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## The Conceptual Realism of Nino Cocchiarella

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### Introduction

I wish to thank Professor Cocchiarella for helping me to complete this bibliography.

"Research Profile: Cocchiarella proved the first completeness theorems in tense logic and second-order modal logic. He was the first to develop several second-order logics with nominalized predicates as abstract singular terms and then to use those systems in a consistent logical reconstruction of both Frege's and Russell's early logics and in the application of those reconstructions to the semantic analysis of natural language. This work also led to Cocchiarella's development of formal theories of predication and comparative formal ontology, including especially logical reconstructions of nominalism, conceptualism, logical realism, and the logic of natural kinds. Cocchiarella also showed how logical atomism is compatible with logical necessity as a modality, and that it is the only ontology in which logical necessity, as opposed to other kinds of modalities, makes sense. Cocchiarella's own preferred ontological framework is conceptual realism, which he has been formally developing for many years, and which contains a logic of both actualism and possibilism in terms of a distinction between concepts that entail concrete existence and those that do not. It also contains a logic of classes as many as plural objects, which is the basis of Cocchiarella's semantics for plurals and mass nouns in natural language, and in which the Leonard-Goodman calculus of individuals (and therefore Leśniewski's mereology as well) is reducible. Cocchiarella has also shown that Leśniewski's ontology, which is also called a logic of names, is reducible to his theory of reference in conceptual realism, and that the medieval supposition theories of Ockham, Buridan, and other medieval logicians can be logically reconstructed in terms of this theory of reference. Cocchiarella is currently continuing his work on different subsystems of conceptual realism, including in particular a logic of events as truth-makers.

Teaching: Cocchiarella has taught introductory, intermediate, and advanced courses in logic, semantics, set theory and Montague Grammar, as well as seminars on some of the most recent areas of research in logic. He has placed an emphasis in his teaching on the logical analysis of natural language and the ontological interpretations of both scientific and mathematical language.

Vision Statement: Cocchiarella sees logic as a powerful tool for the analysis of our scientific theories and the structures that underlie natural language and our commonsense understanding of the world. The study of logical categories in particular provides an important way to study the semantic and ontological categories underlying our scientific and commonsense world views." (pp. 52-53)

From: Dov M. Gabbay, John Woods (eds.), *The International Directory of Logicians. Who's Who in Logic*, London: College Publications 2009.

## Formal ontology

"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."

Edmund Husserl was among the first to characterize a logistic system in this way, and it was he who also first introduced the notion of a formal ontology. For Husserl, logic has both an apophantic (assertional) aspect, which he called formal apophantics (and which amounts to a theory of logical form as characterized above), and an ontological aspect, which he called formal ontology. The switch from a formal-apophantic attitude to an ontological one is achieved primarily through a process of nominalization, and the underlying unity of the two aspects is given through a 'Law of Denominative Equivalence', according to which the well-formed expressions of any given category may be transformed into corresponding nominal forms. It is in this way, for example, that propositional forms and their predicative components (as generated in the theory of logical forms) are transformed into nominal forms that stand for states of affairs and properties and relations, respectively. The 'categorical objectivities' or 'correlates' that originate from such 'denominative reductions' (or nominalizations) of the pure forms of apophantic logic are then claimed to make up the fundamental conceptual material of formal ontology (cf. *Logical Investigations*, Volume I, §§67—8, *Ideas*, §119, and *Formal and Transcendental Logic*, Chapter 2, §25). The important connection of ontology with a logistic system is that the logico-grammatical distinctions made in the latter are based ultimately on a distinction between different modes of being, even if that distinction is

initially described in terms of different modes of significance. More is required by way of comprehensive grasp, however, before a logistic system can be taken as a system of logic or a formal ontology in its fullest sense. In particular, such a logistic system must be rich enough to contain, when suitable non-logical constants, axioms, and meaning postulates (regarding such constants) are added to it, every scientific theory and the logical analysis of every meaningful declarative sentence of any natural language. In that case such a logistic system can be taken as a *lingua philosophica*, or what Leibniz also called a *characteristica universalis*, and as such it is also none other than a comprehensive system of formal ontology.

(...)

