessness of many-worlds metaphysics and semantics, the hazards posed by Bayesianism, the nature of partial truth, the obstacles to improving medical diagnosis, and the formal conditions for the emergence of a cross-discipline.

Bunge is not interested in idle fantasies, but about many of the problems that occur in any discipline that studies reality or ways to control it. His work is about the merger of initially independent lines of inquiry, such as developmental evolutionary biology, cognitive neuroscience, and socio-economics. Bunge proposes a clear definition of the concept of emergence to replace that of supervenience and clarifies the notions of system, real possibility, inverse problem, interdiscipline, and partial truth that occur in all fields.

### **Presentación del editor**

¿Cómo emergieron las moléculas, la vida, la mente, las normas sociales, el Estado? ¿Por qué convergieron la fisicoquímica, la biofísica, la bioquímica, la neurociencia cognitiva o la socioeconomía?

Estas preguntas guían la fascinante exploración de todos los ámbitos científicos que **Mario Bunge** presenta en esta obra. Objeto de sus análisis son los mecanismos subyacentes en los hechos observables, las limitaciones del individualismo y el holismo, los alcances de la reducción, los abusos del darwinismo, las diferencias entre la elección racional y la hermenéutica, la conformación modular del cerebro en contraposición con la unidad de la mente, el conjunto de conceptos que se hallan en torno al “puede ser”, la relevancia de la verdad en todos los aspectos de la vida humana, los obstáculos a superar para lograr un diagnóstico médico correcto y las condiciones formales necesarias para la emergencia de una transdisciplina. No se trata de vanas fantasías acerca de enigmas ingeniosos pero estériles, sino de problemas de gran actualidad que se presentan en todas las disciplinas que estudian la realidad.

Si bien este libro aborda problemas filosóficos, cuando éstos son realmente importantes desbordan la filosofía. Por eso, no está dirigido sólo a filósofos profesionales, sino también a la amplia comunidad de personas que está interesada en las cuestiones que caracterizan nuestro tiempo y que nos afectan a todos.

### **About the author**

Mario Bunge was born in Buenos Aires (Argentina) in 1919. After training as a physicist –doctorate in mathematical physics, Universidad Nacional de La Plata (1952), where he learnt atomic physics and quantum mechanics from Guido Beck, an Austrian expatriate who had been an assistant of Heisenberg–, he was professor of theoretical physics (1956-1966) and philosophy, which he taught at the University of Buenos Aires from 1957 to 1963. He was the first South American philosopher of science to be trained in science.

Driven to emigrate by the political situation of his native country, particularly due to his socialist leanings, Mario Bunge initially settled in Europe, then in Montréal, where in 1966 he joined the philosophy department at McGill University, and never looked back. His career as a researcher rapidly assumed international scope and led him on to countless activities as an editor, speaker, guest professor, learned society member, and recipient of honorary distinctions, etc.

As Michael R. Matthews –University of New South Wales, Sydney, Australia– underline, the unifying thread of Mario Bunge’s scholarship is the constant and vigorous advancement of the Enlightenment Project, and criticism of cultural and academic movements that deny or devalue the core planks of the project: namely its naturalism, the search for truth, the universality of science, rationality, and respect for individuals. At a time when specialization is widely decried, and its deleterious effects on science, philosophy of science, educational research and science teaching are recognized – it is salutary to see the fruits of one person’s pursuit of the ‘Big’ scientific and philosophical picture.

Mario Bunge was the Frothingham Professor of Logic and Metaphysics at McGill University until his retirement in 2011 and is now Professor Emeritus in Philosophy.

He is author of over 80 books (including many translations into several languages) and some 500 articles mainly in English and Spanish, cofounder with logician Hugues Leblanc of the Society for Exact Philosophy, Mario Bunge set himself a task as an epistemologist, achieving a synthesis of rationalism and empiricism (*Scientific Research*, 1967, new version: *Philosophy of Science*, 1999), and also as a generalist philosopher and creator of a complete system, thanks to his monumental 8 volume *Treatise on Basic Philosophy* (1974-89), in which he defended conceptions on materialism and humanism. In his own cutting style, his *Dictionary of Philosophy* (1999) –the first edition of the *Philosophical Dictionary*–, accurately conveys this thought. Advocate of a precise philosophy “offering axiomatic and formalized expression of concepts and theories” he no less supported original positions on moral thought and politics. He is also the author of *Finding Philosophy in Social Science* (1996), *Social Science under Debate. A Philosophical Perspective* (1998), *The Sociology-Philosophy Connection* (1999), *Philosophy in Crisis: The Need for Reconstruction* (2001), *Scientific Realism: Selected Essays of Mario Bunge* (edited by Martin Mahner, 2001), *Matter and Mind. A Philosophical Inquiry* (2010), *Evaluating Philosophies* (2012), *Medical Philosophy* (2013) and *Memorias entre dos mundos* (2014).

Mario Bunge is a member of the American Association for the Advancement of Science (from 1984) and the Royal Society of Canada (from 1992). He was awarded the Premio Príncipe de Asturias of Spain in 1982 and the John Simon Guggenheim Fellowship in 1971.

### **Degrees**

PhD in physico-mathematical sciences, Universidad Nacional de La Plata (1952)

Twenty honorary doctorates

Five honorary professorships

### **Teaching and research areas**

Theoretical physics

Ontology

Epistemology

Philosophy of science

Philosophy of technology

Philosophy of mind

Value theory and ethics

### **Current research**

Philosophy of the social sciences, philosophy of mind, and metaphysics

### **Bunge's Preface**

This book is about parts and wholes, as well as about the old and the new –two perennial problems in science, technology, and the humanities. More precisely, it is about systems and their emergent properties, as exemplified by the synthesis of molecules, the origin of species, the creation of ideas, and social innovations such as the transnational corporation and the welfare state. The present work is also about the merger of initially independent lines of inquiry, such as developmental evolutionary biology, social cognitive neuroscience, socio-economics, and political sociology. This book is, in sum, about new coming from old, both in reality and in its study. Shorter: It deals with newcomers, whether concrete or conceptual. Even shorter: It is about novelty.

However, we shall also examine submergence, or the disappearance of hither-level things and their properties, as in the cases of evaporation, forgetting, and the crumbling of social systems. And we shall not forget that one of the emergence mechanisms is splitting or divergence, as exemplified by nuclear fission, cell division, and the division of a field of study into subdisciplines. Hence a more adequate title for this book would be *Emergence and Submergence, Convergence and Divergence*.

The following list of topical and intriguing problems involving both emergence and cross-disciplinarity should help elucidate the nature and importance of these categories:

<i>How did they emergent?</i>	<i>Why did they converged?</i>
<b>Molecules</b>	<b>Chemical physics</b>
<b>Life</b>	<b>Biophysics</b>
<b>Mind</b>	<b>Biochemistry</b>
<b>Social norms</b>	<b>Cognitive neuroscience</b>
<b>The State</b>	<b>Socio-economics</b>

Along the way we shall also examine such topical problems as the advantages of looking for mechanisms underneath observable facts, the limitations of both individualism and holism, the reach of reduction, the abuses of Darwinism, the rational choice–hermeneutics feud, the modularity of the brain versus the unity of the mind, the cluster of concepts around ‘maybe’, the relevance of truth to all walks of life, the obstacles to correct medical diagnosis, and the formal conditions , and the formal conditions for the emergence of a cross-discipline. (pp. xi-xii)

[...].

Although this book tackles philosophical problems, it is addressed to the broad community of people who –regardless of their specialties– are interested in intriguing general problems, rather than professional philosophers only. One reason is that all the really important philosophical problems overflow philosophy. The Glossary at the end of this book may be of help to the reader who, like the author, has had no formal philosophical training. More detailed elucidations of technical philosophical terms may be found in the author’s *Philosophical Dictionary* (2003). (pp. xii-xiii)

### **Prefacio de Mario Bunge**

Este libro trata de partes y totalidades, así como de lo antiguo y lo nuevo, dos problemas perennes de la ciencia, la tecnología y las humanidades. Más precisamente, trata de sistemas y de sus propiedades emergentes, de los cuales son ejemplos la síntesis de moléculas, el origen de las especies y la creación de ideas e innovaciones sociales tales como las empresas transnacionales y el Estado benefactor. Esta obra trata también de la fusión de líneas de investigación inicialmente independientes, como en los casos de la biología evolutiva del desarrollo, la neurociencia cognitiva social, la socioeconomía y la ciencia política. En

resumen, este libro trata de lo nuevo que surge a partir de lo viejo, tanto en la realidad como en su estudio. Abreviando: trata de recién llegados, sean concretos o conceptuales. Más brevemente: trata de la novedad.

Sin embargo, también examinaremos la extinción o desaparición [*submergence*] de cosas de niveles superiores y de sus propiedades, como en los casos de la evaporación, el olvido y el derrumbe de sistemas sociales. Y no olvidaremos que uno de los mecanismos de emergencia es la división o divergencia, tal como lo ilustran la fisión nuclear, la división celular y la división de un campo de investigación en subdisciplinas. Por lo tanto, un título más adecuado para este libro sería *Emergencia y extinción, convergencia y divergencia*. (p. 13)

La siguiente lista de problemas, todos ellos actuales y fascinantes, que involucran tanto la emergencia como la transdisciplinariedad, debería ayudar a comprender la naturaleza y la importancia de estas categorías:

<i>¿Cómo emergieron?</i>	<i>¿Por qué convergieron?</i>
<b>Las moléculas</b>	<b>La fisicoquímica</b>
<b>La vida</b>	<b>La biofísica</b>
<b>La mente</b>	<b>La bioquímica</b>
<b>Las normas sociales</b>	<b>La neurociencia cognitiva</b>
<b>El Estado</b>	<b>La socioeconomía</b>

En esta obra examinaremos problemas como los relacionados con las ventajas de buscar los mecanismos subyacentes en los hechos observables, las limitaciones del individualismo y el holismo, los alcances de la reducción, los abusos del darwinismo, las diferencias entre la elección racional y la hermenéutica, la conformación modular del cerebro en contraposición con la unidad de la mente, el conjunto de conceptos que se hallan en torno al “puede ser”, la relevancia de la verdad en todos los aspectos de la vida humana, los obstáculos a superar para lograr un diagnóstico médico correcto y las condiciones formales necesarias para la emergencia de una transdisciplina. (pp. 13-14)

Si bien este libro aborda problemas filosóficos, no está dirigido solo a filósofos profesionales, sino también a la amplia comunidad de personas que, sin importar sus especialidades, están interesadas en problemas generales y fascinantes. Una de las razones de ello es que todos los problemas filosóficos realmente importantes desbordan la filosofía. El *Glosario* ubicado al final puede ser de ayuda para el lector que, como el autor, no haya tenido entrenamiento formal en filosofía. Pueden hallarse elucidaciones más detalladas de los términos técnicos filosóficos en el *Diccionario de Filosofía* (2001)\* del autor. (p. 15)

\* Existe de esta obra una nueva edición en inglés (2003) aun no traducida al español.

## Editorial Reviews

“The sheer range of scientific/philosophical disciplines dealt with, competently and systematically, in *Emergence and Convergence*, cannot fail to impress. Quantum mechanics, economics, ethics, linguistics, truth, probability, are all brought into Bunge’s unified picture of the world.”

Philip Goff

“Mario Bunge has over the years established himself as the prime exponent of a scientifically informed philosophy of man, society, and nature. His characteristic mode of approach seeks to integrate science into a seamless whole with traditional philosophical concerns. This book – clearly written, incisively argued, and widely informed – forms part of this larger project and offers us some vintage Bunge.”

Nicholas Rescher,  
Department of Philosophy  
University of Pittsburgh

“Summing up, Bunge’s book is of great value to the analysts (and designers) whose work is based on two complementary activities –“account of particulars” and “search for pattern” (p. 282). It exactifies the still existing “debates between mindless data hunters and gatherers and those who engage in hypothesis-driven research” (p. 269). And it emphasizes the need to use “the language of all the sciences, namely, mathematics” (p. 283).

