

Definitions of *Ontology* - Second Part: from Nicolai Hartmann to the present time

CONTEMPORARY ONTOLOGISTS

NICOLAI HARTMANN (1882-1950)

"All ontology has to do with fundamental assertions about being as such. Assertions of this sort are precisely what we call categories of being. Like the Kantian categories - which, as far as content is concerned, are also precisely this: fundamental assertions about being - they have the character of universal constitutive principles comprising all more specialized ontological assertions. Hence, the new ontology might be expected to provide a transcendental deduction also of these ontological assertions. Otherwise, it is argued, it could not guarantee their objective validity. That, however, would mean that this ontology in its turn was in need of an epistemological foundation which would have to provide the justification of a priori principles of an even wider scope.

Thereby a way for ontology is traced, and this way once more follows the scheme of the old deductivity. But it is here that the roads of the old and the new ontology part. Just as in regard to the problem, of being it is today no longer a question of substantial forms and of the teleological determination of actual processes by these forms, so also the problem at issue is no longer that of a post factum justification of a priori principles. The categories with which the new ontology deals are won neither by a definition of the universal nor through derivation from a formal table of judgments. They are rather gleaned step by step from an observation of existing realities. And since, of course, this method of their discovery does not allow for an absolute criterion of truth, here no more than in any other field of knowledge, it must be added that the procedure of finding and rechecking is a laborious and cumbersome one. Under the limited conditions of human research it requires manifold detours, demands constant corrections, and, like all genuine scholarly work, never comes to an end.

Here one may truly and literally speak of new ways of ontology. The basic thesis can possibly be formulated like this: The categories of being are not a priori principles. Only such things as insights, cognitions, and judgments can be a priori. In fact the whole contrast between a priori and a posteriori is only an epistemological one. But ontology is not concerned with knowledge, much less with mere judgments, but with the object of knowledge in so far as this object is at the same time "transobjective," that is, independent of whether or to what extent being is actually transformed into an object of knowledge. The principles of the object in its very being are in no way eo ipso also cognitive principles. In some fields they can be quite heterogeneous, as the manifold admixtures of the unknowable in nearly all basic problems of philosophy amply prove. From this alone it follows that the principles of being cannot be a priori principles of our intellect, that they, as a matter of fact, are just as indifferent to the dividing line between the knowable and the unknowable as the being whose principles they are."

From: Nicolai Hartmann - *New ways of Ontology* (1949) Translated by Reinhard C. Kuhn -Chicago, Henry Regnery Company, 1953 pp. 13-14

"The true characteristics of reality do not depend on the categories of space and matter but on those of time and individuality. Ontologically considered, time and space are not categories of equal worth: Time is by far more fundamental than space. Only material things and living beings, including the processes through which their existence flows, are spatial. But spiritual and psychic processes, as well as material processes, are temporal. For everything real is in time and only a part of it in space --we might say, only one half of the real world, its lower forms.

Inseparably joined with temporality is individuality. This consists in nothing but singleness and uniqueness.

The real is perishable and thereby also unrepeatable. The same sort of thing recurs, never the same identical thing. This holds true of historical events as well as of cosmic motions, of persons as well as of things. Only the universal recurs, for, considered by itself, it is timeless, always existing, eternal. This timelessness was once considered in the old ontology to be a being of a higher order, indeed, even the only true being. But, in truth, it is rather a dependent, a merely ideal being, and the universal has reality nowhere else but in the real particulars which are both temporal and individual. What once was considered a kingdom of perfection, the kingdom of essences, whose faint copies things were supposed to be, has proved itself to be a kingdom of incomplete being which becomes independent only through abstraction. In the recognition of this lies perhaps the most striking contrast of the new ontology to the old.

That is why the new ontology can very well grapple with the deep problems of German idealism, why it can deal with the spirit and freedom, social life and history, just as well as with the cosmos and the organism. Hence new light may be expected to be shed by it on the characteristic situation and activity of man as a spiritual being within a non-spiritual, law-determined world.

These reflections are but a small section from a chapter on categorial analysis. Here they are only sketched. They justly demand a much more exact discussion of space, time, process, psychic act, reality, and so forth. Particularly reality, the pure mode of being of the structures and processes which form the world, is a very difficult subject for analysis. In order to understand reality the philosopher must start with an examination of the relationship of possibility and actuality -- for centuries the fundamental problem of ontology. And the revolution in the whole problem of being extends even to these very foundations of being. For what the old ontology teaches about potency and act -- a relationship according to which everything real is a realization of a pre-existing disposition and all being is destined to become what it is by disposition -- proves to be far from adequate in view of the broadened problem of reality. It is incumbent upon us to introduce a new concept of 'real possibility' (Realmöglichkeit) which no longer coincides with essential possibility but which signifies the totality of conditions present at a given time within the real context. To this must correspond just as novel a concept of 'actual reality' (Realwirklichkeit) which is no longer thought of as the goal of an anthropomorphically conceived tendency, as if the processes in the cosmos were tied to the activity of an intelligence. Rather such actual reality must in every case be considered to be the complex result of a far-flung context of determinants. A whole science concerns itself with these inner relationships of reality considered as a mode of being. It forms the core of the new ontology, and, in contrast to an analysis of categories directed toward the structural content, it may be called modal analysis." *ibid.* pp. 25-27.