Beginning with Aristotle, the standard assumption in (pre-formal) ontology has been that being is not a genus, i.e. that being is multivalent, and that the principal method of ontology is categorial analysis. This raises the problem of how the different categories or modes of being fit together, and of whether one of the senses or modes of being is preeminent and the others somehow dependent on that sense or mode of being. The differential categorial analyses that have been pro-posed as a resolution of this problem have all turned in one way or another on a theory of predication, i.e. on how the different categories fit together in the nexus of predication, and they have differed from one another primarily on whether the analysis of the fundamental forms of predication is to be directed upon the structure of reality or the structure of thought. In formal ontology, the resolution of this problem involves the construction of a formal theory of predication. Aristotle's categorial analysis, for example, is directed upon the structure of reality and not upon the structure of thought, and the pre-eminent mode of being is that of concrete individual things (or primary substances). Predication, moreover, is explained in terms of two ontological configurations that together characterize the essence-accident distinction of Aristotle's ontology, viz. the relation between an individual and its species or genera on the one hand, and the inherence of a universal in an individual on the other. Aristotle's moderate realism regarding species, genera, and universals is a form of natural realism and not of logical realism, and a formal theory of predication constructed as an Aristotelian formal ontology must respect that distinction as well as give an adequate representation of the two ontological configurations underlying the Aristotelian analysis of predication. In particular, such a theory must contain a logic of natural kinds and must impose the constraint of moderate realism that every natural property or relation is instantiated (i.e. that every natural property or relation exists only in rebus). This constraint leads to Aristotle's problem of the fixity of species (according to which members of a species cannot come to be except from earlier members of that species, and that therefore there can be no evolution of new species); but, given the modal category of natural necessity and possibility as part of a revised Aristotelian formal ontology of modal natural realism, this problem can be resolved by requiring of every natural property or relation not that it actually be instantiated (at any given time) but only that such an instantiation be within the realm of natural possibility. Such a formal ontology, needless to say, will contain a modal logic for natural necessity and possibility, as well as a logic of natural kinds that is to be described in terms of that modal logic. (Cf. Cocchiarella 1976.) Plato's ontology is also directed upon the structure of reality, but the pre-eminent mode of being in this framework is not that of concrete or sensible objects but of the Ideas. This leads to the problem of *μέθεξις*, or of how and in what sense concrete objects participate in Ideas, and also to the problem of *χωρισμός*, or of how and in what sense Ideas are 'things' or abstract individuals separate from the concrete individuals that participate in them. A Platonist theory of predication in contemporary formal ontology is the basis of logical realism (where it is assumed that a property or relation exists corresponding to each well-formed predicate expression of logical grammar, regardless of whether or not it is even logically possible that such a property or relation has an instance). When applied as a foundation for mathematics (as was Plato's own original intent), logical realism is also called ontological logicism. The best-known form of logical realism today is Bertrand Russell's theory of logical types, which Russell developed as a way to avoid his famous paradox of predication (upon which his paradox of membership is based), a paradox not un-related to Plato's problem of *χωρισμός*. Whether and to what extent Russell's theory of logical types can satisfactorily resolve either of Plato's problems and be the basis of an adequate realist formal ontology is an issue that belongs to what we have called comparative formal ontology. (pp. 640-643)

(...)

Comparative formal ontology, as our remarks have indicated throughout, is the proper domain of many issues and disputes in metaphysics, epistemology, and the methodology of the deductive sciences. Just as the construction of a particular formal ontology lends clarity and precision to our informal categorial analyses and serves as a guide to our intuitions, so too comparative formal

ontology can be developed so as to provide clear and precise criteria by which to judge the adequacy of a particular system of formal ontology and by which we might be guided in our comparison and evaluation of different proposals for such systems. It is only by constructing and comparing different formal ontologies that we can make a rational decision about which such system we should ourselves ultimately adopt, and that is a decision that can be made only in comparative formal ontology. (p. 647)

From: Nino Cocchiarella, "Ontology II: Formal Ontology" in: Hans Burkhardt & Barry Smith (eds.), *Handbook of Metaphysics and Ontology*, Munich: Philosophia Verlag 1991, pp. 640-647.