Haim Kilov, Independent Consultant and  
Steven Institute of Technology

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<http://www.gedisa.com/ficha.aspx?cod=302536&titulo=Emergencia-y-convergencia#.VTAj02ccTcs>

<http://fr.scribd.com/doc/246800585/Mario-Bunge-Emergencia-y-Convergencia#scribd>

[http://www.tematika.com/libros/humanidades--2/filosofia--2/epistemologia--2/emergencia\\_y\\_convergencia--391534.htm#indCont](http://www.tematika.com/libros/humanidades--2/filosofia--2/epistemologia--2/emergencia_y_convergencia--391534.htm#indCont) \*\*\*

“Mario Bunge es un filósofo muy completo, sistemático, universal; un filósofo clásico en este sentido, lo cual me parece admirable. Ahora hay una tendencia a que los filósofos se especialicen en un solo tema o, peor aún, que solo se dediquen a hacer juegos de palabras, completamente alejados del mundo y de la realidad, como si esta les importase un bledo. Celebro que Bunge no sea así, sino todo lo contrario. A él le interesa mucho el mundo, la sociedad, el cerebro, la física, los átomos, lo que quieras. Platón caracterizaba al filósofo como 'synoptikós' (el que tiene la visión de conjunto). En este mundo donde el trabajo está tan especializado, donde muchos saben cada vez más sobre cada vez menos, algunos pensadores, como Bertrand Russell y Mario Bunge, han conservado la curiosidad universal de la gran filosofía clásica, algo que comparto y aplaudo” (Jesús Mosterín,\* *Jot Down*)

*\* Filósofo, catedrático de Lógica y Filosofía de la Ciencia en la Universidad de Barcelona, profesor de investigación del Instituto de Filosofía del CSIC, miembro del Center for Philosophy of Science de Pittsburgh, de la Academia Europea de Londres, del Institut International de Philosophie de París y de la International Academy of Philosophy of Science.*

### **For further knowledge of Mario Bunge / Para obtener más información sobre Mario Bunge**

**Biblioteca BUNGE. Editorial LAETOLI. La Biblioteca Bunge está compuesta por textos corregidos, revisados por el autor y en su mayor parte con nuevos prólogos escritos especialmente para esta edición. Están publicados ya los seis primeros títulos. Cf.:**

“Bunge es un filósofo ilustrado, racionalista, materialista, crítico, comprometido con la ciencia y con una concepción progresista de la sociedad y la política. Por eso ha sido y sigue siendo un filósofo esencial para nuestro tiempo. Ahora que las posibilidades de que los ciudadanos accedan al conocimiento de la filosofía están viéndose reducidas en los planes de estudio, la iniciativa de la editorial Laetoli, creando esta biblioteca de obras esenciales, debe ser bienvenida” (Miguel Ángel Quintanilla, [Catedrático de Lógica y Filosofía de la Ciencia en la Universidad de Salamanca], *Materia*).

<http://www.laetoli.es/14-biblioteca-bunge-editorial-laetoli>

Mario BUNGE: Decenas de vídeos. Cf.: [Español]

[http://es.mashpedia.com/Mario\\_Bunge](http://es.mashpedia.com/Mario_Bunge)

BUNGE, Mario, “Defensa del científicismo”. Vídeo: 2h01’20”

[http://es.mashpedia.com/Mario\\_Bunge?pagetype=topic&tab=1&pagecode=CDIQAA&xn=51](http://es.mashpedia.com/Mario_Bunge?pagetype=topic&tab=1&pagecode=CDIQAA&xn=51)

La filosofía científica de Mario Bunge (+ Vídeos). Cf.:

<https://storify.com/filosofiacr/la-filosofia-cientifica-de-mario-bunge-videos>

“Mario Bunge”. Cf.:

[http://enhancedwiki.altervista.org/es.wikipedia.php?title=Mario\\_Bunge](http://enhancedwiki.altervista.org/es.wikipedia.php?title=Mario_Bunge)

[http://translate.google.com/translate?u=http%3A%2F%2Fenhancedwiki.altervista.org%2Fes.wikipedia.php?title=Mario\\_Bunge&langpair=es%7Cen&hl=en&ie=UTF-8&oe=UTF-8](http://translate.google.com/translate?u=http%3A%2F%2Fenhancedwiki.altervista.org%2Fes.wikipedia.php?title=Mario_Bunge&langpair=es%7Cen&hl=en&ie=UTF-8&oe=UTF-8)

Wikipedia y Miguel MARTÍN, “Perfil de un infatigable investigador y gran docente: Dr. Mario Augusto Bunge”, *Metafuegos Dragodsm*, 18/07/2009, pp. 10. Cf.:  
<http://dragodsm.com.ar/pdf/marioaugustobunge.pdf>

MARIO BUNGE: Questpedia  
[http://www.questpedia.org/es/Mario\\_Bunge](http://www.questpedia.org/es/Mario_Bunge)

“Mario Bunge. Sitio [no oficial] dedicado al filósofo argentino”. Cf.:  
<http://www.mariobunge.com.ar/>

“Mario Bunge”, *Wikikote*, la colección libre de citas y frases célebres. Cf.:  
[http://es.wikiquote.org/wiki/Mario\\_Bunge](http://es.wikiquote.org/wiki/Mario_Bunge)  
[http://en.wikiquote.org/wiki/Mario\\_Bunge](http://en.wikiquote.org/wiki/Mario_Bunge)

“Anexo: Bibliografía de Mario Bunge”, *Wikipedia*. Cf.  
[http://es.wikipedia.org/wiki/Anexo:Bibliograf%C3%ADa\\_de\\_Mario\\_Bunge](http://es.wikipedia.org/wiki/Anexo:Bibliograf%C3%ADa_de_Mario_Bunge)

Selected bibliography on the Scientific Philosophy of Mario Bunge. Cf.:  
<http://www.ontology.co/biblio/bungem.htm>

Grupo ALETHEIA, *Congreso-Homenaje Internacional a Mario Bunge*. Vigo, 21-23 de maio 2003,. Pontevedra (España): Grupo Aletheia, 2005, pp. 235. Cf.:

[Includes articles **in Spanish** by Mario Bunge (*Inverse problems*), Javier Aracil (*Mario Bunge and systems theory*), Alfons Barceló (*Philosophy and economics: three Bungen notions*), Ignacio Morgado Bernal (*Brain, mind and philosophy*), Jesús Mosterín (*Biographical sketch of Mario Bunge*), Miguel Ángel Quintanilla (*Instrumental rationality*) y Héctor Vucetich (*Quantum mechanics and realism*), and **in English** by Martin Mahner (*Mario Bunge's philosophy of biology*)].

Recoge las ponencias de las XIII Jornadas de Filosofía Congreso-Homenaje Internacional a Mario Bunge celebrada en Vigo en mayo de 2003. Textos en gallego, castellano e inglés.  
<http://xornal.vigo.org/xnnoticia.php?noticia=2639>

Theory PDF, “Mario Bunge”. Cf.:  
<http://pdf.theory1.net/Mario-Bunge-pdf.html>

“Professor Mario Bunge: Curriculum Vitae”, pp. 337-382. Cf.:  
<http://factorelblog.com/wp-content/uploads/2014/09/Bunge-bibliografiA.pdf>

Literatuur: Mario Bunge [Leiden Universitat]. Cf.:  
<https://openaccess.leidenuniv.nl/bitstream/handle/1887/13765/Literatuur+en+Registers.pdf;jsessionid=B51266F00B6887A1D4A17653EB9E4990?sequence=15>

JAIME, “Mario Bunge”, *epistemologíablogger: historia de la epistemología*, viernes 16 de octubre de 2009. Cf.:  
<http://epistemologiblogger.blogspot.fr/2009/10/mario-bunge.html>

“De la physique à l'éthique par Mario bunge”, *3<sup>e</sup> millenaire. L'homme en devenir*, 26 février 2010. Cf.:  
<http://www.revue3emillenaire.com/blog/de-la-physique-a-l%E2%80%99ethique-par-mario-bunge/>

“Mario Bunge se jubila”, *El Escéptico* (España), n.º 31 y 32, Septiembre 2009-Abril 2010, pp. 30-35. Cf.:

[http://www.escepticos.es/repositorio/elesceptico/numeros\\_pdf/EE\\_31-32.pdf](http://www.escepticos.es/repositorio/elesceptico/numeros_pdf/EE_31-32.pdf)

“Mario Bunge: Evaluations of his Systematic Philosophy”, *Science & Education* (Springer), Special Issue [15 articles], vol. 21, n.º 10, October 2012, pp. 1393-1613. Cf.:

Michael R. MATTHEWS / Mario Bunge, Systematic Philosophy and Science Education: An Introduction, pp. 1393-1403.

Joseph AGASSI / Between the Under-Labourer and the Master-Builder: Observations on Bunge’s Method, pp. 1405-1418.

Alberto CORDERO / Mario Bunge’s Scientific Realism, pp. 1419-1435.

Martin MAHNER / The Role of Metaphysical Naturalism in Science, pp. 1437-1459.

Richard T.W. ARTHUR / Virtual Processes and Quantum Tunneling as Fictions, pp. 1461-1473.

Peter SLEZAK / Mario Bunge’s Materialist Theory of Mind and Contemporary Cognitive Science, pp. 1475-1484.

Dan Alexander SENI / Do the Modern Neurosciences Call for a New Model of Organizational Cognition?, pp. 1485-1506.

Andreas PICKEL / Between Homo Sociologicus and Homo Biologicus. The Reflexive Self in the Age of Social Neuroscience, pp. 1507-1526.

Javier VIRUES-ORTEGA, Camilo HURTADO-PARRADO, Toby L. MARTIN & Flávia JULIO / Psycho-neural Identity as the Basis for Empirical Research and Theorization in Psychology: An Interview with Mario A. Bunge, pp. 1527-1534.

Pierre DELEPORTE / The Systemist- Emergentist view of Mahner and Bunge on ‘Species as Individuals’: What Use for Science and Education?, pp. 1535-1544.

POE YU-ZE WAN / Analytical Sociology: A Bungean Appreciation, pp. 1545-1565.

Jean-Pierre MARQUIS / Mario Bunge’s Philosophy of Mathematics: An Appraisal, pp. 1567-1594.

Andrew Michael CAVALLO / On Mario Bunge’s Definition of System and System Boundary, 1595-1509.

MARIO AGUSTO BUNGE / Does Quantum Physics Refute Realism, Materialism and Determinism?, 1601-1610.

<http://ihpst.net/news/sept-oct2012.pdf>

BUNGE, Mario, “The Maturation of Science”, in LAKATOS, Imre, and Alan MUSGRAVE (Eds.), *Problems in the Philosophy of Science. Proceedings of the International Colloquium in the Philosophy of Science*, London, 1965. Volume 3, Amsterdam: North-Holland Publishing Company, 1968, pp. 120-147. ISBN 13: 978-04445-3413-2. Cf.:

[http://sistemas.fciencias.unam.mx/~lokylog/images/stories/Alexandria/Studies%20in%20Logic%20and%20the%20Foundations%20of%20Mathematics/%5BSLFM%20049%5D%20Problems%20in%20the%20Philosophy%20of%20Science%20-%20Imre%20Lakatos,%20Alan%20Musgrave%20%5BStudies%20in%20Logic%20and%20the%20Foundations%20of%20Mathematics%5D%20\(NH%201968\)\(T\).pdf](http://sistemas.fciencias.unam.mx/~lokylog/images/stories/Alexandria/Studies%20in%20Logic%20and%20the%20Foundations%20of%20Mathematics/%5BSLFM%20049%5D%20Problems%20in%20the%20Philosophy%20of%20Science%20-%20Imre%20Lakatos,%20Alan%20Musgrave%20%5BStudies%20in%20Logic%20and%20the%20Foundations%20of%20Mathematics%5D%20(NH%201968)(T).pdf)

BUNGE, Mario, “A model for processes combining competition with cooperation”, *Applied Mathematical Modelling*, vol. 1, n.º 1, 1976, pp. 21-23. Cf.:

Cooperative processes are usually treated separately from competitive processes. Such separation is often artificial, for there are a number of processes, at all levels, where cooperation intertwines with competition. A class of processes of this kind involving two component systems is described. The components are assumed to cooperate until they attain an optimum level, and to hinder each other's growth from then on. The model boils down to a system of non-linear equations which are solved in closed form for the most interesting case, the one where the process does not even get started unless there is cooperation.

<http://www.sciencedirect.com/science/article/pii/0307904X76900196>

BUNGE, Mario, "Emergence and the Mind", *Neuroscience 2*, 1977, pp. 501–509.

