TREATISE ON BASIC PHILOSOPHY

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SEMANATICS I  *Sense and Reference*

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ONTOLOGY I  *The Furniture of the World*

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ETHICS  *The Good and the Right*
MARIO BUNGE

Treatise on Basic Philosophy

VOLUME 3

Ontology I:

THE FURNITURE OF THE WORLD

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GENERAL PREFACE TO THE TREATISE

This volume is part of a comprehensive Treatise on Basic Philosophy. The treatise encompasses what the author takes to be the nucleus of contemporary philosophy, namely semantics (theories of meaning and truth), epistemology (theories of knowledge), metaphysics (general theories of the world), and ethics (theories of value and of right action).

Social philosophy, political philosophy, legal philosophy, the philosophy of education, aesthetics, the philosophy of religion and other branches of philosophy have been excluded from the above quadrivium either because they have been absorbed by the sciences of man or because they may be regarded as applications of both fundamental philosophy and logic. Nor has logic been included in the Treatise although it is as much a part of philosophy as it is of mathematics. The reason for this exclusion is that logic has become a subject so technical that only mathematicians can hope to make original contributions to it. We have just borrowed whatever logic we use.

The philosophy expounded in the Treatise is systematic and, to some extent, also exact and scientific. That is, the philosophical theories formulated in these volumes are (a) formulated in certain exact (mathematical) languages and (b) hoped to be consistent with contemporary science.

Now a word of apology for attempting to build a system of basic philosophy. As we are supposed to live in the age of analysis, it may well be wondered whether there is any room left, except in the cemeteries of ideas, for philosophical syntheses. The author's opinion is that analysis, though necessary, is insufficient – except of course for destruction. The ultimate goal of theoretical research, be it in philosophy, science, or mathematics, is the construction of systems, i.e. theories. Moreover these theories should be articulated into systems rather than being disjoint, let alone mutually at odds.

Once we have got a system we may proceed to taking it apart. First the tree, then the sawdust. And having attained the sawdust stage we should move on to the next, namely the building of further systems. And this for three reasons: because the world itself is systemic, because no idea can
become fully clear unless it is embedded in some system or other, and because sawdust philosophy is rather boring.

The author dedicates this work to his philosophy teacher

Kanenas T. Pota

in gratitude for his advice: "Do your own thing. Your reward will be doing it, your punishment having done it".
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This book and its companion, namely Volume 4 of our Treatise, concern the basic traits and patterns of the real world. Their joint title could well be The Structure of Reality. They constitute then a work in ontology, metaphysics, philosophical cosmology, or general theory of systems. Our work is in line with an old and noble if maligned tradition: that of the pre-Socratic philosophers, Aristotle, Thomas Aquinas, Descartes, Spinoza, Leibniz, Hobbes, Helvetius, d’Holbach, Lotze, Engels, Peirce, Russell, and Whitehead. But at the same time it departs from tradition in the matter of method. In fact our aim is to take the rich legacy of ontological problems and hints bequeathed us by traditional metaphysics, add to it the ontological presuppositions of contemporary scientific research, top it with new hypotheses compatible with the science of the day, and elaborate the whole with the help of some mathematical tools.

The end result of our research is, like that of many a metaphysical venture in the past, a conceptual system. It is hoped that this system will not be ridiculously at variance with reason and experience. It is intended moreover to be both exact and scientific: exact in the sense that the theories composing it have a definite mathematical structure, and scientific in that these theories be consistent with and moreover rather close to science – or rather the bulk of science. Furthermore, to the extent that we succeed in our attempt, science and ontology will emerge not as disjoint but as overlapping. The sciences are regional ontologies and ontology is general science. After all, every substantive scientific problem is a subproblem of the problem of ontology, to wit, What is the world like?

After a long period underground, talk about metaphysics has again become respectable. However, we shall not be talking at length about ontology except in the Introduction. We shall instead do ontology. In the process we shall attempt to exhibit the mathematical structure of our concepts and we shall make the most of science. Being systematic our ontology may disappoint the historian. Being largely mathematical in form it will be pushed aside by the lover of grand verbal (but sometimes
deep and fascinating) systems – not to speak of the lover of petty verbal matters. And being science-oriented it will fail to appeal to the friend of the esoteric. Indeed we shall be concerned with concrete objects such as atoms, fields, organisms, and societies. We shall abstain from talking about items that are neither concrete things nor properties, states or changes thereof. Any fictions entering our system will be devices useful in accounting for the structure of reality. (Constructs were dealt with in Volumes 1 and 2 of this work.)