### Mathematical logic as formal ontology

"Gödel has remarked that mathematical logic "has two quite different aspects. On the one hand, it is a section of Mathematics treating of classes, relations, combinations of symbols, etc., instead of numbers, functions, geometric figures, etc. On the other hand, it is a science prior to all others, which contains the ideas and principles underlying all sciences" (1) In the former case, mathematical logic is principally, though not only, a *calculus ratiocinator*. Under that aspect, beyond consistency, no special heed need be paid a formal system regarding the philosophical significance of its grammatical forms and the viability of the primitive concepts and assumptions expressed by means of these forms. In the latter case, however, it is quite otherwise. As a science prior to all others, Gödel's description of mathematical logic is comparable to Aristotle's description of metaphysics. Only, as a science which is prior to all others, metaphysics, according to Aristotle, is therefore the science of the "modes" or "categories of being". Where the particular, specialized sciences, including mathematics, are concerned with but their own special "modes of being", metaphysics and now mathematical logic under its second aspect — or what we might instead call formal ontology — is concerned with the study and development of alternative formalizations regarding the systematic co-ordination of all the "modes" or "categories of being" under the most general laws. Usually, and perhaps most appropriately since this is where ontological commitment comes in, each "mode of being" within a particular formal ontology is represented by a type of bindable variable whose syntactical role is intended to reflect in some philosophically coherent way the ontological role of that "mode of being". Under this second aspect, mathematical logic, or formal ontology, is concerned with the adequacy of formal systems as alternative formulations of the deepest structural maps of reality.(2)

Viewed in this way, each feature of a proposed formal system is to be evaluated in terms of its purported philosophical significance, how well, for example, it functions as a proposed metaphysical map of reality. Different metaphysical schools, of course, will be interested in different ways of understanding a formal system as a map of reality. Conceptualists, for example, would view the grammar of a formal system together with its logistic behaviour as a proposed formal map of the structuring powers of human cognition, a proposed map, that is, of the structure of constructive cognitive processes of the human mind. Operations of the system must then be devised with limitations built into them that reflect in an appropriate manner the limitations of these same constructive powers of the mind. It is much in this sort of way that the constructivist attitude in the philosophy of mathematics must be understood. Realists, on the other hand, would construe the operations and elements of the formal map as having ontological significance independently of the constructive power of the human mind. Limitations built into the system, whether they apply to the notion of grammatical well-formedness or to the logistic behaviour of the ontological grammar, are evaluated then on grounds other than the nature of thought and its inherent limitations. Some of the most obvious of such grounds for limitation pertain to the way the implicit metaphysical scheme underlying the system proposes to resolve the known antinomies.

Leibniz, as Gödel has pointed out, was one of the first expositors of this view of mathematical logic. Leibniz himself referred to such a formal system as a *characteristica universalis*. But it was not until Frege and Peano that any significant attempt at the construction of a formal ontology was made. Frege called his system a *Begriffsschrift*, indicating, as Gödel remarks, that "Frege was chiefly

interested in the analysis of thought".(3) Frege himself in a response to Schroder's criticisms of his *Begriffsschrift* stated "that, unlike Boole's, his logic is not a *calculus ratiocinator*, or not merely a *calculus ratiocinator*, but a *lingua characteristica*.(4)

Now this Fregean emphasis on concepts (*Begriffe*) and the nature of thought is significant. For although it would seem, because of this emphasis, that Frege is a conceptualist and that therefore his logic would reflect certain limitations in the nature of human concept formation, it turns out that Fregean concepts are real, objective entities of a "mode of being" which is independent of minds and the subjective ideas by means of which minds think. To be sure, Fregean concepts are not self-subsistent entities, but their ontological dependence is upon the individual objects "falling under" them and not, apparently, upon the nature of thought. Their ontological dependence consists only in their being "unsaturated". They are nevertheless "real" entities in so far as Frege takes quantification over them as having ontological significance.(5) In this regard, Frege's ontology is realistic, though somehow it is also an analysis of thought.(6)

I shall not try to account here for this apparent ambiguity in the Fregean enterprise. I mention it in part because it is an ambiguity which Russell apparently shared (or perhaps even inherited from Frege) in the construction of his own formal ontology, the ramified theory of types, and which he never himself adequately resolved. As a formal embodiment of the Russell-Poincaré "vicious circle principle", the ramified theory of types purports to represent a limitation in the powers of human concept formation, specifically a limitation regarding impredicative concept formation. Adjoining the axiom of reducibility to this formal ontology, however, can be justified only by taking a realistic attitude, an attitude which Russell clearly accepted in at least some of his writings.(7) The two attitudes taken together: the attitude, on the one hand, that the limitations imposed on both the ontological grammar and the logical constructions based upon that grammar are dictated by one's conceptualist views regarding at least the "higher-order" portion of one's ontology; and the attitude, on the other hand, that the reality represented by one's ontological grammar and the operations on that grammar is independent of mind and the nature of thought; these two attitudes though apparently not formally inconsistent, seem not to result in a philosophically coherent formal ontology. It is within this sort of context that I understand Myhill's concluding remark that "the ramified *Principia* itself falls uncomfortably between these two positions, and apparently does not correspond to any coherent philosophy of mathematics..." (p. 27).