This commentary deals with the mind-body problem from the point of view of a general systems theory. It starts by elucidating the notions of thing, property, state and process. In particular it shows how the concept of a state space can be used to represent the states and changes of state of a concrete thing such as the central nervous system. Next the concepts of emergence and of level are discussed. An emergent property is defined as a property possessed by a system but not by its components. The notion of level and the peculiar relation existing between levels are clarified, only to show later on that the mental cannot be regarded as a level on a par with the physical or the social. The upshot is a rationalist and naturalist pluralism.

The second half of the paper expounds and examines the various versions of psychoneural monism and dualism. Dualism is found unclear, at variance with the general framework of science, and untestable. Eliminative materialism and reductive materialism are rejected for ignoring the peculiar (emergent) properties of the central nervous system. A variety of psychoneural monism called emergentist materialism is found the most acceptable because of its compatibility with our present knowledge and because of its heuristic power. However, it is emphasized that emergentist materialism is still largely a programmatic hypothesis in search of detailed theories, in particular mathematical ones, of the various emergent functions of the central nervous system and its subsystems.

<http://www.sciencedirect.com/science/article/pii/0306452277900471>

BUNGE, Mario. *Treatise on Basic Philosophy, Volume 4, Ontology II: A World of Systems*, Dordrecht (Holland) and Boston (U.S.A.): D. Reidel Publishing Company, 1979, pp. 314. Cf.:

[http://books.google.fr/books?id=4hpNzUzH1E4C&pg=PR3&source=gb\\_s\\_selected\\_pages&cad=3#v=onepage&q&f=false](http://books.google.fr/books?id=4hpNzUzH1E4C&pg=PR3&source=gb_s_selected_pages&cad=3#v=onepage&q&f=false)

BUNGE, Mario, "A systems concept of society: Beyond individualism and holism", *Theory and Decision*, vol. 10, n.° 1-4, pp. 13-30, 1979. Cf.:

Three rival views of the nature of society are sketched: individualism, holism, and systemism. The ontological and methodological components of these doctrines are formulated and analyzed. [Individualism](#) is found wanting for making no room for social relations or emergent properties; holism, for refusing to analyze both of them and for losing sight of the individual.

A systems view is then sketched, and it is essentially this: A society is a system of interrelated individuals sharing an environment. This commonsensical idea is formalized as follows: A society  $\sigma$  is representable as an ordered triple Composition of  $\sigma$ , Environment of  $\sigma$ , Structure of  $\sigma$  , where the structure of  $\sigma$  is the collection of relations (in particular connections) among components of  $\sigma$ . Included in the structure of any  $\sigma$  are the relations of work and of managing which are regarded as typical of human society in contrast to animal societies.

Other concepts formalized in the paper are those of subsystem (in particular social subsystem), resultant property, and emergent or gestalt property. The notion of subsystem is used to build the notion of an  $F$ -sector of a society, defined as the set of all social subsystems performing a certain function  $F$  (e.g. the set of all schools). In turn, an  $F$ -institution is defined as the family of all  $F$ -sectors. Being abstractions, institutions should not be attributed a life and a mind of



their own. But, since an institution is analyzable in terms of concrete totalities (namely social subsystems), it does not comply with the individualist requirement either.

It is also shown that the systems view is inherent in any mathematical model in social science, since any such schema is essentially a set of individuals endowed with a certain structure. And it is stressed that the systems view combines the desirable features of both individualism and holism.

<http://link.springer.com/article/10.1007%2FBF00126329>

BUNGE, Mario, *Scientific Materialism*, Dordrecht: Holland/Boston: USA/London: England, D. Reidel Publishing Company, 1981, pp. 221. Cf.:

[http://www.rosenfels.org/Mario\\_Bunge\\_-\\_Scientific\\_Materialism\\_\(Reidel\\_Pub.,\\_1981\).pdf](http://www.rosenfels.org/Mario_Bunge_-_Scientific_Materialism_(Reidel_Pub.,_1981).pdf)

BUNGE, Mario, “Is Chemistry a Branch of Physics?”, *Zeitschrift für allgemeine Wissenschaftstheorie*, n.º 13, n.º 2, 1982, pp. 209-223. Cf.:

Opinion is divided as to whether chemistry is reducible to physics. The problem can be given a satisfactory solution provided three conditions are met: that a science not be identified with its theories; that several notions of theory dependence be distinguished; and that quantum chemistry, rather than classical chemistry, be compared with physics. This paper proposes to perform all three tasks. It does so by analyzing the methodological concepts concerned as well as by examining the way a chemical rate constant is derivable with the help of the quantum atomic theory. The conclusion is that chemistry, and in particular quantum chemistry, is not a part of physics although it is certainly based on the latter.

<http://link.springer.com/article/10.1007%2FBF01801556>

BUNGE, Mario, “Speculation: Wild and sound”, *New Ideas in Psychology*, vol. 1, n.º 1, 1983, pp. 3-6. Cf.:

There is no original research without guessing or speculation. However, in science there are constraints on speculation: the latter must harmonize with the bulk of background knowledge and it must be testable in some way or other. In other words, it is false that in science “anything goes”, as epistemological anarchism claims.

<http://www.sciencedirect.com/science/article/pii/0732118X83900247>

BUNGE, Mario, “Los siete pecados capitales de nuestra universidad y como redimirlos”. *Interciencia*, n.º 9, 1984, pp. 37-38. Publicado también en: *Vistas y entrevistas. Opiniones impopulares sobre temas de actualidad*, Buenos Aires: Siglo Veinte, 1987, pp. 27-32. La 2ª edición de este libro fue publicada en Buenos Aires por la Editorial Sudamericana en 1997. Originalmente publicado en el diario *El País* (Madrid, España) el 9 y 10 de julio de 1983. Cf.:

[http://elpais.com/diario/1983/07/09/sociedad/426549608\\_850215.html](http://elpais.com/diario/1983/07/09/sociedad/426549608_850215.html)

[http://elpais.com/diario/1983/07/10/sociedad/426636004\\_850215.html](http://elpais.com/diario/1983/07/10/sociedad/426636004_850215.html)

BUNGE, Mario, “From Mindless Neuroscience and Brainless Psychology to Neuropsychology”, *Annals of Theoretical Psychology*, vol. 3, 1985, pp. 115-133. Cf.:

Three main strategies for the study of behavior and mentation are examined: behaviorism, mentalism, and psychobiology. [Behaviorism](#) is found wanting for eschewing most of the problems that traditional psychology posed but left unsolved. Two kinds of mentalism are distinguished: traditional and cognitivist (or information-theoretic). Both are found wanting for ignoring the nervous system and begging the question, since they postulate the mind instead of explaining it. Only the psychobiological (or neuropsychological) approach, which regards the mind as a collection of brain functions, is found promising for studying that which

guides behavior and does the mentation, namely, the brain. It is also shown to have the advantage of promoting the union of psychology with biology and of bridging psychiatry to neurology, neurophysiology, and neurochemistry. It is argued that this approach is the only fully scientific one of the three approaches discussed in the paper.

[http://link.springer.com/chapter/10.1007%2F978-1-4613-2487-4\\_7](http://link.springer.com/chapter/10.1007%2F978-1-4613-2487-4_7)

BUNGE, Mario, "Ideology and Science", in EBERLEIN,, Gerald R., and Hal BERGHEL (Eds.), *Theory and Decision. Essays in Honor of Werner Leinfellner*, Dordrecht-Boston: D. Reidel Publishing Company, 1988, pp. 79-90. Cf.:

Mario Bunge intends his paper to be a methodological preliminary to a scientific study of some of the most influential ideologies, distinguishing between total, religious and sociopolitical ideologies. In his critical assessment he outlines the concepts of a fundamentalist and a scientific ideology, and discusses some of their methodological and epistemological problems: (a) What are the differences between ideology and science? (b) Is all ideology incompatible with science?, and (c) Are scientific ideologies possible? His contribution provides another example for the interdependence of philosophy and the social sciences, and especially points out the importance of methodological inquiries into the difference between ideology and science for the application of scientific analysis to social and political problems. (Introduction, p. xiv)

[http://download-v2.springer.com/static/pdf/692/bfm%253A978-94-009-3895-3%252F1.pdf?token2=exp=1429214260~acl=%2Fstatic%2Fpdf%2F692%2Fbfm%25253A978-94-009-3895-3%25252F1.pdf\\*~hmac=c093d687ead9085257c3665f24c390164e551d60280c6425842eb2a555086d77](http://download-v2.springer.com/static/pdf/692/bfm%253A978-94-009-3895-3%252F1.pdf?token2=exp=1429214260~acl=%2Fstatic%2Fpdf%2F692%2Fbfm%25253A978-94-009-3895-3%25252F1.pdf*~hmac=c093d687ead9085257c3665f24c390164e551d60280c6425842eb2a555086d77)

BUNGE, Mario, "What kind of discipline is psychology: Autonomous or dependent, humanistic or scientific, biological or sociological", *New Ideas in Psychology*, vol. 8, n.º 2, 1990, pp. 121-137. Cf.:

The main views on the status and place of psychology are examined, and a new view is proposed. The rejected opinions are that psychology is an autonomous discipline, a branch of the humanities, a component of cognitive science, a biological science, and a social science. It is suggested that, though not autonomous, psychology is a very special science dependent upon other disciplines. It overlaps partially with biology as well as with sociology. But it also has its peculiar concepts, theories, and methods. Consequently psychology is not fully reducible to other disciplines. Such incomplete epistemological reduction contrasts with the full ontological reduction of the mental to the neurophysiological.

<http://www.sciencedirect.com/science/article/pii/0732118X9090002J>

BUNGE, Mario, "Computerism – A brainless approach to cognition: A reply to Sloman", *New Ideas in Psychology*, vol. 8, n.º 3, 1990, pp. 377-379. Cf.:

Professor Sloman starts by asserting that he agrees with almost everything in my paper. However, our disagreement is soon revealed as fundamental, for whereas he extols "cognitive science"—the merger of cognitive psychology with linguistics and knowledge engineering (AI)— I attack it. Moreover I hold that because mental processes are brain processes and they are strongly influenced by social stimuli, psychologists ought to study them in the light of neuroscience and social science, not in ignorance of these sciences. I also hold that, because computers are designed by people, not the other way round, psychologists ought to concentrate on people, not computers. More to the point of the title of Sloman's response, I maintain that, because all of the subsystems of the nervous system are coupled to one another as well as to the endocrine system, psychologists ought not to detach the study of cognition from that of motivation and affect—a detachment which cognitivists incur inconsistently.

\*Author's reply to A. Sloman (1990) No separation between cognition and emotion: A response to Bunge, vol. 8, n.º 3, pp. 375-376.

<http://www.sciencedirect.com/science/article/pii/0732118X9490023X>

BUNGE, Mario, "A skeptic's beliefs and disbeliefs", *New Ideas in Psychology*, vol. 9, n.º 2, 1991, pp. 131-149. Cf.:

Two kinds of skepticism are distinguished: systematic (or radical) and methodological (or moderate). It is argued that the former is logically impossible, whereas the latter is part of the scientific outlook. When beliefs in the supernatural and the paranormal are subjected to methodical doubt, they turn out to be not only lacking in empirical support but also at variance with certain scientific principles and with certain general philosophical presuppositions of scientific research. It is noted that, when scientists overlook these principles, they run the risk of consuming or even producing some non-scientific ideas. The cases of parapsychology and psychoanalysis are examined in some detail. Next ten other specimens of pseudoscience are briefly analyzed: general measurement theory, quantum theory of measurement, creationist cosmology, genetic instruction hypothesis, selfish gene hypothesis, human sociobiology, applied catastrophe theory, applied game theory, neoclassical microeconomics, and textualism. Finally some of the key tacit principles of the creed of the methodological skeptic are formulated: materialism (an extension of naturalism), realism, rationalism, empiricism, and systemism.

<http://www.sciencedirect.com/science/article/pii/0732118X9190017G>

**BUNGE, Mario, "What is science? Does it matter to distinguish it from pseudoscience? A reply to my commentators",** *New Ideas in Psychology*, vol. 9, n.º 2, 1991, pp. 245-283. Cf.