STANISLAV LESNIEWSKI (1886-1939)

"Lesniewski's system of logic consists of two theories, which he called Protothetic and Ontology. Of these the former is perhaps the most comprehensive Logic of Propositions which has ever been devised. It goes beyond the classical Calculus of Propositions in several respects. It allows for instance for functorial variables for which constant functors of the Calculus of Propositions can be substituted. It provides for the use of the universal quantifier to bind both the propositional and the functorial variables. It has a rule of definitions, which enables us to extend at will the variety of semantical categories within the field of the Logic of Propositions, and, in addition, it has a rule of extensionality; but the most significant point about Protothetic is that with its aid we can derive theses which enable us to dispose of the usual rules for operating with the universal quantifier in any deductive theory of lower generality. In the edifice of the possible deductive theories Protothetic forms the very base. It requires no more fundamental theory than itself whereas other deductive theories, not included in it, have to be built on it or on a part of it. This is the case with Ontology.

If Protothetic is the most comprehensive Logic of Propositions then Ontology is the most comprehensive Logic of Names. Roughly speaking, it comprises the traditional logic in its modernized form and has counterparts of the Calculus of Predicates, the Calculus of Classes, and the Calculus of Relations including the Theory of Identity.

(...) At first sight Lesniewski's use of the term Ontology may seem curious and daring, but it should become clearer as we proceed that he was eminently justified. In fact his whole conception of logic was ontological through and through in a truly classical sense. (...) Contrary to the widely accepted practice Lesniewski intended his logic to be an interpreted system. He attached definite meanings to his constants and regarded the theses of his deductive theories as true propositions in the sense in which propositions of empirical sciences are accepted as true. It is with this in mind that we should approach his theories. Ontology has been described as the most comprehensive Logic of Names because its most characteristic expressions belong to the semantical category of names, just as the most characteristic expressions of Protothetic belong to the semantical category of propositions. If, however, we take into account the contents of Ontology then it would be more appropriate to describe it as a theory of what there is. Just as astronomy tells us something about heavenly bodies, the theses of Ontology tell us something about things, or objects if one prefers, or individuals. Since in accordance with Lesniewski's intentions theses of Ontology are to be regarded not as mere 'well formed formulae' but as meaningful propositions which can be examined for their truth or falsity, it is essential that we should understand as clearly as possible the ontological vocabulary. Only when we have mastered this vocabulary can a further step be made, namely the one which consists of a critical study of those ontological theses which are already at our disposal. Finally, we may try to discover new truths, which we can formulate in terms of the ontological vocabulary, and assign them their proper places in the theory by deducing them from the axiom or establishing their independence."

From: Czeslaw Lejewski - *On Lesniewski's Ontology* - In: Ratio vol. I, n.2, 1958, pp. 150-176 (Reprinted in: Jan T. J. Szrednicki, V. F. Rickey (eds) - *Lesniewski's Systems. Ontology and Mereology* - The Hague, Martinus Nijhoff, 1984, pp. 123-148). pp. 124-126 (notes omitted).

ROMAN INGARDEN (1893-1970)

"The ontological analyses of works of art affected Ingarden's entire ontology. Its best elaboration is contained in *Spór o istnienie swiata* (The controversy over the existence of the world, 1947-48). A being, i.e., an object, can be considered in three different respects: (1) the material one, (2) the formal one, and (3) the existential one (modes of being). Ingarden understands ontology as based on eidetic insight and intuitive analyses of the contents of ideas, i.e., upon the EIDETIC METHOD, which enables one to discover the necessary and purely possible relations between the pure ideal qualities. Ontology is for him the most general theory of objects. He distinguishes it from metaphysics, which fulfills the role of an applied theory of objects and which, being based on ontology, considers the nature and essence of factual beings. The eidetic character distinguishes metaphysics from the so-called real sciences.

Ontology aims at obtaining a general spectrum of eidetic possibilities and necessities with reference to any objects whatever. In the frame of an existential ontology, which has nothing to do with Martin Heidegger's FUNDAMENTAL ONTOLOGY, Ingarden distinguishes and clearly defines four mutually exclusive pairs of moments of being: something can be (1) existentially autonomous or heteronomous, (2) existentially original or derivative, (3) existentially separate or not separate, and (4) existentially self-dependent or contingent. Considerations connected with the analysis of the second pair has led Ingarden to an original interpretation of the relation of causality. His analysis of time has brought some additional pairs of existential moments, such as actuality and non-actuality; persistence and fragility; and fissuration and non-fissuration. These differentiations enables him to distinguish and describe four basic modes of being (consisting of non-contradictory combinations of existential moments). These are: (I) absolute being (autonomous, original, separate, self-dependent); (2) temporal (real) being; (3) ideal (extra-temporal) being; and (4) purely intentional (quasi-temporal) being. We cannot experience any existing object without its mode of being.