Let us note that where Myhill speaks to the question of a coherent philosophy of mathematics, I have referred instead to the problem of a philosophically coherent formal ontology. The distinction is minor or not depending on how broad one's criteria are for the coherence of a philosophy of mathematics. Certainly, since the problem of the nature of mathematical existence is an ontological problem par excellence, every philosophically coherent formal ontology must contain a coherent philosophy of mathematics.(9) Tolerance forbids, I would suppose, maintaining the converse." (pp. 29-32)

From: Nino Cocchiarella, "Formal Ontology and the Foundations of Mathematics" in George Nakhnikian (ed.), *Bertrand Russell's Philosophy*, London: Duckworth 1974, pp. 29-46 (notes renumbered.)

## Notes

(1) K. Gödel, "Russell's Mathematical Logic", in P. A. Schilpp (ed.), *The Philosophy of Bertrand Russell*, Evanston, Ill., 1944.

(2) cf. G. Bergmann, "Ontological Alternatives", in E. D. Klemke (ed.), *Essays on Frege*, Urbana, Ill., 1968, p. 148: "Logic without ontology is merely a calculus. A calculus acquires philosophical import only if its author claims that it is an ideal language (*Begriffsschrift*), i.e. that it perspicuously reflects an adequate ontology."

(3) Gödel, *op. cit.*

(4) J. van Heijenoort, "Logic as Calculus and Logic as Language", *Synthese* 17, 3 (1967), p. 324.

(5) Bergmann, *op. cit.*, p. 135, construes Frege's concepts as syncategorematic entities, but his only reason for this seems to be their ontological dependence on objects. We shall here understand a primitive symbol of a formal ontology to be a syncategorematic sign—and the entity, if any, it represents to be a syncategorematic entity — if it is not a substituent for (and the entity is not "indicated" by) any type of variable in the grammar of the system.

(6) cf. R. Grossman, "Frege's Ontology", in Klemke (ed.), *Essays on Frege*, for a discussion of this issue in regard to Frege's ontology.

(7) For example, in his *Introduction to Mathematical Philosophy*, he says that "logic is concerned with the real world just as truly as zoology, though with its more abstract and general features" (p. 169). We might note that the realism implicit in the reducibility axiom is one in regard to classes and not properties (or, in Russell's terminology, propositional functions). Indeed, Russell first referred to the axiom as "the axiom of classes". What is peculiar about this is that Russell took his formal ontology to be a "no class" ontology.

(8) Most proposals regarding the construction of a philosophically coherent formal ontology are programmatic and fragmentary and do not purport to constitute a completed metaphysical system. The importance of formally constructing such partial or fragmentary ontologies is not at issue here. Nor is it being suggested that a fragmentary ontology which defers the question of mathematical existence is for that reason incoherent. Of course, if such a fragmentary ontology cannot be extended so as to contain a coherent account of the nature of mathematical existence, especially vis-à-vis that of concrete or physical existence, then it does indeed represent a philosophically incoherent ontology, even if only fragmentarily. For this reason, metaphysical programmes should not long defer the question of containing a coherent philosophy of mathematics.

### Predication theory and the Problem of Universals

"Predication theory has been a subject of philosophical concern since at least the writings of Plato and Aristotle. It is in its way the locus of a number of philosophical issues both in metaphysics and epistemology, not the least of which is the problem of universals. The latter problem, sometimes all too simply put as the question of whether there are universals or not, is especially Germane to the notion of predication since a theory of universals is at least in part a semantic theory of predication; and it is just to such a theory that we must turn in any philosophical investigation of the notion of predication. In doing so, however, we need not assume the truth or superiority of any one theory of universals over another. Indeed, an appropriate preliminary to any such assumption might well consist of a comparative analysis of some of the different formal theories of predication that can be semantically associated with these different theories of universals: for just as the latter provide a semantics for the former, it is only through the logical syntax of a formal theory of predication that the logical structure of a theory of universals can be rendered perspicuous. That, in any case, is the principal methodological assumption for the approach to the problem of universals we shall undertake in the present monograph where we will be more concerned with the construction and comparison of the abstract logical systems that may be associated with different theories of universals than with the metaphysical or epistemological issues for which they were originally designed. It is our hope and expectation, however, that these comparative formal analyses will be instrumental toward any philosophical decision as to whether to adopt a given theory of universals or not."