Author's reply to J.E. Alcock (1991) On the importance of methodological skepticism, E. Bauer and W. v Lucadou (1991) A strawman called "psi"—Or: What is Professor Bunge afraid of?, D. Blitz (1991) The line of demarcation between science and non-science: The case of psychoanalysis and parapsychology, R. Boudon (1991) On two questions: Should man be considered as rational? How to distinguish science from non-science?, P. Feyerabend (1991) It's not easy to exorcize ghosts, W. Harman (1991), The epistemological foundations of science reconsidered, G. Kreweras (1991) Skepticism, and truth, U. Laucken (1991) The ontology of the natural sciences as a truncheon, S. Moscovici (1991) Reflections and reactions to the credo of a true believer, M. Perrez (1991) Difference between everyday knowledge, ideology and scientific knowledge, R. Thom (1991) A dangerous illusion, and J. Van Rillaer (1991) Strategies of dissimulation in the pseudosciences, Vol. 9, No. 2, pp. 151–155, 157–162, 163–170, 171–179, 181–186, 187–195, 197–201, 203–213, 215–225, 227–231, 233–234, and 235–244, respectively.

<http://www.sciencedirect.com/science/article/pii/0732118X9190030P>

BUNGE, Mario, "A critical examination of the foundations of rational choice theory", in GÖTSCHL, Johann (Ed.), *Revolutionary Changes in Understanding Man and Society*, Dordrecht-Boston: Kluwer, 1995, pp. 211-228. Published also in MAHNER, Martin (Ed.), *Scientific Realism. Selected Essays of Mario Bunge*, Amherst, New York: Prometheus Books, 2001, pp. 303-319.

BUNGE, Mario, "The Poverty of Rational Choice Theory" in JARVIE, I.E, and Nathaniel LAOR (Eds.), *Critical Rationalism, Metaphysics and Science. Essays for Joseph Agassi*, Vol. I. Dordrecht-Boston: Kluwer Academic Publishers, 1995, pp. 149-168 (Boston Studies in the Philosophy of Science, vol. 161). Cf.:

Rational choice theory has become very fashionable in all social sciences, from anthropology to history. Actually it is not a theory but a family of models that share

two simple and attractive ideas. One of them is the version of the Rationality Postulate according to which people know what is best for them, and act accordingly. The other basic idea is that this feature of human cognition, valuation, choice, volition and action is all we need to know in order to account for social life anywhere and at any time. This is of course the Methodological Individualism Postulate. These two ideas, if true, would be extraordinarily powerful. Indeed, they would allow us to explain, predict and plan all human actions in any society. Furthermore, they would unify all of the social sciences and sociotechnologies. No wonder then that rational choice models have been mushrooming over the past half century in all of the so-called human sciences.

[http://link.springer.com/chapter/10.1007/978-94-011-0471-5\\_10](http://link.springer.com/chapter/10.1007/978-94-011-0471-5_10)

BUNGE, Mario, “Mechanisms and explanation”, *Neuroscience, Philosophy of the Social Sciences*, vol. 27, n.º 4, December 1997, pp. 410-465. Cf.:

The aim of this article is to elucidate the notions of explanation and mechanism, in particular of the social kind. A mechanism is defined as what makes a concrete system tick, and it is argued that to propose an explanation proper is to exhibit a lawful mechanism. The so-called covering law model is shown to exhibit only the logical aspect of explanation: it just subsumes particulars under universals. A full or mechanistic explanation involves mechanistic law statements, not purely descriptive ones such as functional relations and rate equations. Many examples from the natural, biosocial, and social sciences are examined. In particular, macro-micro-micro-macro social relations are shown to explain otherwise puzzling macro-macro links. The last part of the article relates the author's progress, over half a century, toward understanding mechanism and explanation.

<http://pos.sagepub.com/content/27/4/410.short?rss=1&ssource=mfc>

BUNGE, Mario, “Semiotic systems”, in ALTMANN, Gabriel, and Walter A. KOCH (eds.), *Systems: New Paradigms for the Human Sciences*, Berlin (Germany): Walter de Gruyter, 1998, pp. 337-349. Cf.:

[http://books.google.fr/books?id=14PtBm6cFLgC&printsec=frontcover&source=gb\\_s\\_e\\_summary\\_r&cad=0#v=onepage&q&f=false](http://books.google.fr/books?id=14PtBm6cFLgC&printsec=frontcover&source=gb_s_e_summary_r&cad=0#v=onepage&q&f=false)

BUNGE, Mario, “The Crisis of Global Capitalism [Open Society Endangered]: George Soros; New York, Public Affairs, 1998, xxx + 247”. Book Review. *The Journal of Socio-Economics*, vol. 28, n.º 4, 199, pp. 533-536. Cf.:

<http://www.sciencedirect.com/science/article/pii/S1053535799000438>

BUNGE, Mario, “Systemism: the alternative to individualism and holism”, *The Journal of Socio-Economics* (North-Holland), vol. 29, n.º 2, 2000, pp. 147-157.

<http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.196.5414&rep=rep1&type=pdf>

BUNGE, Mario, *Epistemología. Curso de actualización*, 3ª edición [1980], México D.F.: Siglo XXI Editores, 2002, pp. 252. Cf.:

<http://josemramon.com.ar/wp-content/uploads/BUNGE-Epistemologia.pdf>

BUNGE, Mario, *Ser, Saber, Hacer*, México: Editorial Paidós-Universidad Nacional Autónoma de México, Facultad de Filosofía y Letras, 2002, pp. 133. Cf.:

[http://www.ict.edu.mx/acervo\\_humanidades\\_filosofia\\_Ser%20saber%20hacer\\_Mario%20Bunge.pdf](http://www.ict.edu.mx/acervo_humanidades_filosofia_Ser%20saber%20hacer_Mario%20Bunge.pdf)

BUNGE, Mario, "Philosophy of Science and Technology: A Personal Report", *Contemporary Philosophy*, vol. 8, FLØISTAD, Guttorm, *Philosophy of Latin America*, Kluwer Academic Publishers, 2003, pp. 245-272. Cf.:

What follows is a summary of my work in the general philosophy and methodology of science and technology, as well as in the philosophy of some of their various branches. There is also a glance at my work in value theory and ethics insofar as it relates to science and technology. Finally all these various pieces are shown to be components of a new philosophical system hoped to be in harmony with contemporary science and technology and moreover one capable of stimulating their advancement.

[http://link.springer.com/chapter/10.1007%2F978-94-017-3651-0\\_12](http://link.springer.com/chapter/10.1007%2F978-94-017-3651-0_12)

BUNGE, Mario, *Philosophical Dictionary* [Enlarged edition], Amherst, New York: Prometheus Books, 2003, pp. 316. Cf.:

This lexicon of modern Western philosophical concepts, problems, principles, and theories may well be the shortest dictionary of philosophy in the English language, but one of the most useful. Organized by internationally recognized philosopher Mario Bunge, this indispensable volume, directed to general and university audiences, elucidates and evaluates many contemporary philosophical ideas from a humanist and scientifically oriented perspective.

From A to Z, most entries are brief and nontechnical in nature, highlighting useful philosophical terms rather than trendy ones. Placing emphasis on "living" philosophy, Bunge has deliberately excluded many of the archaic terms and philosophical curios of other dictionaries. He has incorporated a number of "minipapers," or longer definitions of some terms, and he critically analyzes such influential doctrines as existentialism, phenomenology, idealism, materialism, pragmatism, deontological ethics, utilitarianism, and many others. Constructive alternatives are offered to all philosophical approaches criticized.

This is a superb reference work for both students and professional philosophers. (From the publisher)

BUNGE, Mario, "How does it work? The search for explanatory mechanisms", *Philosophy of the Social Sciences*, vol. 34, n.º 2, June 2004, pp. 182-210. Cf.:

[http://www.gemas.fr/dphan/cosmagems/docs/socio/PhilosophyOfTheSocialSciences2004Symposium\\_2Bunge.pdf](http://www.gemas.fr/dphan/cosmagems/docs/socio/PhilosophyOfTheSocialSciences2004Symposium_2Bunge.pdf)

BUNGE, Mario, "Clarifying some misunderstandings about social systems and their mechanisms", *Philosophy of the Social Sciences*, vol. 34, n.º 3, September 2004, pp. 371-381. Cf.:

The goal of this article is to answer some of the criticisms of my views on social science formulated by contributors to the symposium on my philosophy of social science.

<http://pos.sagepub.com/content/34/3/371>

BUNGE, Mario, *Matérialisme et humanisme: pour surmonter la crise de la pensée*, Montréal (Canada): Liber, 2004, pp. 294. [Traduction de l'anglais par Laurent-Michel VACHER: *Philosophy in Crisis: The Need for Reconstruction*, Prometheus, 2001].

<http://www.editionsliber.com/gestion/uploads/file/bulletin-liber/bulletin-no-04.pdf>

BUNGE, Mario, "A systemic perspective on crime", in WIKISTRÖM, Per-Olof, and Robert J. SAMPSON, *The Explanation of Crime: context, mechanisms, and development*, Cambridge: Cambridge University Press, 2006, pp. 8-30. Cf.:

<http://ebooks.cambridge.org/chapter.jsf?bid=CBO9780511489341&cid=CBO9780511489341A011>

BUNGE, Mario, “Vers un nouveau matérialisme”, in DUBESSY, Jean, Guillaume LECOINTRE, Marc SILBERSTEIN (sous la direction de), *Les matérialismes (et leurs détracteurs)*, Paris : Éditions Syllepse, 2004, pp. 75-80. Cf. : <http://persocite.francite.com/assomat/apcollmat.pdf>

BUNGE, Mario, *Le matérialisme scientifique*, Paris: Syllepse, 2008, pp. 214. Cf. :

Mario Bunge est un théoricien du matérialisme de première importance. Pourtant, il s'avère que son œuvre, remarquable par la diversité des sujets et des domaines explorés, reste insuffisamment traduite en français. Le matérialisme scientifique comble quelque peu cette lacune et surtout donne aux lecteurs une idée précise de ce qui constitue l'originalité du projet encyclopédique de son auteur, tel qu'il le développe notamment dans les huit volumes de son *Treatise on Basic Philosophy*. Physicien de formation, philosophe des sciences de la nature et des sciences humaines, attentif à la technologie, Bunge est un des rares penseurs de notre siècle à entreprendre l'examen et la construction d'un système de connaissances scientifiques et philosophiques. Tout au long de sa vie de chercheur, il a approfondi cette idée d'une unité des savoirs, en intégrant les théories et données atomisées par la spécialisation scientifique – certes nécessaire –, et en respectant l'autonomie des disciplines et des objets qu'exhibent ou définissent les sciences et l'épistémologie. Chez lui, aucune velléité d'annexion de tel ou tel domaine au profit d'un autre; au contraire, Bunge dénonce les excès d'un matérialisme brutal, qui voudrait abolir certaines entités, faute de les bien comprendre. Puis, regardant à l'autre bout du spectre des conceptions du monde, Bunge, spécialiste de mécanique quantique, fustige l'un des poncifs les plus constants de la vulgate contemporaine: la “dématérialisation” de la matière. Mario Bunge signe ici un ouvrage dense, parfois technique (d'où l'aspect souvent axiomatique de son propos, comme lorsqu'il traite de l'esprit ou de la culture, domaines généralement peu abordés de la sorte...), mais qui sait aussi être savoureusement caustique, notamment dans son exposé des vaines promesses de la dialectique, ou encore de l'évanescence du monde 3 de Karl Popper. La conception bungiennne du matérialisme fait de ce dernier une ontologie et une méthode pour “découvrir” le monde. Loin des frilosités ontologiques des formes les plus affadies du positivisme, Mario Bunge décrit comment et explique pourquoi philosophie et sciences ne peuvent que confluer pour parvenir à ce but, l'un des plus élevés de l'humanité.

*Sommaire* : préface ; avant-propos de l'auteur ; chapitre 1. La matière aujourd'hui ; chapitre 2. Le matérialisme aujourd'hui ; chapitre 3. Modes de devenir ; chapitre 4. Une critique de la dialectique ; chapitre 5. Une théorie matérialiste de l'esprit ; chapitre 6. L'esprit en évolution ; chapitre 7. Une conception matérialiste de la culture ; chapitre 8. Le troisième monde de Popper n'est pas de ce monde ; chapitre 9. Le statut des concepts ; chapitre 10. Logique, sémantique et ontologie ; appendice ; bibliographie ; index.