In epistemology Ingarden distinguishes: (1) the pure theory of knowledge, which is actually a part of ontology, because he describes it as an a priori analysis of the general idea "knowledge"; (2) criteriology, which researches such epistemic values as objectivity and adequacy; and (3) the critique of knowledge,

which evaluates factually obtained results of scientific and philosophical cognition."

From: Andrzej Przylebski -*Roman Ingarden* - In: Lester Embree, and alii (eds.) - *Encyclopedia of phenomenology* - Dordrecht, Kluwer, 1997, pp. 348-349.

MARIO BUNGE (1919-

"ONTOLOGY The serious secular version of metaphysics. The branch of philosophy that studies the most pervasive features of reality, such as real existence, change, time, chance, mind, and life. Ontology does not study constructs, i.e., ideas in themselves. These are studied by the formal sciences and epistemology. Hence the expression 'ontology of mathematics' makes sense only in the context of objective idealism (such as Pythagoras's and Plato's). By contrast, the question 'What is the ontological status of mathematical objects?' is meaningful in all contexts, and in a fictionist philosophy of mathematics it has a simple answer: None. (...) Ontology can be classed into general and special (or regional). General ontology studies all existents, whereas each special Ontology studies one genus of thing or process-physical, chemical, biological, social, etc. Thus, whereas general ontology studies the concepts of space, time, and event, the ontology of the social investigates such general sociological concepts as those of social system, social structure, and social change. Whether general or special, ontology can be cultivated in either of two manners: speculative or scientific. The ontologies of Leibniz, Wolff, Schelling, Hegel, Lotze, Engels, Mach, W. James, H. Bergson, A. N. Whitehead, S. Alexander, L. Wittgenstein, M. Heidegger, R. Carnap, and N. Goodman are typically speculative and remote from science. So is the contemporary possible worlds metaphysics. Warning: the expression 'the ontology of a theory' is sometimes misleadingly employed to designate the reference class or universe of discourse of a theory. The expression is misleading because ontologies are theories, not classes."

From: Mario Bunge - *Dictionary of philosophy* - Amherst, Prometheus Books, 1999, pp. 200-201.

FRED SOMMERS (1923-

"The main object of the ensuing analysis is to tie together several seemingly disparate topics. These include: (a) a theory of types (that is, a theory describing the way terms are conjoined to form category correct statements in a natural language); (b) a formal theory of ontological categories and ontological features; (c) a theory of predication (that is, a theory accounting for the subject-predicate distinction and one which provides certain formal characteristics of the binary relation 'is predicable of'); (d) a procedure for enforcing ambiguity.

The results of the analysis support the main features of the Russell program. I take these to be that (a) clarification of natural language is ontologically revealing and discriminatory of the sorts of things there are; (b) linguistic structures and ontological structures are isomorphic. The meaning of 'ontology' in what immediately follows is 'the science of categories.'(...)

The ontologist is interested in categories; he is, qua ontologist, not interested in whether a thing is red or whether it is green but in whether it is colored. Even this is not altogether accurate: he is interested in its character of being colored or colorless. For the ontologist 'colored' means | red | which is the same thing as colored or colorless. A toothache is neither, but water can be either red or not red or colored or colorless.

We speak as ontologists when, for example, we say that points belong to the category of extension even though they belong to the class of extensionless things. The category of extension is defined by the predicate | extended | and points belong to it. Concepts do not belong to it since they are neither extended nor extensionless. Space (spatial) is another category word since it has no complement which is not categorial. And if the word 'color' is taken to include that 'color' we call 'colorless,' it too is a category

word. (pp. 351-352).

From: Fred Sommers - "*Types and ontology*," *The Philosophical Review* 72: 327-363 (1963).

Sommers defines 'ontology' as the 'science of categories' ('Types and Ontology,' p. 351). More specifically, it is the systematic attempt to say what categories are, how they are determined, and how they are related to one another. Ontology is, of course, nothing new. Plato's theory of forms, Aristotle's Categories, Russell's theory of types are three quite obvious examples of attempts at a science of categories. But it is Sommers' own theory which comes closest to a complete, workable theory of categories.

So what is a category? It is a group of things, a class--but a special kind of class. We saw above that a class consists of all those things of which some given term is true. The notion true of is the source of one of the problems with classes. Consider how we negate. Modern logicians take all the kinds of negation which can occur in a natural language sentence as amounting to the negation of the entire sentence.

(...)

Let us make a distinction between what a term is true of and what it spans ('Types and Ontology,' p. 329). A term spans whatever either it or its negation could be used to sensibly characterize. And all the things spanned by a given term constitute the category with respect to that term. Thus, while the lowest prime is in the counter-class of 'married,' it is not in the category determined by 'married.' While a term and its negation exclusively and exhaustively divide the world, a term and its negation both determine the same category, which need not exhaust the world. This is because whatever can be sensibly characterized by a term can be sensibly characterized by its negation. Spanning is not defined in terms of truth. While a term and its negation are never true of the same things, they both span the same things. For example, whatever can be sensibly characterized as married can equally well be characterized (though perhaps falsely) as unmarried. It would be false, but nonetheless sensible, to characterize Queen Elizabeth as unmarried. On the other hand, neither 'married' nor 'unmarried' can be used to characterize the lowest prime number. To characterize it in either way would be senseless, nonsense, category mistaken.