#### 1. The problem of the predicable nature of universals

The original use of the term 'universal' goes back to Aristotle according to whom a universal is that which can be predicated of things (*De Interpretatione* 17 a 39). We shall retain the core of this notion throughout this essay and assume that whatever else it may be a universal has a predicable nature and that it is this predicable nature which is what constitutes its universality. Nothing follows from that assumption, however, regarding whether a universal is (1) merely a predicate expression (nominalism) of some language or other; (2) a concept (conceptualism) in the sense of a socio-biologically based cognitive ability or capacity to identify, collect or classify, and characterize or relate things in various ways; or (3) a real property or relation existing independently of both language and the natural capacity humans have for thought and representation (realism). We propose to take each of these interpretations or theories of universals seriously in what follows at least to the extent that we are able to associate each with a formal theory of predication. Our particular concern in this regard, moreover, will be with the explanation each provides of the predicable nature of

universals, i.e., of that in which the universality of universals consists. Our discussion and comparison of nominalism, conceptualism and realism, accordingly, will not deal with the variety of arguments that have been given for or against each of them, but with how each as a theory of universals may be semantically associated with a formal theory of predication. Our assumption here, as indicated above, is that insofar as such an associated formal theory of predication provides a logically perspicuous medium for the articulation of the predicable nature of universals as understood by the theory of universals in question, then to that extent the formal theory may itself be identified with the explanation which that theory of universals provides of the predicable nature of universals. It is in the sense of this assumption, moreover, that we understand a philosophical theory of predication to be a formal theory of predication together with its semantically associated theory of universals. (pp. 11-12)

From: Nino Cocchiarella, *Logical Investigations of Predication Theory and the Problem of Universals*, Napoli: Bibliopolis 1986.

### Theories of universal: A) Nominalism

“Traditionally, there have been three general types of approach to the problem of universals: nominalism, conceptualism, and realism, with nominalism being the most restrictive. Some forms of nominalism, more-over, are even more restrictive in this regard than others. We shall not concern ourselves with these variations here, however, but shall identify (generic) nominalism with three general semantical theses instead. The first general thesis of nominalism is that universals have only a formal mode of existence, i.e., that beyond the predicate expressions that occur or can occur in language there are no universals. Predicate expressions, in other words, do not designate any universals beyond themselves; and therefore predicate expressions are the only entities according to nominalism that have a predicable nature. For this reason, we shall occasionally refer to predicate expressions as nominalistic universals.

We do not dispute here, it will be noted, that there are universals. That is, the problem of universals as we understand it here is not the problem whether there are universals; for indeed all theories of universals acknowledge that there are at least nominalistic universals, though some will assert that there are other universals as well. The problem of universals, as we have already said, is the problem of providing a philosophically coherent explanation of the predicable nature of universals, i.e., of that in which their universality consists. And in nominalism, this problem concerns the sense in which predicate expressions may be predicated of individuals.

The second general thesis of nominalism is the thesis of extensionality, i.e., the thesis that, semantically, predicate expressions may make no finer distinction of content than can be generated by co-extensive predicate expressions; and therefore the thesis that co-extensive predicate expressions are to be interchangeable *salva veritate* in any applied formal theory of predication suitable for nominalism. This means in particular that only an extensional logic is appropriate to nominalism, a corollary of which is anti-essentialism, i.e., the thesis that no nominalistic universal is necessarily true of some of the things of which it may be predicated without being necessarily true of all. It is sometimes claimed, we should note, that only the latter thesis, or a suitable reconstruction of it, is really necessary to nominalism and that in fact a nominalistic formal theory of predication may contain a modal, and therefore non-extensional, logic after all. We shall evaluate, and reject, this claim at a later section of this chapter. For now, however, we simply assume that nominalism requires the stronger thesis of extensionality.