[http://www.syllepse.net/syllepse\\_images/divers/FicheBunge.pdf](http://www.syllepse.net/syllepse_images/divers/FicheBunge.pdf)

BUNGE, Mario, “Bayesianism: Science or pseudoscience”, *International Review of Victimology*, vol. 15, n.° 1, September 2008, pp. 165-178. Cf.:

This is a criticism of Bayesianism, the opinion that all probabilities are a matter of opinion, hence beyond objective tests. It is shown that the mathematical concept of a probability function makes no room for a person, and that in physics, chemistry and biology probabilities are objective quantities subject to calculation and measurement. It is also shown that the use of subjective probabilities in medicine and criminology is bound to lead to either nonsense or injustice. The upshot is that only the realistic interpretation of probability, as the quantitation of objective possibility, is legitimate.

<http://irv.sagepub.com/content/15/2/165.abstract>

BUNGE, Mario, “A Systems design of the future”, in PARRA-LUNA, Francisco (Ed.), *Systems Science and Cybernetics*, UNESCO-Encyclopedia of Life Support Systems, vol. 1, 2009, pp. 112-136. Cf.:

[http://www.eolss.net/ebooklib/ViewEbookDetail\\_1.aspx?catid=2&fileid=E6-46](http://www.eolss.net/ebooklib/ViewEbookDetail_1.aspx?catid=2&fileid=E6-46)

BUNGE, Mario, “Dos enfoques de la Ciencia: Sectorial y Sistémico”, *Revista de la Real Academia de Ciencias de Zaragoza*, Zaragoza (España), vol. 64, 2009, pp. 51-63. Cf.:

<http://www.unizar.es/acz/05Publicaciones/Revistas/Revista64/p051.pdf> ø

BUNGE, Mario, *Evaluating Philosophies*, Dordrecht (Netherlands): Springer, 2012, pp. 216 (Boston Studies in the Philosophy and History of Science n.º 295). “.PDF”. Cf.:

<http://link.springer.com/book/10.1007/978-94-007-4408-0>

BUNGE, Mario, “Wealth and well-being, economic growth, and integral development”, *International Journal of Health Services*, n.º 42, 2012, pp. 65-76. Cf.:

This chapter tackles a bimillenary problem in psychology, ethics, economics, and political philosophy: that of the relation between wealth and wellbeing. What are they, and should we live for pleasure, or rather seek to live a full and useful life?

[http://link.springer.com/chapter/10.1007/978-94-007-4408-0\\_7](http://link.springer.com/chapter/10.1007/978-94-007-4408-0_7)

BUNGE, Mario, *La ciencia. Su método y su filosofía*, *Materia*, 07-04-2013. [Nuevo “Prólogo”] Pamplona (Navarra): Editorial Laetoli, 2013, pp. 144 (Colección Biblioteca Bunge). Cf.:

Este ensayo –que se publicó en 1959– se convirtió en un manual de referencia para entender el método científico y los pilares de la filosofía de la ciencia. En este prólogo, Mario Bunge hace un recorrido por la evolución de esta disciplina en las últimas cinco décadas. Cf.:

<http://esmateria.com/2013/04/07/la-ciencia-su-metodo-y-su-filosofia/>

BUNGE, Mario, *Materialismo y ciencia*, Pamplona (Navarra): Editorial Laetoli, 2013, pp. 216 (Colección Biblioteca Bunge). Cf.:

Reedición corregida, revisada por el autor y con un nuevo prólogo especialmente escrito para esta edición del libro publicado por la editorial Ariel en 1981.

“El materialismo –escribe el autor– es la fuerza filosófica que ha impelido algunas revoluciones científicas tales como la física atómica y nuclear, la biología evolucionista, la teoría química de la herencia, el estudio científico del origen de la vida, la fisiología de la mente y los avances más recientes de la paleoantropología y la historiografía. Lejos de alejarse del materialismo, la ciencia se está tornando cada vez más materialista en forma explícita. Lo está haciendo no sólo evitando el comercio con objetos inmateriales (fuerzas vitales, fantasmas, pensamientos desencarnados, fuerzas históricas supramateriales, etc.), sino también, y de hecho especialmente, estudiando entes materiales”.

<http://www.laetoli.es/biblioteca-bunge-editorial-laetoli/113-materialismo-y-ciencia-9788492422609.html>

BUNGE, Mario, “Cómo acabar con la ciencia: ABC de la ‘cienciología’, de Mario Bunge”, *Materia*, 29-03-2014. [Capítulo del libro *Ciencia, técnica y desarrollo*: Pamplona (Navarra): Editorial Laetoli, 2014, pp. 158 (Colección Biblioteca Bunge). Cf.:

Con un nuevo prólogo del autor a esta edición en la Biblioteca Bunge de su libro clásico de 1980 *Ciencia y desarrollo*. “Las tesis centrales de este libro –afirma el autor– son: uno, en la sociedad moderna la ciencia y la técnica son los motores de la innovación; y dos, el desarrollo auténtico es integral, es decir, biológico, económico, cultural y político. La primera tesis no

implica menospreciar las humanidades sino negar que sean la avanzada de la cultura, como lo fueron en el Renacimiento. La segunda tesis implica que los negocios y el ejercicio de la democracia (la participación política), aunque no bastan, son necesarios para avanzar. En pocas palabras, el desarrollo no es una recta sino un polígono".

<http://esmateria.com/2014/03/29/abc-de-la-cienciadiologia-mario-bunge/>

BUNGE, Mario, *Pseudo ciencia e ideología*, Pamplona (Navarra): Editorial Laetoli, 2013, pp. 312 (Colección Biblioteca Bunge). Cf.:

¿Qué son las pseudociencias? ¿Por qué siguen prosperando? ¿Qué podemos hacer para acabar con ellas? ¿Y qué es la ideología? ¿Qué relación existe entre la ideología y la pseudociencia? Mario Bunge da respuesta a estas cuestiones en este libro agotado hace tiempo, revisado ahora por el autor, para el cual ha escrito un nuevo prólogo.

“La edición revisada de *Pseudociencia e ideología*, de Mario Bunge, debería ser de obligada lectura para todo aquel que quiera mantener su mente a salvo de la nueva ola pseudocientífica que contagia a la sociedad. En especial, es una obra de referencia para docentes e investigadores, responsables últimos de salvaguardar la razón y forjar el pensamiento crítico de los jóvenes [...]. Una obra que, lejos de perder vigencia, se antoja imprescindible para salvaguardar las pocas luces que quedan en esta sociedad enferma de pseudociencia" (Toni Hernández, *E-ciencia*).

<http://www.laetoli.es/biblioteca-bunge-editorial-laetoli/114-pseudociencia-e-ideologia-mario-bunge-9788492422630.html>

BUNGE, Mario, *100 ideas*, Pamplona (Navarra): Editorial Laetoli, 2014, pp. 293 (Colección Biblioteca Bunge). Cf.:

100 ideas expuestas con un estilo muy libre, desenfadado, a menudo humorístico, que para muchos supondrá el descubrimiento de otro Bunge, más cercano, compañero de conversación en la mesa de un café o la sobremesa de una comida.

“He escrito estos artículos –escribe el autor– para informar, provocar, proponer, entretener y divertirme, aunque no para ‘matar el tiempo’, barbarismo que sacaba a mi padre de sus casillas. Ojalá mis lectores se diviertan leyendo estas páginas casi tanto como yo al escribirlas”.

<http://www.laetoli.es/biblioteca-bunge-editorial-laetoli/127-100-ideas-mario-bunge-9788492422715.html>

BUNGE, Mario, *Economía y filosofía*, Pamplona (Navarra): Editorial Laetoli, 2015, pp. 130 (Colección Biblioteca Bunge). Cf.:

“En 1982, cuando se publicó la primera edición de esta obra –escribe el autor en su nuevo prólogo–, Ronald Reagan acababa de comenzar su primer período presidencial. Al principio su gobierno aplicó fielmente la política económica que le recomendara Milton Friedman, jefe de la Escuela de Chicago, y que fuera llamada *Reaganomics*. Cuando se vio que esta política llevaba a la crisis, el gobierno de Reagan la abandonó. En cambio, la política socioeconómica de dicha escuela fue adoptada por varios gobiernos autoritarios de América Latina, con los resultados conocidos: destrucción de la industria nacional, debilitamiento de los servicios sociales estatales, y empobrecimiento de los pobres. Por estos motivos, la Escuela de Chicago se distinguió por ser el blanco favorito de economistas progresistas como John Kenneth Galbraith y Raúl Prebisch”.

“Más aún, no hay una teoría económica que permita explicar los fenómenos globales del desarrollo, ni de esas crecientes disparidades sociales, salvo en lo que concierne a ciertas restricciones del libre juego de las leyes económicas y a las imperfecciones del mercado.



¿Qué hacer entonces? Al procurar la respuesta, entro decididamente a un campo de amplia coincidencia con el doctor Bunge. Si la teoría económica resulta claramente insuficiente es porque ignora la estructura social y sus mutaciones y las cambiantes relaciones de poder que emergen de todo ello. En su afán de asepsia doctrinaria, sus adeptos evitan cuidadosamente la influencia de elementos exógenos. A mi juicio, ni los elementos técnicos, políticos, sociales y culturales son exógenos. Forman parte integrante de un sistema y, como tales, tienen gran influencia en esas mutaciones y en las contradicciones que aparecen cada vez más en su funcionamiento”. (Presentación de Raúl Prebisch, expresidente de la CEPAL (Comisión Económica para América Latina de las Naciones Unidas).

<http://www.laetoli.es/biblioteca-bunge-editorial-laetoli/130-economia-y-filosofia-por-mario-bunge-9788492422814.html>

BUNGE, Mario, “Sociology, Epistemology of”, in *International Encyclopedia of the Social & Behavioral Sciences*, 2<sup>nd</sup> edition, 2015, pp. 984-988.\* Cf.:

Three aspects of the epistemology (or philosophy) of sociology are examined: its ontology, epistemology in the narrow sense, and methodology. The matter of the nature of the social has two foci: the idealism–materialism dilemma and the individualism–holism–systemism trilemma. The main schools in the knowledge of the social are skepticism, apriorism, empiricism, and realism. And the discussions on the methodology of social research include empiricism (priority of data collection), interpretivism (or hermeneutics), and scientism (which combines data collection with theorizing). Finally, the sociology–epistemology connection and the sociology of epistemology are examined. The virtues and flaws of the various stands are pointed out, and reasons for favoring systemism and realism are proposed.

<http://www.sciencedirect.com/science/article/pii/B9780080970868321468>

\* Wright, James D. [Editor in-chief], *International Encyclopedia of the Social & Behavioral Sciences*, 2<sup>nd</sup> edition, [April] 2015, Elsevier Ltd., pp. 23.185. ISBN: 978-0-08-097086-8 (hardback).