While classes are defined in terms of truth, categories are defined in terms of spanning (which in turn is defined in terms of sense). A category with respect to a term 'X' will include the class of X things and some (usually not all) of the counter-class of X things. The class of married things has in it me, the Queen, my wife, etc. The counter-class has my son, the Pope, the Moon, Mars, etc. (viz. anything of which 'married' is not true). The category with respect to 'married' has me, the Queen, my wife, my son, the Pope, etc., but not the Moon, Mars, etc. For, while 'married' is false of, say, both my son and Mars, it spans only the former and not the latter." pp. 4-5

From: George Englebretsen - *A reintroduction to Sommers' tree theory* - Chapter 1 of: *Essays on the philosophy of Fred Sommers* - Lewiston, The Edwin Mellen Press, 1990.

ERNST TUGENDHAT (1930-

"Lecture 3. Ontology and semantics.

It is at the beginning of Book IV of his *Metaphysics* that Aristotle first introduces his new conception of philosophy. 'There is a science which studies being as being.' Indeed the special character of this science vis-à-vis the other sciences is supposed to consist in the fact that whereas the latter investigate a particular sphere of being philosophy investigates being as being. (1) What distinguishes the concept of being, for Aristotle, is that it is the most general concept. (2) For of everything and anything one can say that it is. Everything and anything, therefore, can be called being.

Clearly Aristotle arrives at his new conception of philosophy by dropping the aspect of justification from the preliminary conception developed at the beginning and settling exclusively for the aspect of highest

generality. The highest, pre-eminent science, called philosophy, is universal, but does not have a justificatory role in relation to the particular sciences. This conception, since it is orientated towards the concept of being (on), leads to the conception of philosophy as ontology. (...) An explicitly semantic enquiry was, however, unknown to Aristotle. This is why he called predicative determinations both onta (beings) and legomena (something said). (3) In the Middle Ages this undecidedness became the starting-point of the nominalism controversy. Aristotle refused to follow Plato in treating the meaning of predicates as an independent object. However, because he failed to perceive the semantic dimension he inevitably objectified their meaning. The result is a peculiar extension of the concept of being (on). It is - together with the concepts of the one and of something - more comprehensive than that of an object (tode ti).

The title 'ontology' now begins to iridesce. It would have an unequivocal sense if one were to define it, as I initially did, and as is usual in analytical philosophy, in terms of the concept of an object, or, which amounts to the same thing, in terms of the concept of being in the sense of existence; 'ontology' would then mean 'theory of objects'. In contrast to this the introduction of ontology by Aristotle, which became standard in the tradition, contains a tension which was not resolved in the tradition. This tension is a consequence of Aristotle's dual orientation: on the one hand, to the - objectual - formula 'being as being'; on the other hand, to the verbal form 'is'. He lets himself be guided by this verbal form even where it does not connote being in the sense of existence, i.e. where the 'is' is not the 'is' of a being; and since the formula 'being as being' nonetheless remains the guiding principle, the formalizing approach, which in itself would have led away from the restriction to the problem of objects, is again being cast into an objectual terminology. Aristotelian ontology transcends the formal theory of objects in the direction of a formal semantics, but in such a way that what emerges is misinterpreted in terms of an object-oriented perspective, owing to the lack of awareness of the semantic dimension.

Thus if one views the traditional elaboration, essentially determined by Aristotle, of the idea of a philosophical fundamental discipline as ontology from a language-analytical perspective (one of reflection on the meaning of words) it turns out to be unsatisfactory in regard to both of the aspects in Aristotle's preliminary conception of philosophy. Firstly, in regard to its justification: the object-orientated Aristotelian formal discipline lacks a foundation in a method of reflection; such a foundation would be provided by a formal semantics (though whether this is the only possible foundation we do not yet know). Secondly, in regard to its scope: its claim to universality could only seem convincing so long as one remained orientated to objects. But the orientation to everything (and that means: to all objects) appears itself restricted as soon as one focusses on the realm of the formal itself. The perspective on objects then corresponds to just one semantic form among others."

1 1003a22-25, 1025b7-10.

2 998b220f.

3 cf. e.g. 1045b30 f.

From: Ernst Tugendhat - *Traditional and analytical philosophy. Lecture on the philosophy of language* - Translated by P. A. Gerner - Cambridge, Cambridge University Press, 1982 p. 21

REINHARDT GROSSMANN (1931-2010)

"Ontology asks and tries to answer two related questions. What are the categories of the world? And what are the laws that govern these categories? In chemistry, by comparison, we search for chemical elements and the laws which they obey; and in physics we try to discover the elementary particles and their laws. But ontology is not a science among sciences. Its scope is larger; its viewpoint, fundamentally different.