The third general thesis of nominalism is that there are only individuals (in the logical sense), i.e., that quantificational reference is univocal and applies only to the individual things of which our various predicate expressions may be said to be either true or false. Whether, in addition, all and only concrete particulars are individuals, as has been maintained in more traditional variants of nominalism, we shall leave unspecified. Certainly some contemporary variants of nominalism, such as that of Quine's, include, e.g., sets as part of their ontology; and no doubt others may include other types of abstract individuals as well.

The third general thesis, it should be noted, does not follow from the first. E.g., one may consistently maintain that there are no universals other than predicate expressions but that the latter in their logico-grammatical role as predicate expressions are unsaturated linguistic structures; and therefore that there is a mode of quantificational reference, viz., that to possible predicate expressions, which is not a form of quantificational reference to individuals. Nevertheless, while it is consistent to maintain this, i.e., to affirm the first and deny the third general thesis of nominalism, we remain unsure that the result can be developed into a philosophically coherent theory of universals. (1) We, in any case, shall not attempt to associate such a combination with any formal theory of predication here. (2) As is well-known, the theory of predication which is commonly associated with nominalism today is standard first-order predicate logic (with identity). Indeed, standard articulation of the predicable nature of universals as understood by the theory of universals in question. Thus the association of nominalism with standard first-order predicate logic is intended not only as a validation of nominalism's three general semantical theses but also as an explanatory or clarifying thesis to the effect that the predicable nature of nominalistic universals, i.e., of possible predicate expressions, is the logico-grammatical role they are represented as having in the logical forms of standard first-order predicate logic (with identity).

We are in almost complete agreement with this association of nominalism with standard first-order predicate logic (with identity). Our one reservation concerns the fact that the latter, strictly speaking, occurs properly only as the logical component of applied first-order theories. That is, except for the possible use of dummy schema predicate letters, first-order predicate logic cannot be described as a pure formal theory of predication. Dummy schema predicate letters can of course be transformed into predicate variables and quantifiers can be applied to these, resulting thereby in a pure second-order theory of predication. Typically, however, this move has been seen as a violation of nominalism's first general thesis in that it would appear to commit us to universals other than predicate expressions themselves. The move to a second-order logic, in other words, exceeds the limits of nominalism insofar as predicate quantifiers may be given a referential interpretation. Fortunately, however, there is another interpretation of predicate quantifiers which does not transcend nominalism and the ontological framework of standard first-order predicate logic (with identity). This is the non-referential or so-called substitutional interpretation of predicate quantifiers whereby the significance of such a quantifier in the context of an applied first-order theory is exhausted by the totality of its substituends, i.e., predicate expressions in the form of the open propositional forms of that theory, rather than by a reference to either real or conceptual universals existing independently of the language of the theory and supplemental to its domain of discourse. By utilizing substitutionally interpreted predicate quantifiers, nominalism can of course be developed as a pure second-order theory of predication.

There will, however, be certain constraints which such an interpretation of predicate quantifiers imposes upon the specification of nominalistic universals; and these constraints are in fact precisely those involved first-order predicate logic is typically taken by nominalists precisely as we are recommending any formal theory of predication should be taken: viz., as a logically perspicuous medium for the in the comprehension principle of standard predicative second-order logic. In this regard we agree with the growing consensus that standard predicative second-order logic is an appropriate medium for the representation of a nominalist theory of predication. (3)" (pp. 29-32)

## Notes

(1) Cf. the theory of universals represented by the logically perspicuous language described by Wilfrid Sellars in "Naming and Saying", «Philosophy of Science», vol. 29, 1962, pp. 7-26. We believe this is really a conceptualist, and not a nominalist, theory of predication, however, albeit it is a form of conceptualism which is very close to nominalism.

(2) Cf. Cocchiarella, N., "Logical Atomism, Nominalism, and Modal Logic", «Synthese», vol. 31, 1975, pp. 23-62, where such an attempt is made, but with doubtful success, as is suggested in the article itself.

(3) Cf. "A Plea for Substitutional Quantification", by Charles Parson, «Journal of Philosophy», vol. LXVIII, no. 8, 1971, pp. 231-237.

From: Nino Cocchiarella, "*Logical Investigations of Predication Theory and the Problem of Universals*, Napoli: Bibliopolis 1986.

### Theories of universal: B) Conceptualism vs. Nominalism

"As cognitive capacities which may or may not be exercised on a given occasion, concepts are neither mental images nor ideas in the sense of particular mental occurrences. Concepts, in other words, and predicable concepts in particular, do not have an individual nature but are rather unsaturated cognitive structures whose realization or saturation in thought is what informs particular mental acts with a predicable nature.