The first ideas for this work dawned upon me when I was engaged in axiomatizing some basic physical theories involving ontological concepts such as those of thing, property, possibility, change, space, and time, none of which are the exclusive property of physics but all of which belong to the metaphysical background of this science, or protophysics (Bunge 1967b). And the earliest plan for this work occurred to me a bright day of June 1966 when travelling from Freiburg im Breisgau to Geneva at the invitation of Jean Piaget. I have been working on this project ever since, on and off, stimulated by what seemed a grand design and occasionally inhibited by the difficulties met with in carrying it out. The result is a system but not a closed and final one: there is much room for improvement and of course also for divergent developments.

This volume deals with the concepts of substance, form (or property), thing (or concrete object), possibility, change, space, and time. The companion volume, A World of Systems, will tackle the concepts of system, novelty, biosystem, psychosystem, and sociosystem.
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The Alexander von Humboldt-Stiftung covered my first incursions into the intersection of physics and metaphysics (1965-66). The Canada Council contributed to this project by awarding me research grants (1969–72, 1974–76), one of them on behalf of the Killam Foundation. And the John Simon Guggenheim Memorial Foundation awarded me a fellowship that gave me a happy and fruitful year (1972–73). It was during the tenure of that fellowship, at the ETH Zürich, that I started to write this book. I am grateful to all those organizations for their support, and to Professors Gerhard Huber and Peter Huber for their hospitality at the ETH. Last, but not least, I thank my guide in the fascinating and puzzling Mexican labyrinth, Professor Fernando Salmerón, director of the Instituto de Investigaciones Filosóficas of the UNAM, where this volume acquired its final shape during the 1975–76 academic year.

MARIO BUNGE
SPECIAL SYMBOLS

\( x \triangleright y \)  \hspace{1cm} x \text{ acts on } y
\( c = a \ast b \)  \hspace{1cm} c \text{ is the association of individuals } a \text{ and } b
\( A \times B \)  \hspace{1cm} the cartesian product of sets A and B
\( \langle s, s', g \rangle \)  \hspace{1cm} the change from state s to state s' along curve g
\( C \)  \hspace{1cm} set of constructs
\( \mathcal{G}(x) \)  \hspace{1cm} the composition of thing x
\( x \perp y \)  \hspace{1cm} x \text{ and y are detached}
\( E_i(x) \)  \hspace{1cm} the event space of thing x
\( E_A x \)  \hspace{1cm} x exists in A
\( \mathcal{S}(A) \)  \hspace{1cm} the extension of attribute (predicate) A
\( f: A \to B \)  \hspace{1cm} function f maps set A into set B
\( F \)  \hspace{1cm} set of facts
\( F = \langle F_1, F_2, \ldots, F_n \rangle \)  \hspace{1cm} state function
\( h(x) \)  \hspace{1cm} the history of thing x
\( a \cap b \)  \hspace{1cm} c interposes between a and b
\( c = a \vee b \)  \hspace{1cm} c is the juxtaposition of a and b
\( k(\mathbb{R}) \)  \hspace{1cm} the kind of things sharing all properties in \( \mathbb{R} \)
\( G_i(x) \)  \hspace{1cm} the set of lawful transformations of the states of x
\( l(x) \)  \hspace{1cm} the laws of thing x
\( \langle x, y \rangle \)  \hspace{1cm} the ordered pair of x and y
\( \Box \)  \hspace{1cm} the null thing
\( x \subset y \)  \hspace{1cm} x is a part of y
\( \mathcal{P}(S) = 2^S \)  \hspace{1cm} the power set of S
\( P \preceq Q \)  \hspace{1cm} property P precedes property Q
\( P \)  \hspace{1cm} the set of all properties
\( p(x) \)  \hspace{1cm} the collection of properties of thing x
\( Pr \)  \hspace{1cm} probability function
\( \mathbb{R} \)  \hspace{1cm} the real line
\( S(x) \)  \hspace{1cm} lawful state space of thing x
\( c = a \times b \)  \hspace{1cm} c is the superposition of things a and b
\( S \)  \hspace{1cm} the set of all substantial (concrete) individuals
\( \mathcal{S}(P) \)  \hspace{1cm} the scope of property P
\( [T] = \inf T \)  \hspace{1cm} the additive aggregation of all things in T
\( (T) = \sup T \)  \hspace{1cm} the multiplicative aggregation of all things in T
\( \Theta \)  \hspace{1cm} the set of all things
\( \Box \)  \hspace{1cm} the world or universe
INTRODUCTION