ALCOCK, James E., “On the importance of methodological skepticism”, *New Ideas in Psychology*, vol. 9, n.º 2, pp. 151-155 [Special issue: “Mario Bunge on nonscientific psychology and pseudoscience: A debate”. Comments on Mario Bunge’s (1991) *A skeptic’s beliefs and disbeliefs*, vol. 9, n.º 2, 131-149]. Cf.:

<http://www.sciencedirect.com/science/article/pii/S0732118X9190018H>

BAUER, Eberhard, and Walter v. LUCACOU, “A Strawman called ‘psi’ – Or: What is Professor Bunge afraid of?”, *New Ideas in Psychology*, vol. 9, n.º 2, 1991, pp. 157-162. Cf.:

<http://www.sciencedirect.com/science/article/pii/S0732118X9190019I>

BAZI, R.E.R; SILVEIRA, M.A.A, “Constituição e institucionalização da ciência: apontamentos para uma discussão”, *TransInformação*, vol. 19, n.º 2, maio/ago. 2007, pp. 129-137. Cf.:

<http://www.scielo.br/pdf/tinf/v19n2/04.pdf>

[http://www.scielo.br/scielo.php?script=sci\\_issuetoc&pid=0103-378620070002&lng=pt&nrm=iso](http://www.scielo.br/scielo.php?script=sci_issuetoc&pid=0103-378620070002&lng=pt&nrm=iso)

BELTRAMINO, Rafael, “Un intento de aproximación entre Hayek y Bunge”, *Invenio*, 2005, pp. 35-46. Cf.:

[http://www.google.fr/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&cad=rja&uact=8&ved=0CCYQFjAB&url=http%3A%2F%2Fdialognet.unirioja.es%2Fdescarga%2Farticulo%2F4317384.pdf&ei=uZ8vVbmMNM\\_YapqggbAB&usg=AFQjCNHvyMdrKaKm8WiUxSp111CzAtdBww&sig2=LmL2s88pwTdr6QNoOp7kxA&bvm=bv.91071109,d.d2s](http://www.google.fr/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&cad=rja&uact=8&ved=0CCYQFjAB&url=http%3A%2F%2Fdialognet.unirioja.es%2Fdescarga%2Farticulo%2F4317384.pdf&ei=uZ8vVbmMNM_YapqggbAB&usg=AFQjCNHvyMdrKaKm8WiUxSp111CzAtdBww&sig2=LmL2s88pwTdr6QNoOp7kxA&bvm=bv.91071109,d.d2s)

BERNIER, Richard J., *The Plausibility of Substance Dualism as an Approach to the Mind-Body Problem: A Philosophical and Theological Inquiry*. A Thesis in the Department of Theological Studies. Presented in Partial Fulfilment of the Requirements for the Degree of Master of Arts (Theological Studies) at Concordia University, Montreal, Québec, Canada, November 2003, pp. 130. Cf.:

[http://www.newdualism.org/papers/R.Bernier/Bernier\\_Thesis.pdf](http://www.newdualism.org/papers/R.Bernier/Bernier_Thesis.pdf)

BERNSTEIN, Jay Hillel, “Disciplinarity and Transdisciplinarity in the Study of Knowledge” [Kingsborough Community College, City University of New York], *Informing Science: the International Journal of an Emerging Transdiscipline*, vol. 17, 2014, pp. 241-273. Cf.:

<http://www.inform.nu/Articles/Vol17/ISJv17p241-273Bernstein0681.pdf>

BLITZ, David, “The line of demarcation between science and nonscience: The case of psychoanalysis and parapsychology”, *New Ideas in Psychology*, vol. 9, n.º 2, 1991, pp. 163-170. Cf.:

Mario Bunge’s article “A Skeptic’s Beliefs and Disbeliefs,” delivered at the conference on Magical Thinking and its Prevalence in the World Today, is controversial and polemical attempt to demarcate between science and pseudoscience. He is not afraid to name names-in this case, whole areas of endeavor. I would like to focus on the criteria Bunge advances for rejecting the claims of psychoanalysis and parapsychology as fields of scientific psychology, in contrast to what he views as the well-founded claim of neuropsychology. I will investigate how history and philosophy of science, using not only the concepts of pseudoscience, but also those of proto-science and quasi-science as well, can arrive at an evaluation of these fields in a critical yet balanced way. My conclusion is in part as suggested by Bunge, but in part differs in taking into consideration the historical dimension of science and the difficulty of distinguishing between what is now not science and will never be, and what is now not science but may lead on to it. I begin by situating Mario Bunge in the context of attempts by Rudolf Carnap and Karl Popper to set out a line of demarcation between science and non-science. This is necessary in order to understand the historical context and theoretical motivation for the radical demarcation Bunge proposes.

<http://www.sciencedirect.com/science/article/pii/0732118X9190020M>

BRITO, Ronnie Fagundes de, and Marta Cristina Goulart Braga [Universidade Federal de Santa Catarina (UFSC)], Conference ICBL2009, November 05-07, 2009, Florianopolis, Brazil. Cf.:

<http://wright.ava.ufsc.br/~alice/icbl2009/proceedings/program/pdf/Contribution035.pdf>

BOULAD-AJOUB, Josiane, *Mimes et parades. L’activité symbolique dans la vie sociale*, Paris: Éditions L’Harmattan, 1995, pp. 382. Cf.:

[http://classiques.uqac.ca/contemporains/boulad\\_ajoub\\_josiane/mimes\\_et\\_parades/Mimes\\_et\\_parades.pdf](http://classiques.uqac.ca/contemporains/boulad_ajoub_josiane/mimes_et_parades/Mimes_et_parades.pdf)

BOWLER, T. Downing, *Book Reviews: “Treatise on Basic Philosophy, Volume 4, Ontology II: A World of Systems”*, Dordrecht (Holland) and Boston (U.S.A.): D. Reidel Publishing Company, 1979, pp. 291. Cf.:

[http://www.tandfonline.com/doi/abs/10.1080/03081078008934780#.VS6s\\_2ccTct](http://www.tandfonline.com/doi/abs/10.1080/03081078008934780#.VS6s_2ccTct)

CAVALLO, Andrew M., “On Mario Bunge’s Definition of System and System Boundary”, *Science & Education*, vol. 21, n.º. 10, October 2012, pp. 1595-1599. Cf.:

<http://link.springer.com/article/10.1007%2Fs11191-011-9365-0>

- CORDERO, Mario, "Mario Bunge's Scientific Realism", *Science & Education*, vol. 21, n.º 10, October 2012, pp. 1419-1435. Cf.:  
<http://link.springer.com/article/10.1007%2Fs11191-012-9456-6>
- DELEPORTE, Pierre, "Le matérialisme scientifique de Mario Bunge", in DUBESSY, Jean, Guillaume LECOINTRE, Marc SILBERSTEIN (sous la direction de), *Les matérialismes (et leurs détracteurs)*, Paris: Éditions Syllepse, 2004, pp. 81-84 (Collection "Matériologiques"). Cf.:  
<http://persocite.francite.com/assomat/apcollmat.pdf>
- ELDER-VASS, Dave, "Emergence and the realist account of cause", *Journal of Critical Realism* (Springer, Netherlands), vol. 4, n.º 2, 2005, pp. 315-338. Cf.:  
<http://booksandjournals.brillonline.com/content/journals/15725138/4/2;jsessionid=1p5rvkli2tabp.x-brill-live-02>  
<http://booksandjournals.brillonline.com/content/journals/10.1163/157251305774356667>
- ELGUETA ROSAS, María Francisca y Eric Eduardo PALMA GONZÁLEZ, *La investigación en ciencias sociales y jurídicas*, 2ª edición revisada y actualizada, Santiago de Chile: Ediciones Orión, 2010, pp. 374 (Colección Juristas Chilenos). Cf.:  
<http://www.derecho.uchile.cl/ensenazadelderecho/docs/LaInvestigacion.pdf>
- ENGEL, Pascal, "Faut-il jeter le bébé de l'individualisme méthodologique avec l'eau du bain?", 1998. Cf.:  
<http://www.unige.ch/lettres/philo/enseignants/pe/Engel%201998%20Faut-il%20jeter%20le%20bebe%20de%20l%20individualisme.pdf>
- ERDURAN, Sibel, and Ebru MUGALOGLU, "Philosophy of chemistry in chemical education: Recent trends and future directions", in Michael MATTHEWS *Handbook of Research on History, Philosophy and Sociology of Science*, Dordrecht (Netherlands): Springer, 2014, pp. 287-315 Cf.:  
<http://www.springer.com/fr/book/9789400776531>  
[http://research-information.bristol.ac.uk/files/8275627/SCED991\\_1\\_.pdf](http://research-information.bristol.ac.uk/files/8275627/SCED991_1_.pdf)
- ERONEN, Markus, *Emergence in the Philosophy of Mind*. Master's Thesis, Helsinki: University of Helsinki, Department of Philosophy, November 2004, pp. 83. Cf.:  
<http://ethesis.helsinki.fi/julkaisut/hum/filos/pg/eronen/emergenc.pdf>
- FEYERABEND, Paul, "It's not easy to exorcize ghost", *New Ideas in Psychology*, vol. 9, n.º 2, 1991, pp. 181-186. [Special issue: "Mario Bunge on nonscientific psychology and pseudoscience: A debate". Comments on Mario Bunge's (1991) *A skeptics beliefs and disbeliefs*, vol. 9, n.º 2, 131-149]. Cf.:  
<http://www.sciencedirect.com/science/article/pii/0732118X9190022E>
- GALASSI, Jorge Gibert, "Ontología social y el problema de los mecanismos", *Eikasia. Revista de filosofía* (Universidad de Valparaíso, Chile), n.º 86, enero de 2014, pp. 83-92. Cf.:  
<http://revistadefilosofia.com/54-06.pdf>

GARRITZ, Andoni, "Teaching the Philosophical Interpretations of Quantum Mechanics and Quantum Chemistry Through Controversies", *Science & Education*, vol. 22, n.º 7, July 2013, pp. 1787-1807. Cf.:

<http://link.springer.com/article/10.1007/s11191-012-9444-x>

<http://link.springer.com/journal/11191/22/7/page/1>

GOYER, Simon, *Pour un modèle de l'explication pluraliste et mécaniste en psychiatrie*. Mémoire présenté comme exigence partielle de la maîtrise en philosophie. Montréal (Canada): Université du Québec à Montréal, Mai 2013, pp. 207. Cf.:

<http://www.archipel.uqam.ca/5449/1/M12940.pdf>

HEDSTRÖM, Peter, and Petri YLIKOSKI, "Causal Mechanisms in the Social Sciences", *Annual Review of Sociology*, vol. 36, 2010, pp. 49-67. Cf.:

<http://www.lophisc.org/wp-content/uploads/2014/02/Hedstrom-Ylikoski.-Causal-Mechanisms-in-the-Social-Sciences-2010.pdf>

HENDEN, Gisle, *Intuition and its role in Strategic Thinking*. A dissertation submitted to BI Norwegian School of Management for the Degree of Dr. Oecon. Sandvika: BI Norwegian School of Management, Department of Strategy and Logistics, 2004, pp. 189. Cf.:

[http://web.bi.no/forskning/papers.nsf/0/2682ad7f82929fdcf1256ecc002d3841/\\$FILE/2004-04-henden.pdf](http://web.bi.no/forskning/papers.nsf/0/2682ad7f82929fdcf1256ecc002d3841/$FILE/2004-04-henden.pdf)

HOFKIRCHNER, Wolfgang [University of Salzburg], "A Critical Social Systems View of the Internet", *Philosophy of the Social Sciences* (Sage Publications), vol. 37, n.º 4, December 2007, pp. 471-500. Cf.:

<http://www.icts.sbg.ac.at/media/pdf/pdf1455.pdf>

HOLLINGSWORTH, Rogers, Karl H. MÜLLER, Ellen Jane HOLLINGSWORTH, and David M. GEAR, "Socio-economics and a New Scientific Paradigm", in FLAM, Helena, and Marcus CARSON (eds.), *Rule Systems Theory. Applications and Explorations*, New York: Peter Lang, 2008, pp. 39-56 Cf.:

[https://books.google.fr/books?id=Ng-OzHkHElgC&pg=PA39&lpg=PA39&dq=%22Socio-Economics+and+a+New+Scientific+Paradigm%22&source=bl&ots=QFrwllreeU&sig=5U0YftR\\_o8FRJQVweyZOvTdl9-g&hl=fr&sa=X&ei=88EuVfyxFMLmaqblgdAC&ved=0CCoQ6AEwAQ#v=onepage&q=%22Socio-Economics%20and%20a%20New%20Scientific%20Paradigm%22&f=false](https://books.google.fr/books?id=Ng-OzHkHElgC&pg=PA39&lpg=PA39&dq=%22Socio-Economics+and+a+New+Scientific+Paradigm%22&source=bl&ots=QFrwllreeU&sig=5U0YftR_o8FRJQVweyZOvTdl9-g&hl=fr&sa=X&ei=88EuVfyxFMLmaqblgdAC&ved=0CCoQ6AEwAQ#v=onepage&q=%22Socio-Economics%20and%20a%20New%20Scientific%20Paradigm%22&f=false)

[http://faculty.history.wisc.edu/hollingsworth/documents/Hollingsworth,M%C3%BCller,Hollingsworth,Gear.Socio-Economics\\_and\\_A\\_New\\_Scientific\\_Paradigm.htm](http://faculty.history.wisc.edu/hollingsworth/documents/Hollingsworth,M%C3%BCller,Hollingsworth,Gear.Socio-Economics_and_A_New_Scientific_Paradigm.htm)

[http://faculty.history.wisc.edu/hollingsworth/documents/Hollingsworth,M%C3%BCller,Hollingsworth,Gear.Socio-Economics\\_and\\_A\\_New\\_Scientific\\_Paradigm.htm](http://faculty.history.wisc.edu/hollingsworth/documents/Hollingsworth,M%C3%BCller,Hollingsworth,Gear.Socio-Economics_and_A_New_Scientific_Paradigm.htm)

HURTADO-PARRADO, C., J. VIRUES-ORTEGA, T. L. MARTIN, & F. JULIO, "Causes of Behavioral Processes: An Interview with Mario A. Bunge", *Universitas Psychologica*, vol. 10, n.º 3, Septiembre-Diciembre de 2011, pp. 965-972.