Conceptualism, accordingly, rejects the third general thesis of nominalism, i.e., the thesis that there are only individuals, and therefore the sense in which there are concepts is not a restricted form of the sense in which there are individuals. Quantificational reference is not a univocal semantical notion in conceptualism, in other words, but is rather (at least) doubly aspected, depending on whether the reference is through the logico-grammatical role of a subject expression, and is therefore to individuals (in the logical sense), or whether it is through the role of an ( $n$ -place) predicate expression, and is therefore to ( $n$ -ary) concepts. (We shall also speak of «-ary concepts as *relational concepts* if  $n > 1$ .)

Conceptualism, of course, also rejects the first general thesis of nominalism, i.e., the thesis that there are no universals other than predicate  $\chi$  expressions. Indeed, according to conceptualism, a genuine predicate expression is precisely such only through having a concept as the semantic ground for its correct or incorrect application. This is not to say, on the other hand, that the possession of a concept will not come to be behaviorally equivalent to the possession of a linguistic ability to correctly apply a predicate expression having that concept as its semantic ground. Nor is it to deny that the possession of such a linguistic ability will naturally come to serve as a criterion for possession of the concept. Nevertheless, all questions of behavioral equivalence aside, being a criterion for the possession of a concept, according to conceptualism, is not the same as being that concept.

Despite their distinctness, however, concepts and predicate expressions do have analogous roles in their respective mediums, and to some extent the development of concepts in the medium of thought is determined by the development of predicate expressions in the medium of language — just as the development of language is determined in part by the development of thought. In holistic conceptualism especially, as we shall see, impredicative concept-formation is a generalized capacity which is achieved only through the capacity for language, and in particular through the capacity to systematically use language for the expression of constructive or predicative concepts. In this regard, impredicative concept-formation is a mediated process, and language and the linguistic ability to use predicate expressions to express predicative concepts is the means used to master and direct such a process. Aside from this meditation, however, the laws of compositionality for systematic concept-formation in holistic conceptualism, and in particular the impredicative comprehension principle (CP) for predicable concepts, greatly exceed the principle of compositionality in nominalism, viz., the comprehension principle (CP!). In this regard, in other words, there can be no question of reducing or otherwise explaining only in terms of nominalistic universals the formal theory of predication we shall come to associate with holistic conceptualism. The prospects are better, no doubt, for a reduction of constructive conceptualism to nominalism; and indeed, in a sense, the formal theory of predication we shall associate with constructive conceptualism is contained in the formal theory determined by nominalism, viz., standard predicative second-order logic.

Nevertheless, whereas it is predicativity in the purely grammatical sense which is the basis of nominalism's formal theory of predication, it is predicativity in the logico-grammatical sense which is the basis of constructive conceptualism's formal theory of predication; for, as we shall see (in §2), it is only in this sense that we are to understand the closure conditions of the comprehension principle (CCP!) of constructive conceptualism's formal theory of predication. Unlike the situation in nominalism, in other words, where wffs that are predicative in the purely grammatical sense are ipso facto predicative in the logico-grammatical sense, in constructive conceptualism not all wffs (of

an applied context) that are predicative in nominalism's purely grammatical sense need also be predicative in the logico-grammatical sense.

One of the consequences of this difference, as we shall see (in §3), is a corresponding difference in the notion of a possible {explicit} definition of a predicate constant. For whereas predicate constants are the paradigms of predicative expressions in nominalism, in constructive conceptualism not all predicate constants of an applied context need themselves be predicative, i.e., they need not all stand in that context for the value of a bound predicate variable. Thus, unlike the situation in nominalism, predicate constants can be definitionally introduced in an applied context of constructive conceptualism with definiens that are impredicative in either or both the purely grammatical and the logico-grammatical sense. That is, whereas such definitions can be proved to be both non-creative and eliminable in constructive conceptualism, they will be both creative and non-eliminable in nominalism, i.e., in standard predicative second-order logic.