In this Introduction we shall sketch the business of ontology, or metaphysics, and shall locate it on the map of learning. This has to be done because there are many ways of construing the word ‘ontology’ and because of the bad reputation metaphysics has suffered until recently – a well deserved one in most cases.

1. Ontological problems

Ontological (or metaphysical) views are answers to ontological questions. And ontological (or metaphysical) questions are questions with an extremely wide scope, such as ‘Is the world material or ideal – or perhaps neutral?’, ‘Is there radical novelty, and if so how does it come about?’, ‘Is there objective chance or just an appearance of such due to human ignorance?’, ‘How is the mental related to the physical?’, ‘Is a community anything but the set of its members?’, and ‘Are there laws of history?’.

Just as religion was born from helplessness, ideology from conflict, and technology from the need to master the environment, so metaphysics – just like theoretical science – was probably begotten by the awe and bewilderment at the boundless variety and apparent chaos of the phenomenal world, i.e. the sum total of human experience. Like the scientist, the metaphysician looked and looks for unity in diversity, for pattern in disorder, for structure in the amorphous heap of phenomena – and in some cases even for some sense, direction or finality in reality as a whole. Metaphysics and science have then the same origin. However, they can be distinguished up to a certain point, namely by the scope of their problems. Whereas the scientific specialist deals with rather specific questions of fact, the ontologist is concerned with all of the factual domains: he is a generalist not a fragmentarian. His enterprise is more ambitious, hence also riskier, than any one scientific project. But the two concerns are not mutually exclusive and, in fact, sometimes they are indistinguishable: an extremely general scientific question may be a special ontological one.
Ontological questions are not easy to characterize or even to recognize as meaningful in isolation from ontological frameworks or ontological theories. Consider for example the following questions:

(i) Why is there something rather than nothing?
(ii) Does essence precede existence?
(iii) What is being?
(iv) Where is one?
(v) What is there?

The first question makes sense in any creationist system of theodicy, such as Leibniz', but it makes no sense elsewhere. The second, at first blush unintelligible, makes good sense in a Platonic metaphysics, where essences are ideal and prior to physical existents. The third question becomes meaningful if reformulated as 'What are the features common to all existents?'. The fourth question was asked by my son Eric when he was 18 months old. It must have made some sense in his own Weltanschauung and, rewriting 'one' with a capital O, it might be safely attributed to Parmenides. The fifth - which is how Quine seems to understand the task of ontology - calls for either an exhaustive inventory of existents - a job for scientists of the Baconian persuasion - or a simplistic answer such as 'There are bodies and persons' (Strawson, 1959).

The preceding questions make hardly any sense in the system to be developed in this book. On the other hand the following problems do make sense in it and moreover can be given definite answers:

(vi) Are things bundles of properties? (No.)
(vii) Are there natural kinds? (Yes.)
(viii) Is change possible without an unchanging substrate? (Yes.)
(ix) How do emergent properties come about? (Wait for Volume 4.)
(x) What is the mind? (Ditto.)

These questions are both fundamental and extremely general. Moreover they are factual questions – only, comprehensive or cross-disciplinary rather than special. There are as many such questions as we care to ask. The more we come to know, the more problems we can pose and the less final our solutions prove to be. In both regards then – factual content and open-endedness – ontological questions are no different from scientific ones. (For the latter see Bunge, 1967a, Vol. I, Ch. 4.) They differ only in scope. And even this difference is often non-existent, as will be seen in Sec. 7.
INTRODUCTION

2. The business of ontology

At least the following ten conceptions of the concern of ontology (or metaphysics) have followers nowadays:

(i) Metaphysics is a discourse (in either ancient Greek or modern German) on Being, Nothingness, and Dasein [human existence] (Heidegger, 1953). Objection: impossible, because the said discourse is unintelligible and moreover avowedly irrational. If in doubt try to read Heidegger or Sartre.