When Anaximander speculated that everything is made up from the four elements -- fire, earth, air, and

water -- he proposed, in effect, a rudimentary theory of chemistry. And so did Anaximenes when he maintained that everything consists of various densities of air. Ontology was born when someone realized that any view of this sort implies a distinction between individual things, on the one hand, and their properties, on the other. Ontology was born when someone realized that there are, not only different kinds of individual thing, but also different kinds of entity. This realization must have led almost immediately to a number of distinctly ontological questions. How, precisely, do individuals and properties differ? How are they related to each other? Are there perhaps any other kinds of entity? And so on. Plato's theory of forms deals with just these sorts of questions, and we think of it, therefore, as one of the first ontological inquiries. (...) But properties are not the only kind of abstract entity, as we shall see. There are numbers and, hence, there is arithmetic. There are sets and, hence, there is set theory. There are several kinds of abstract entity and, hence, several further kinds of inquiry, distinct both from the natural sciences and from ontology. And this fact raises a number of new questions for ontology. How do these kinds of abstract entity differ from each other? How are they connected with each other? And how are they related to individual things? What looks at the beginning of the ontological enterprise like the fundamental dichotomy, namely, the distinction between individuals and properties, turns out to be just one of many equally basic distinctions.

A particular ontological theory must of course strive to accommodate all of these differences and connections. It must attempt to present us with a complete list of categories. Everything there is must find a place in the system. The theory is unsatisfactory if it is incomplete, that is, if there are entities which are not categorized. It may be argued, for example, that classes have no place within the Aristotelian framework of substance and modification of substance. But it is not enough that everything should find a category in the theory. Everything must be fitted to the proper category. An ontological theory is also faulty if it assigns entities to the wrong categories. For example, a Cartesian would contend that Aristotelians misplace the mind: A mind is a substance in its own right and not, as Aristotelians claim, a mere modification of a substance. Or it might be argued, to turn to the present, that natural numbers are, not classes of classes, but quantifiers of a certain kind. Nor, finally, must the ontology contain distinctions that make no differences. Categorical distinctions must not be made capriciously. Categories are not to be multiplied arbitrarily. Aristotelian ontology may be accused of introducing a spurious distinction by separating so-called essential from accidental properties.

Hand in hand with the discovery of categories goes the discovery and formulation of categorial laws. To discern the former is, in a sense, to find the latter; for these laws specify how the categories differ from each other and resemble each other. There is again a similarity to the natural sciences. In physics, the fundamental laws describe the behavior of elementary particles. In ontology, similarly, the fundamental laws describe the behavior of categories. For example, individuals are subject to change, while properties are not. Individuals, furthermore, even though they exemplify properties, are never exemplified by anything. Laws of this nature distinguish between different categories; and the second law mentioned also shows how they establish connections between categories. Properties are connected with entities by means of what I shall call "the nexus of exemplification." Classes, on the other hand, are connected with entities by the membership relation. And it may be thought, mistakenly as we shall see, that properties and classes determine each other mutually."

From: Reinhardt Grossmann - *The categorial structure of the world* - Bloomington, Indiana University Press, 1983, pp. 3-5

NINO COCCHIARELLA (1933-

"Metaphysics consists of the separate disciplines of ontology and cosmology, each with their respective methodologies.

Formal ontology connects logical categories -- especially the categories involved in predication -- with ontological categories.

The goal of a formal ontology is the construction of a *lingua philosophica*, or *characteristica universalis*, as explicated in terms of an *ars combinatoria* and a *calculus ratiocinator* as part of a formal theory of predication.

A formal ontology should serve as the framework of a *characteristica realis*, and hence as the basis of a formal approach to science and cosmology. It should also serve as a framework for our commonsense understanding of the world."

From: Nino Cocchiarella - *Formal ontology and conceptual realism* - New York, Springer, 2007, p. 23.

"Formal ontology is the result of combining the intuitive, informal method of classical ontology with the formal, mathematical method of modern symbolic logic, and ultimately identifying them as different aspects of one and the same science. That is, where the method of ontology is the intuitive study of the fundamental properties, modes, and aspects of being, or of entities in general, and the method of modern symbolic logic is the rigorous construction of formal, axiomatic systems, formal ontology, the result of combining these two methods, is the systematic, formal, axiomatic development of the logic of all forms and modes of being. As such, formal ontology is a science prior to all others in which particular forms, modes, or kinds of being are studied.

Logic can be distinguished from formal ontology, but only in the sense of logic as an uninterpreted calculus, i.e. as the method of constructing abstract formal systems subject to varying interpretations over varying domains. A formal system in which logical (or syncategorematic) constants can be distinguished from non-logical (or categorematic) constants and in which the axioms and rules are assumed to be logically valid is not an uninterpreted calculus, however, but a logistic system in which logic is a language with content in its own right. The defining characteristic of a logistic system is that it propounds a theory of logical form, which comprises both a pure logical grammar, i.e. a system of categories and rules for generating meaningful expressions, and a system of logical axioms and rules that determine the deductive relations between different sets of expressions of that grammar. The purely formal or non-descriptive content of the existence of any and all physically real individuals or of the natural properties and relations that such individuals might have in nature, is not independent of the different modes of being of such entities, and in fact presupposes such modes in its very articulation."