Mario A. Bunge is one of the most prominent philosophers and humanists of our time. His vast record of publications has covered, among others, epistemology, ontology, ethics, philosophy of natural and social sciences, philosophy of technology, and philosophy of mind.

A topic that intersects many of these areas and is recurrent in Bunge's work is causality. His analyses of the causal principle and the redefinition of determinism into near-determinism have been applied to different philosophical issues that range from the causal role of neuronal functioning to the laws of social phenomena. Bunge has criticized functionalism, cognitivism, computationalism, behaviourism, and idealism in their attempt to explain human and non-human behaviour. This article results from an extensive interview held with Dr. Bunge in which we discussed a variety of conceptual issues related to the notions of causality and explanation in psychology.

<http://revistas.javeriana.edu.co/index.php/revPsycho/article/viewFile/1577/1195>

INIESTA MASMANO, Rosa. *Una Relación Dialógica Improbable: Edgar Morin/Heinrich Schenker. Hacia una Teoría de la Complejidad Musical para el Sistema Tonal*. Tesis Doctoral. Facultad de Filosofía y Ciencias de la Educación, Departamento de Lógica y Filosofía de la Ciencia. Universitat de València, Servei de Publicacions, 2009, pp. 393. <http://www.tdx.cat/bitstream/handle/10803/10007/iniesta.pdf;jsessionid=60980327A9CB068DBD8F7ECB40901C39.tdx1?sequence=1>

KAIDESOJA, Tuukka., "Bhaskar and Bunge on Social Emergence", *Journal for the Theory of Social Behaviour*, vol. 39, n.º 3, September 2009, pp. 300–322. Cf.:

This article discusses the theories of social emergence developed by Roy Bhaskar and Mario Bunge. Bhaskar's concept of emergent causal power is shown to be ambiguous, and some of the difficulties of his depth-relational concept of social emergence are examined. It is argued that Bunge's systemic concept of emergent property is not only different, but also clearer and more consistent than Bhaskar's concept of emergent causal power. Despite its clarity and consistency, Bunge's definition of the concept of emergent property is shown to be too broad and analytically imprecise for the purposes of an emergentist social ontology. It is argued that Bunge's systemic account of social emergence can be developed further by using William Wimsatt's gradual approach to emergent phenomena and his four conditions of aggregativity of a systemic property. It is shown that these conditions provide useful conceptual tools for clarifying and investigating different kinds of mechanisms of social emergence and developing stronger varieties of the concept of emergent social property than that indicated in Bunge's definition of this concept.

<http://onlinelibrary.wiley.com/doi/10.1111/j.1468-5914.2009.00409.x/abstract>

KARLSSON, Hasse, and Matti KAMPPINEN, "Biological Psychiatry and Reductionism. Empirical Findings and Philosophy" [Editorial], *British Journal of Psychiatry*, n.º 167, 1995, pp. 434-438. Cf.:

<http://bjp.rcpsych.org/content/167/4/434?ck=nck>

KERN, Vinícius Medina *et al.*, "Growing a Peer Review Culture among Graduate Students". Proceedings of the IX IFIP World Conference on Computers in Education. Bento Gonçalves-RS. Brazil, July 27-31, 2009, pp. 10. Cf.:

[http://eprints.rclis.org/20482/1/KernEtAl\\_PeerReviewCulture\\_WCCE09.pdf](http://eprints.rclis.org/20482/1/KernEtAl_PeerReviewCulture_WCCE09.pdf)

KERN, Vinícius Medina, "O sistemismo de Bunge: fundamentos, abordagem metodológica e aplicação a sistemas de informação", *XX ENANCIB. Encontro Nacional de Pesquisa em Ciência da Informação*. Brasília, Distrito Federal, 23 a 26 de outubro de 2011, pp. 2693-2709. Cf.:

<http://core.ac.uk/download/pdf/16292476.pdf>

- KILOV, Haim, “Emergence and Convergence: Qualitative Novelty and the unity of Knowledge” by Mario Bunge, *University of Toronto Press*, 2004 [Book review]. *SIGMOND RECORD*, vol. 33, n.º 4, December 2004, pp. 88-90. Cf.:  
[http://www.academia.edu/4436368/Emergence\\_and\\_Convergence\\_Qualitative\\_Novelty\\_and\\_the\\_Unity\\_of\\_Knowledge\\_By\\_Mario\\_Bunge\\_Book\\_Review](http://www.academia.edu/4436368/Emergence_and_Convergence_Qualitative_Novelty_and_the_Unity_of_Knowledge_By_Mario_Bunge_Book_Review)
- KILOV, Haim, “Semantic interoperability: Using RM-ODP to bridge communication gaps between scholars”, in Proceedings of the 1<sup>st</sup> International Workshop on ODP in the Enterprise Computing (WODPEC 2004), Monterey, California, 20 September 2004, pp. 11. Cf.:  
<http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.161.553&rep=rep1&type=pdf>
- KILOV, Haim, and Ira SACK, “Mechanisms for communication between business and IT experts”, *Computer Standards & Interfaces*, n.º 31, 2009, pp. 98-109 Cf.:  
<http://xyuan.myweb.cs.uwindsor.ca/references/CommunicationMech09.pdf>
- LAFUENTE GUANTES, María Isabel, “Una consideración del *cierre categorial* de G. Bueno como perspectiva materialista de la ciencia”. *Ágora–Papeles de Filosofía*, vol. 32, n.º 1, 2013, pp. 63-81. Cf.:  
<http://www.google.fr/url?sa=t&rct=j&q=&esrc=s&source=web&cd=27&ved=0CEUQFjAGOBQ&url=http%3A%2F%2Fwww.usc.es%2Fprevistas%2Findex.php%2Fagora%2Farticle%2Fdownload%2F1125%2F1042&ei=W5UxVba7DJPhaJvdgdAI&usg=AFQjCNHgQ4STXxD-a1ZO01igmiaaFJ5q-g&sig2=YXJ7OWTijYax5VKhezft4w>
- LECOINTRE, Guillaume, “Comprendre la matérialisme par son histoire. Préface”, in CHARBONAT, Pascal, *Histoire des philosophies matérialistes*, Paris: Éditions Syllepse, 2007, pp. 650. Cf.:  
[http://glecointre.mnhn.fr/docs/068\\_Charbonnat-prefaceGL.pdf](http://glecointre.mnhn.fr/docs/068_Charbonnat-prefaceGL.pdf)
- LÉGER, Roger, *Un credo post-religieux. Le credo d’un athée*, 2003-2014. Cf. :  
[http://www.philo5.com/Textes-references/LegerRoger\\_UnCredoPost-Chretien\\_140926.pdf](http://www.philo5.com/Textes-references/LegerRoger_UnCredoPost-Chretien_140926.pdf)
- LINDEMANN, Bern, *A Whole affect its parts? Top-Down changes, a philosophical myth*, Homburg (Germany): Invoco-Verlag, pp. 52. Cf.:  
[http://www.bernd-lindemann.de/download\\_pdf/z11x17\\_Top-down-myth\\_18-f.pdf](http://www.bernd-lindemann.de/download_pdf/z11x17_Top-down-myth_18-f.pdf)
- LITTLE, Daniel, “Emergence”, *Understanding Society*, Friday, January 6, 2012. Cf.: \*\*\*  
<http://understandingsociety.blogspot.fr/2012/01/emergence.html>  
<http://undsoc.org/2012/01/>
- MAHNER, Martin, and Mario BUNGE, “Function and Functionalism: A Synthetic Perspective”, *Philosophy of Science*, vol. 68, n.º 1, March 2001, pp. 75-94. Cf.:  
[http://sumak.cl/2AutoryExp/Varios/funci%F3n\\_funcionalismo\\_bunge.pdf](http://sumak.cl/2AutoryExp/Varios/funci%F3n_funcionalismo_bunge.pdf)
- MARTÍNEZ, Sergio F. y León OLIVÉ (compiladores), *Epistemología evolucionista*, México, D.F.: Paidós-Universidad Nacional Autónoma de México (UNAM), 1997, pp. 296.Cf.  
<http://www.filosoficas.unam.mx/~sfmar/publicaciones/MARTINEZ-OLIVE%201997%20Epistemologia%20Evolucionista.pdf>

MATTHEWS, Michael, “Mario Bunge: Physicist and Philosopher”, *Revista Electrónica de Investigación en Educación en Ciencias*, (Universidad Nacional del Centro de la Provincia de Buenos Aires, Argentina), vol. 4, n.º 1, febrero de 2009, pp. 1-9.

<http://www.redalyc.org/articulo.oa?id=273320452002>

Publicado originalmente en *Science & Education*, August 2003, vol. 12, n.º 5-6, pp. 431-444. Cf.:

<http://link.springer.com/article/10.1023%2FA%3A1025364722916>

MATTHEWS, Michael R. (editor), *International Handbook of Research in History, Philosophy and Science Teaching*, Dordrecht (Netherlands): Springer, 2014, pp. 2532. ISBN 13: 978-007-7653-1

This inaugural handbook documents the distinctive research field that utilizes history and philosophy in investigation of theoretical, curricular and pedagogical issues in the teaching of science and mathematics. It is contributed to by 130 researchers from 30 countries; it provides a logically structured, fully referenced guide to the ways in which science and mathematics education is, informed by the history and philosophy of these disciplines, as well as by the philosophy of education more generally. The first handbook to cover the field, it lays down a much-needed marker of progress to date and provides a platform for informed and coherent future analysis and research of the subject.

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<http://www.springer.com/fr/book/9789400776531>

MARQUIS, Jean-Pierre [Departement de Philosophie, Université de Montréal, Canada], “Mario Bunge’s Philosophy of Mathematics: An Appraisal”, *Science & Education*, vol. 21, n.º 16, October 2012, pp. 1567-1594. Cf.:

<http://link.springer.com/article/10.1007%2Fs11191-011-9409-5>

MAZURKIEWICZ, Héctor y Joaquín GARCÍA, “Enfoque ontológico-sistémico de la tutoría virtual”, *REDHECS*, Edición 9, n.º 9, 5 de septiembre de 2010. Cf.:

<http://publicaciones.urbe.edu/index.php/REDHECS/article/view/578/1766>

MENDOZA STRAFFON, Larissa, *Art in the making. The evolutionary origins of visual art as a communication signal*. Doctoral Thesis. Leiden: Department of Art History, Leiden University Centre for the Arts in Society (LUCAS), Faculty of Humanities, Leiden University, 2014, pp. vii + 223. Cf.:

<https://openaccess.leidenuniv.nl/handle/1887/28698>

MOESSINGER, Pierre, *Voir la société. Le micro et le macro* [Préface de Mario Bunge], Paris: Hermann Éditeurs, 2008, pp. 258. ISBN 13 : 978-2-7056-6674-3. Cf.:

<http://www.unige.ch/ses/socio/moessinger/Voir.la.soc.Hermann.pdf>

MOLINA, Eustoquio, “Detalles sobre la vida, obras y enseñanzas epistemológicas de Mario Bunge”, *El escéptico*, España: n.º 30, mayo-agosto 2009, pp. 50-54. Cf.:

[http://www.escepticos.es/repositorio/elesceptico/numeros\\_pdf/EE\\_30.pdf](http://www.escepticos.es/repositorio/elesceptico/numeros_pdf/EE_30.pdf)

MORETTO, Lyus Augusto Machado, Alessandra Maria Ruiz GALDO, Vinicius Medina KERN, “Uma análise sistêmica sociotecnológica da engenharia de requisitos”, *Encontros Bibli*, vol. 15, n.º esp. 2, 2010, pp. 26-40. Cf.:

<http://periodicos.ufpb.br/ojs/index.php/abcib/article/view/11574>  
<https://periodicos.ufsc.br/index.php/eb/article/view/16889/15760>