(ii) Metaphysics is a collection of instinctive (as opposed to intellectual) beliefs (Bergson, 1903). Objection: if metaphysics is to be a discipline then it cannot collect blindly any received ideas, be they "instinctive" or gotten from tradition. The fact that cave men held "instinctive" beliefs without subjecting them to methodic criticism does not justify us in upholding an attitude that would never have taken us out of the cave.

(iii) Metaphysics is the justification of instinctive beliefs: "the finding of reasons, good, bad or indifferent, for what we believe on instinct" (Strawson, 1959, p. 247). Objection: our least educated tenets must surely be studied – by the cultural anthropologist. Scholars, whether scientists or metaphysicians, are supposed to examine, refine or reject that starting point – and above all to propose new ideas. Reassuring the cave man in his primitive metaphysics is worse than sharing it.

(iv) Metaphysics is "the science of absolute presuppositions" (Collingwood, 1940). That is, metaphysics is the study of all presuppositions, of any discipline, in so far as they are absolute, i.e. lurk behind every question and every answer, and are moreover beyond question. This is a respectable view. However, it is open to the following objections: (a) most presuppositions are not absolute but are bound to rise and fall with the special theory concerned: look at the history of ideas; (b) even though metaphysics does study some of the presuppositions of science, it does not handle them all, as some of them are purely formal (logical or mathematical) and others are methodological.

(v) Metaphysics deals with everything thinkable, whether or not it actually exists, whether reasonable or absurd: it is concerned with "the totality of the objects of knowledge" (Meinong, 1904, in Chisholm, 1960, pp. 78–79). Objections: (a) no theory is possible that will encompass both concrete objects and conceptual ones; in particular,
logical truths may refer to anything but they do not describe or represent any objects except the logical concepts ("or", "all", etc.); (b) objects known to be fantastic, such as Pegasus, may be imagined but cannot constitute the subject of any discipline: only our beliefs about such mythological objects can be studied scientifically.

(vi) Metaphysics is the study of objects neither physical nor conceptual – i.e. of spiritual beings, and of God and his celestial court in the first place. This opinion is quite popular and was occasionally voiced by Thomas himself (1259 Bk. I, Ch. IV). Objection: that is the proper subject of theology, which is no longer recognized as a part of philosophy.

(vii) Metaphysics is the science of being as such: unlike the special sciences, each of which investigates one class of being, metaphysics investigates "all the species of being qua being" and "the attributes which belong to it qua being" (Aristotle, Metaphysics Bk. IV, Chs. 1 and 2). This is what nowadays one would call general ontology by contrast to the various special or regional ontologies (of the biological, the social, etc.). Certainly the Philosopher had a correct grasp of the relation between metaphysics (general) and the sciences (special). Still, the following objections must be raised: (a) the formulation is too imprecise, so much so that it has suggested to some that becoming is not within the purview of metaphysics – an opinion certainly not shared by the Stagirite, who was centrally concerned with change; (b) a science of pure being is a contradiction in terms because it has no definite subject matter (Collingwood, 1940, pp. 10-11).

(viii) Metaphysics is the study of change: of events and processes – because this is what things are (Whitehead, 1929). Objection: an event is a change in the condition (state) of some thing and therefore cannot be studied apart from it any more than things can be studied apart from their changes.

(ix) Metaphysics concerns all possible worlds: it is an ontological interpretation of logic. A system of metaphysics is a set of statements satisfying two conditions: (a) "The horizon [set of referents] of a significant metaphysical statement must surpass in an unambiguous way the horizon of a physical statement", and (b) "A metaphysical statement must not lag behind a physical statement as far as exactness and stability [Standfestigkeit] are concerned" (Scholz, 1941, pp. 138–139). While I have no quarrel with the exactness condition, I dispute the others. My objections are: (a) the fact that logic may refer (apply) to