Nino Cocchiarella - *Ontology II: Formal Ontology* in: Hans Burkhardt & Barry Smith (eds.) - *Handbook of Metaphysics and Ontology* - Philosophia Verlag, Munich, 1991, pp. 640-641

"Comparative formal ontology is the study of how different informal ontologies can be formalized and compared with one another in their overall adequacy as explanatory frameworks. One important criterion of adequacy of course is consistency, a condition that can be satisfied only by formalization. Formalization also makes explicit the commitments of an ontology.

There are other important criteria of adequacy as well, however, in addition to consistency and transparency of ontological commitment. One major such criterion is that a formal ontology must explain and provide an ontological ground for the distinction between being and existence, or, if the distinction is rejected, an adequate account of why it is rejected. Put simply, the problem is: Can there be things that do not exist? Or is being the same as existence? Different formal ontologies will answer these questions in different ways.

The simplest account of the distinction between being and existence is that between actualism and possibilism, where by existence we mean physical existence, i.e., existence as some type of physical object; and by being we mean possible physical existence, i.e., physical existence in some possible world. According to possibilism, there are objects that do not now exist but could exist in the physical universe, and hence being is not the same as existence. In actualism being is the same as existence.

Possibilism: There are objects (i.e., objects that have being or) that possibly exist but that do not in fact exist.

Therefore: Existence = Being.

Actualism: Everything that is (has being) exists.

Therefore: Existence = Being.

Now the implicit understanding in formal ontology of both possibilism and actualism is that the objects that the quantifier phrases in these statements range over are values of the variables bound by the first-order quantifiers \forall and \exists (for the universal and existential quantifiers, respectively), and hence that what has being (on the level of objects) is a value of the (object) variables bound by these quantifiers. In other words, to be (an object, or thing) in both actualism and possibilism is to be a value of the bound object variables of first-order logic. This means that in possibilism, where being is not the same as existence, existence must be represented either by different quantifiers or by a predicate, e.g., $E!$, which is the predicate usually chosen for this purpose.

Another criterion of adequacy for a formal ontology is that it must explain the ontological grounds, or nature, of modality, i.e., of such modal notions as necessity and possibility, and in particular the meaning of possible physical existence. If the modalities in question are strictly formal, on the other hand, as is the case with logical necessity and possibility, then it must explain the basis of that formality.

This criterion cannot be satisfied by a set-theoretic semantics alone, especially one that allows for arbitrary sets of possible worlds (models) and so-called accessibility relations between those worlds. Such a semantics may be useful for showing the consistency of a modal logic, or perhaps even as a guide to our intuitions in showing its completeness; but it does not of itself provide an ontological ground for modality, or, in the case of logical modalities, explain why those modalities are strictly formal.

We restrict our considerations here to how physical existence, both actual and possible, is represented in a formal ontology. This does not mean that the formal ontologies considered here cannot be extended so as to include an account of how abstract objects might be represented as well, if allowed at all." pp. 105-106

Nino Cocchiarella - *Actualism versus Possibilism in Formal Ontology*. In *Theory and Applications of Ontology. Vol 1: Philosophical Perspectives*. Edited by Poli Roberto and Seibt Johanna. Dordrecht: Springer 2010. pp. 105-118

JERZY PERZANOWSKI (1943-2009)

"2. Ontology and its parts.

Ontology is the theory of what there is, the theory of being. It considers the full ontological universe, all items that are possible, describing and classifying them and searching for the principles of this universe, principles of taking together the plurality of ontic objects, particular beings, into one -- the Being.

Thus two questions govern ontological investigations: what is possible and why? The second question, concerning the being's principles, may be strengthened to the deepest -- last in logical order -- question: how that which is given, or rather what there is, is possible? The question about principles of being, i.e. general laws of nature, plus the question that makes possible what there is and renders impossible what there isn't? Because of its matter and problematic ontology is the most general discursive discipline. It is the general theory of possibility. By the nature of its questions it is also very modal.

3. Ontology has two sides: descriptive -- phenomenological, and theoretical -- formal.

Hence, it is divided into three parts: onto-ontics (In brief: ontics), ontomethodology and ontologic.

4. Ontics is devoted to the selection of ontological problems and notions, their differentiation,

classification and analysis. Doing ontics we construe the conceptual net of a given ontological theory, i.e. its categories. It is also one of the tasks of ontics to state ontological hypotheses, based on the previous analysis of concepts.

Ontics, being a part of ontology, is itself complex. Its further description depends on the general idea of ontology, on accepted classification of ontological concepts. For example, Ingarden has distinguished three parts of ontology: the material ontics, the formal ontics and the existential one. Notice that his ontology is, in our terms, ontics!⁵ Ontomethodology concerns ways of doing ontology, methods and types of ontological constructions as well as principles of choice between ontological statements and theories. Examples of such ontomethodic principles are: the principle of non-contradiction, the principle of sufficient reason, and Ockham's razor.