NEUGEBAUER, Tomasz, and Annie MURRAY [Concordia University], “The Critical Role of Institutional Services in Open Access Advocacy”, *The International Journal of Digital Curation* (University of Edinburgh), vol. 8, n.º 1, 2013, pp. 84-106. Cf.:  
<http://www.ijdc.net/index.php/ijdc/article/view/8.1.84/315>

PATY, Michel [Directeur de recherche émérite au CNRS], “Réalité et intelligibilité: chemins épistémologiques. Recherches en physique, en philosophie et en histoire de sciences”, *HAL archives ouvertes.fr*. Notice de titres et travaux. Édition mise à jour janvier 2008 [mars 2003], pp. 324. Cf. :  
<https://hal.archives-ouvertes.fr/halshs-00256765/document>

PEÑA, Adolfo, “The Dreyfus model of clinical problem-solving skills acquisition: a critical perspective”, *Medical Education Online*, June 14, 2010. Cf.:  
<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2887319/>  
<http://med-ed-online.net/index.php/meo/article/view/4846>  
<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2887319/pdf/MEO-15-4846.pdf>

PICKEL, Andreas, *The Hatibus Process: A Biopsychological Conception*, Peterborough (Ontario, Canada): Trent University, Center for the Critical Study of Global Power and Politics, s.d., pp. 36 (Working Paper CSGP 05/1). Cf.:  
<https://www.trentu.ca/globalpolitics/documents/Pickel051.pdf>

PICKEL, Andreas, *Salvaging Systems from General Systems Theory: Systemic Ontology and Mechanism-Based Explanation for the Social Sciences*. Prepared for presentation at the ISA XVIth World Congress of Sociology THE QUALITY OF SOCIAL EXISTENCE IN A GLOBALISING WORLD, Durban, South Africa, July 23-29, 2006, pp. 36. Cf.:  
<https://www.trentu.ca/globalpolitics/documents/Pickel062.pdf>

PICKEL, Andreas, “Peter Hedstöm. Dissecting the Social: On the Principles of Analytical Sociology. Cambridge University Press, 2005, pp. 145”. Book Review. *Canadian Journal of Sociology on Line*, September-October 2006. Cf.:  
<http://www.cjsonline.ca/pdf/dissectsocial.pdf>

PICKEL, Andreas, *Rethinking Systems Theory: The Problem of Culture*. Paper prepared for presentation at the European Association 8<sup>th</sup> Conference, Glasgow, 3<sup>rd</sup>-6<sup>th</sup> September, 2007, pp. 24. Cf.:  
<https://www.trentu.ca/globalpolitics/documents/ProblemofCultureworkingpaper072.pdf>

PICKEL, Andreas, “Between *Homo Sociologicus* and *Homo Biologicus*. The Reflexive Self in the Age of Social Neuroscience”, pp. 31. Cf.:  
[http://www.academia.edu/1870758/Between\\_Homo\\_Sociologicus\\_and\\_Homo\\_Biologicus\\_The\\_Reflexive\\_Self\\_in\\_the\\_Age\\_of\\_Social\\_Neuroscience](http://www.academia.edu/1870758/Between_Homo_Sociologicus_and_Homo_Biologicus_The_Reflexive_Self_in_the_Age_of_Social_Neuroscience)

PIETROCOLA, M, *Construção e Realidade: O Realismo Científico de Mário Bunge e o Ensino de Ciências Através de Modelos (Construction and Reality: The Scientific Realism of Mario Bunge and Science Teaching Through Models)*, *Investigações em Ensino de Ciências*, vol. 4, n.º 3, 1999, pp. 213-227. Cf.:



[http://www.if.ufrgs.br/ienci/artigos/Artigo\\_ID54/v4\\_n3\\_a1999.pdf](http://www.if.ufrgs.br/ienci/artigos/Artigo_ID54/v4_n3_a1999.pdf)

<http://www.if.ufrgs.br/ienci/?go=home#> [All issues of the review/Todos los números de la revista]

PIIROINEN, Tero, “Three Senses of ‘Emergence’: On the Term’s History, Functions, and Usefulness in Social Theory” [University of Turku, Finland], *Prolegomena*, vol. 13, n.º 1, 2014, pp. 141-161. Cf.:

[http://www.google.fr/url?sa=t&rct=j&q=&esrc=s&source=web&cd=55&cad=rja&uact=8&ved=0CD8QFjAEODI&url=http%3A%2F%2Fhrcaak.srce.hr%2Ffile%2F180414&ei=aLUrVY\\_vDdjnaq\\_3gYgI&usq=AFQjCNGG9s8ilDy3XJGYVbGkGWBWDMUMQw&sig2=Hgt17BqenCBB9pOWeFFotw](http://www.google.fr/url?sa=t&rct=j&q=&esrc=s&source=web&cd=55&cad=rja&uact=8&ved=0CD8QFjAEODI&url=http%3A%2F%2Fhrcaak.srce.hr%2Ffile%2F180414&ei=aLUrVY_vDdjnaq_3gYgI&usq=AFQjCNGG9s8ilDy3XJGYVbGkGWBWDMUMQw&sig2=Hgt17BqenCBB9pOWeFFotw)

POE YU-ze WAN [National Sun Yat-sen University, Kaohsiung City, Taiwan], *Reframing the Social. Emergentist systemism and Social Theory*, Surrey (England): Ashgate Publishing Limited, 2011, pp. 246. Cf.:

[http://books.google.fr/books?id=SXdZ1IZCLk4C&pg=PA177&source=gbp toc\\_r&cad=4#v=onepage&q&f=false](http://books.google.fr/books?id=SXdZ1IZCLk4C&pg=PA177&source=gbp toc_r&cad=4#v=onepage&q&f=false)

Chapter 1: Introduction, pp. 1-13. Cf.:

[https://www.ashgate.com/pdf/SamplePages/Reframing\\_the\\_Social\\_Intro.pdf](https://www.ashgate.com/pdf/SamplePages/Reframing_the_Social_Intro.pdf)

POE YU-ze WAN [National Sun Yat-sen University, Kaohsiung City, Taiwan], “Emergence à la Systems Theory: Epistemological Totalausschluss or Ontological Novelty?”, *Philosophy of the Social Sciences*, vol. 41, n.º 1, June 2011, pp. 178-210. Cf.: \*\*\*\*

In this article, I examine Luhmann’s, Bunge’s and others’ views on emergence, and argue that Luhmann’s epistemological construal of emergence in terms of *Totalausschluss* (total exclusion) is both ontologically flawed and detrimental to an appropriate understanding of the distinctive features of social emergence. By contrast, Bunge’s rational emergentism, his CESM model, and Wimsatt’s characterization of emergence as nonaggregativity provide a useful framework to investigate emergence. While researchers in the field of social theory and sociology tend to regard Luhmann as the sole representative of systems theory, the latter has been characterized by its diversity, and the writings of such systems theorists as Mario Bunge deserve more (critical) attention from social researchers than they receive at present. Finally, this article suggests that the perennial debate over methodological individualism and holism in social science may make real progress if such ambiguous terms as reduction and reductionism are elucidated before they are employed.

[http://www.academia.edu/1229705/Emergence\\_%C3%A0\\_la\\_Systems\\_Theory\\_Epistemological\\_Totalausschluss\\_or\\_Ontological\\_Novelty](http://www.academia.edu/1229705/Emergence_%C3%A0_la_Systems_Theory_Epistemological_Totalausschluss_or_Ontological_Novelty)

<http://pos.sagepub.com/content/41/2/178.abstract>

POE YU-ze WAN [National Sun Yat-sen University, University, Kaohsiung City, Taiwan], “Dialectics, Complexity, and the Systemic Approach. Toward a Critical Reconciliation”. *Philosophy of the Social Sciences*, vol. 41, n.º 4, December 2013, pp. 411-452. Cf.:

This article attempts to assess Mario Bunge’s important but widely neglected criticisms of dialectics. It begins by providing a contextualized interpretation of Friedrich Engels’s metaphysics of the dialectics of nature before embarking on a detailed discussion of Leon Trotsky’s and contemporary “dialectical” scientists’ views on materialist dialectics. It argues that while some of Bunge’s criticisms are eminently sensible, the principles underlying the works of dialectical scientists are compatible with Bunge’s emergentist and systemic approach and can shed light on such issues as the levels of organization, the diachronic and synchronic aspects of emergence, and the individualism-holism-systemism trilemma. This article also submits that dialectics is best interpreted as a guideline for a philosophy of change instead of a magical wand

that liberates the investigator from study of facts. Understood as something that serves heuristic purposes, dialectics can be sensibly utilized by scientists to shore up or refine their methodological principles and thereby to facilitate empirical research.

<http://pos.sagepub.com/content/43/4/411.abstract>

ROBLETO GUTIÉRREZ, Jaime, *Crisis de la Culpabilidad en Derecho Penal con relación a la Psicopatía Cognitiva*. Tesis para optar el grado de Doctorado en Derecho. Universidad Estatal a Distancia de Costa Rica, 2014, pp. 299. Cf.:

<http://repositorio.uned.ac.cr/reuned/bitstream/120809/1320/1/Crisis%20de%20la%20culpabilidad%20en%20derecho%20penal%20con%20relacion%20a%20la%20psicopat%20cognitiva.pdf>

QUINTANILLA FISAC, Miguel Ángel, “La filosofía científica de Mario Bunge”, *Materia*, 17/08/2014. Cf.:

<http://esmateria.com/2014/08/17/la-filosofia-cientifica-de-mario-bunge/>

SADONIKOV, Slava. “Systemism, social laws, and the limits of social theory: themes out of Marios Bunge’s ‘The sociology-philosophy connection’”, *Philosophy of the Social Sciences*, vol. 34, n.º 4, December 2004, pp. 536-587. Cf.:

The four sections of this article are reactions to a few interconnected problems that Mario Bunge addresses in his *The Sociology-Philosophy Connection*, which can be seen as a continuation and summary of his two recent major volumes *Finding Philosophy in Social Science* and *Social Science under Debate: A Philosophical Perspective*. Bunge’s contribution to the philosophy of the social sciences has been sufficiently acclaimed. (See in particular two special issues of this journal dedicated to his social philosophy: “Systems and Mechanisms. A Symposium on Mario Bunge’s Philosophy of Social Science,” *Philosophy of the Social Sciences* 34, nos. 2 and 3.) The author discusses therefore only those solutions in Bunge’s book that seem most problematic, namely, Bunge’s proposal to expel charlatans from universities; his treatment of social laws; his notions of mechanisms, “mechanismic explanation,” and systemism; and his reading of Popper’s social philosophy.

<http://pos.sagepub.com/content/34/4/536.abstract>

SAWYER, R. Keith, “The Mechanisms of Emergence”, *Philosophy of the Social Sciences*, vol. 34, n.º 2, June 2004, 260-282. Cf.:

<http://www.lightforcenetwork.com/sites/default/files/R.%20K.%20Sawyer%20-%20The%20Mechanisms%20of%20Emergence.pdf>

VACHER, Laurent-Michel, *Entretiens avec Mario Bunge. Une philosophie pour l’âge de la science*, Montréal (Canada): Liber, 1993, pp. 142 (Collection “de vive voix”). Cf.:

<http://www.editionsliber.com/gestion/uploads/file/bulletin-liber/bulletin-no-04.pdf>

VAN RILLAER, Jacques, “Strategies of dissimulation in the pseudosciences”, *New Ideas in Psychology*, vol. 9, n.º 2, 1991, pp. 235-244. [Special issue: “Mario Bunge on nonscientific psychology and pseudoscience: A debate”. Comments on Mario Bunge’s (1991) *A skeptics beliefs and disbeliefs*, vol. 9, n.º 2, 131-149].

<http://www.sciencedirect.com/science/article/pii/0732118X9190029L>

VINICIUS, “Visão sistêmica segundo Bunge”, *Instituto Stela – Show & Tell # 6*, Florianópolis, 31 de outubro de 2008, 15 diapositivos. Cf.:

<http://fr.slideshare.net/institutostela/instituto-stela-st006-viso-sistmica-segundo-bunge-presentation>

VIRUES-ORTEGA, J., C. HURTADO-PARRADO, T. L. MARTIN, & F. JULIO, “Psycho-neural identity as the basis for empirical research and theorization in psychology: An interview with Mario A. Bunge”, *Science and Education*, vol. 21, n.º 10, 2012, 1527-1534.

<http://link.springer.com/article/10.1007/s11191-011-9418-4>