Indication and discussion of the appropriate principles is necessary for sure for any critique of ontological theories, particularly the critique of the logical means used in ontology.

6. Ontologic is a logic of the ontic realm, It is an investigation of ontological connections, concerning particularly logical relations between pieces of ontic information. Also, it is a theory of the fundament of ontic relations.

Ontologic considers the organization of the ontological universe, trying to describe its mechanism. It describes the complexity of the Being, looking for its laws and base - the Logos.

7. Ontics is a purely descriptive and analytical discipline, ontologic is speculative and formal. They are, however, closely connected and interrelated disciplines, affecting one another. The product of ontics is a description, usually complex, of the ontological universe, whereas ontologic supplies different theories of this universe.

Certainly, at present ontic considerations are more common. In ontology we have many descriptions and claims, but not as many theories.

Among Polish ontologists, for instance, Ingarden may be regarded as a typical ontics reasoner, while Lesniewski should be treated as a typical ontologistian."

From: Jerzy Perzanowski - *Ontologies and ontologies* in: Ewa Zarnecka-Bialy (ed.) - *Logic counts* - Dordrecht, Kluwer, 1990, pp. 23-24.

"2. Beings, the Being and Being.

2.1 Ontology is the discipline of being. It is the theory of what there is, why and how.

As the tradition makes clear, the verb 'to be' used here is ambiguous. It refers either to the domain of existing objects, depending therefore on an appropriate theory of existence, or to what really exists (in a metaphysical sense) - to logos which is behind existing items and behind the facts. The latter realm emerges when emphasis is placed on the second part of the above definition, i.e., on the questions: why and how? The answer we are looking for is of the form: there is x because x is possible and in addition for existing objects x satisfies certain specific conditions of existence. Possibility is frequently explained as a matter of consistency or coherence, whereas existence conditions are specified in terms of stability, homeostasis, actualization, etc.

2.2 Ontology is distinguished by its extreme generality and by the richness and fertility of its basic notions.

The most basic ontological notions are notions of a particular being and the being. Both notions can be approached in at least three ways: possibilistically, connectionally (or qualitatively), and through what we shall call verb-type-ontologies.

2.3 In the verb-type-approach both notions - of a being and the being - are obtained from the verb 'to be'

by transformations and nominalizations.

The theory behind the latter is quite complicated, much more than is the grammar of the verb 'to be' itself, and this is complicated enough. In most Indo-European languages we must distinguish at least eleven variants of the verb 'to be', which leads to a rather rich variety of verb-type-ontologies.

A being here is defined as any item which is in a sense specified according to an appropriate variant of the verb 'to be'.

The verb 'to be' has its basic form in the context 'S is P', where it denotes a binary relation. The most general verb-type-ontology is therefore the general theory of relations. By specification of variants of the verb 'to be' we obtain variants of the verb-type-ontology, for example the ontology of things and properties and the set-theoretic ontology.

2.4 In the possibilistic approach a being is defined as any possible object, hence the ontological universe is understood as the space of all possibilities. Its ontology is therefore the general theory of possibility.

2.5 The qualitative or connectional approach deals with the most traditional concept of a being, defined as any item having some quality (or as a subject of qualities).

Here at least three topics need further elaboration: the ontological connection itself and the items connected: qualities and subjects. In consequence, there are four variants of this type of ontology: the qualitative one, stressing qualities, the subjective one, putting emphasis on subjects (individuals); the connectional one, stressing the formal side of the ontological connection, and the eclectic one, which tries to develop all three factors in unison.

In the present essay I shall consider several fundamental topics of connectional ontology."

From: Jerzy Perzanowski - *The Way of Truth* - in: Roberto Poli, Peter Simons (eds.) - *Formal ontology* - Dordrecht, Kluwer, 1996 pp. 64-65.

JORGE J. E. GRACIA (ca. 1945-

"I must now make a few brief comments about the principal parts of metaphysics. This is necessary because often particular authors confuse metaphysics with some of its parts, thus unnecessarily restricting the scope of the discipline. The discussion of such a taxonomy, then, prevents confusions which may obscure the nature of metaphysics.

Some of the parts of metaphysics with which it is most frequently confused are ontology, etiology, philosophical anthropology, theology, and philosophy of language. There are many others, but for the sake of brevity I shall use only these as examples.

Consider those philosophers who identify metaphysics with ontology. Ontology is concerned with the study of the most fundamental categories of being and with the relations among them. This naturally explains the use of the term "ontology" and suggests that the discipline deals with being, a traditional description of the object of metaphysics. The use of the term "ontology" to refer to metaphysics appears in early modern philosophy and is still with us. Indeed many contemporary metaphysicians speak of their discipline as ontology.

Yet, if ontology involves only the subject matter mentioned, it is clear that it excludes much that metaphysicians discuss. For example, much of what is discussed in the philosophy of mind falls outside ontology, for it does not concern the development of the fundamental categories of being and the exploration of the relations among them. It concerns rather the categorization of the mind and the description of its relations to various categories, and this does not seem to be a part of ontology.";

From: Jorge J. E. Gracia - *Metaphysics and its Task. The search for the categorial foundation of knowledge* - State University of New York Press 1999 pp. 147-148. (notes omitted)

KIT FINE (1946-

"An ontology consists of all those items which are, in an appropriate sense, accepted. There are different views as to what it is for an item to be accepted into an ontology. For some, it is merely a matter of existence or being; for others, it is a matter of real existence or being, where this is something which stands in contrast to ordinary existence or being. This is an issue which, important as it is, will not concern me here; for most of what I have to say will remain correct under any reasonable understanding of the term. However, it is perhaps worth pointing out that I do not require the term to have any psychological connotations. An item is accepted into an ontology because it should be there, not necessarily because someone puts it there. It is, if you like, the ontology which accepts the item and not the person who endorses the ontology.

An ontology is total; it includes everything that is accepted. By contrast, we may talk of a partial ontology or of a subontology, which includes some, but perhaps not all, of what is accepted.

An ontology is actual; it includes everything that it is correct to accept. By contrast, we may talk of a possible ontology, which consists of everything that might be accepted (as the total ontology).

One might take a sceptical stand on either of these two distinctions. One might hold that there is no such thing as a total, as opposed to a partial, ontology; for any ontology there is always a larger ontology within which it is contained. (The paradoxes have led some to hold such a view for the ontology of sets). And one might also hold that there is no such thing as an actual, as opposed to a possible, ontology. There is nothing which counts as the correct ontological stand; there are merely different, equally legitimate, stands.

I shall not engage with the first form of scepticism, though what I have to say can, to some extent, be made to accommodate it. However, I shall engage with the second form. I shall attempt to see how absolutist notions might be eschewed in the description of an ontology.

This is not because I endorse the second form of scepticism. It is more that I am interested in the distinction on which the position rests rather than with the position itself. The sceptic draws a line. But one may be interested in the line without accepting it as a boundary." (p. 265)

From: Kit Fine - *A study of ontology* - *Noûs*. 25, 1991, pp. 263-294

DALE JACQUETTE (1953-

"The word ontology has four established meanings in philosophy.

There are two intersecting sets of distinctions. Pure philosophical ontology is different from applied scientific ontology, and ontology in the applied scientific sense can be understood either as a discipline or a domain.

Ontology as discipline is a method or activity of enquiry into philosophical problems about the concept or facts of existence. Ontology as a domain is the outcome or subject matter of ontology as a discipline. Applied scientific ontology construed as an existence domain can be further subdivided as the theoretical commitment to a preferred choice of existent entities, or to the real existent entities themselves, including the actual world considered as a whole, also known as the extant domain. Ontology as a theoretical domain is thus a description or inventory of the things that are supposed to exist according to a particular

theory, which might but need not be true. Ontology as the extant domain, in contrast, is the actual world of all real existent entities, whatever these turn out to be, identified by a true complete applied ontological theory. As a result, we must be careful in reading philosophical works on ontology, when an author speaks of "ontology" without qualification, not to confuse the intended sense of the word with any of the alternatives."

From: Dale Jacquette - *Ontology* - Montreal, McGill-Queen's University Press, 2002 (pp. 2-3)

ROBERTO POLI (1955-

"Ontology is the theory of objects. And it is so of every type of object, concrete and abstract, existent and non-existent, real and ideal, independent and dependent. Whatever objects we are or might be dealing with, ontology is their theory. *Object* is used in this sense as synonymous with the traditional term *Being*."

"THESIS 1. An ontology is not a catalogue of the world, a taxonomy, a terminology or a list of objects, things or whatever else. If anything, an ontology is the general framework (= structure) within which catalogues, taxonomies, terminologies may be given suitable organization. This means that somewhere a boundary must be drawn between ontology and taxonomy.

THESIS 2. An ontology is not reducible to pure cognitive analysis (in philosophical terms, it is not an epistemology or a theory of knowledge). Ontology represents the 'objective' side (= on the side of the object), and the theory of knowledge the subjective side (= on the side of the knowing subject) of reality. The two sides are obviously interdependent, but this is not to imply that they are the same (exactly like the front and rear of a coin). In order to conduct ontological analysis, it is necessary to 'neutralize', so to speak, the cognitive dimension, that is, to reduce it to the default state. I assume that the default state is the descriptive one, where the dimensions of attention, of interest, etc., are as neutral as possible (= natural attitude). It is of course possible to modify the default state and construct ontologies of the other cognitive states as well, but this involves modifications of the central structure.

THESIS 3. There is nothing to prevent the existence of several ontologies, in the plural. In this case too, ontological study is useful because, at the very least, it renders the top categories explicit and therefore enables verification of whether there are reasonable translation strategies and of which categorization can serve best to achieve certain objectives."

From: Roberto Poli - "*Ontology for knowledge organization*", in Rebecca Green (ed.), *Knowledge organization and change*, Indeks, Frankfurt, 1996, pp. 313-319.

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