These are not trivial or unimportant differences, needless to say, and they indicate the radically different philosophical perspectives involved in a conceptualist as opposed to a nominalist theory of predication. Differences not mentioned here, such as the reducibility or irreducibility of identity in an applied context (cf. §4), and the typical rejection of nominalism's second general thesis, i.e., the thesis of extensionality, only add to the picture of the important philosophical differences between nominalism and conceptualism. Their only point of real similarity in fact is their common denial — or commitment to denial — of there being anything at all like the so-called logical modalities, since the same argument that proves the essential incompleteness of first-order modal logic described in Chapter I also proves the essential incompleteness of any higher order framework such as those we shall consider here (cf. §9)." (pp. 71-73)

From: Nino Cocchiarella, *Logical Investigations of Predication Theory and the Problem of Universals*, Napoli: Bibliopolis 1986.

### Theories of universal: C) Realism

“Realism, like conceptualism, goes beyond nominalism in positing the existence of universals other than predicate expressions. Unlike conceptualism, however, the existence of a real universal does not depend upon the existence of the intellect. That is, real universals exist independently of both language and the natural capacity humans have for thought and representation. In keeping with tradition, we shall refer to real universals as properties and relations.

Now the sense in which properties and relations are said to exist is not the same in all forms of realism. We assume, however, that despite their differences all forms of realism fall under two general and exclusive types which we shall call natural and logical realism, respectively. We agree of course that the differences between two variants of a given type may affect the sense in which each claims that there are real universals; but we maintain nevertheless that there is a common core of agreement between these variants which distinguishes them in a radical way from all variants of the other type. It is this agreement and distinction, respectively, which is the basis for our classification of realism into what we will call natural and logical realism.

In all variants of natural realism, for example, properties and relations are said to exist only within nature and that in particular they are integral components of the causal structure of the world. Such universals may exist independently of what is not determined by the causal structure of the world, and in that sense they may be said to exist independently of the world itself (considered as a whole); but, on the other hand, they cannot also exist independently of the causal structure of the world, and in that regard they cannot exist independently of all causal alternatives to the actual world where the same laws of nature hold as hold in the actual world. Traditionally, these universals have been called material properties and relations; but this did not always mean that they were the properties and relations posited in one or another form of materialism — and in particular it did not mean that the only universals in question are physical properties and relations, i.e., the fundamental properties and relations posited in physics. The terminology rather harks back to a distinction between concepts which were said to have a material as opposed to a merely formal significance (as constructions of

the intellect), which is only to say that it is a distinction between concepts to which such real universals correspond as opposed to those to which no such real universals correspond. We shall not adopt this terminology here ourselves however, since we wish not to suggest, even inadvertently, that natural realism is committed to one or another form of materialism. Materialism, to be sure, is committed to one or another variant of natural realism (to the extent that it admits properties and relations at all); but not all variants of natural realism, it must be emphasized, need be committed to materialism. What is assumed in natural realism as a general type is only that somehow nature contains within its causal matrix all the properties and relations there are, regardless of whether these properties and relations are those only of physics, or also of chemistry, or also of biology, or also of any other natural science whatsoever.

Now all variants of logical realism, it should be noted, take a completely opposite stand on this issue. That is, all variants of logical realism maintain that real properties and relations exist independently not only of what is not determined by the causal structure of the world but also of that causal structure itself — and, indeed, even of whether there is a world at all! Logically real universals, in other words, exist independently of all forms of concrete existence and the causal grounds for such. They do not exist independently of one another, to be sure, but that dependence obtains only in a timeless, transcendent realm of being which, according to all variants of logical realism, is in fact the semantico-ontological ground for the logical truths we express in thought and language — and it is for this reason, needless to say, that we refer to such a theory of universals as a variant of logical realism. Thus, unlike the situation in natural realism, it is assumed in all variants of logical realism that there is a real universal corresponding to every fully applied wff  $\phi(x_1, \dots, x_n)$ , including those which are logically determinate, i.e., those which are logically true or logically false of any individuals whatsoever.

Traditionally, because of their independent and transcendent mode of being, logically real universals have been called Platonic forms. However, because Platonism in general also assumes that universals are individuals, we shall avoid that label here, since there are also variants of logical realism (e.g. Gottlob Frege's) in which properties and relations are assumed to have only a predicable and not also an individual nature; i.e., variants in which logically real universals are in some sense only unsaturated structures.

It is not clear, incidentally, that natural realism can also allow for variants in which natural properties and relations have an individual as well as a predicable nature. In modal natural realism, for example, we argue that natural properties and relations can only be causally determinate unsaturated structures (the saturation of which results in the facts or states of affairs that obtain in the world). We believe a similar argument can be given with respect to the actual world alone, i.e., independently of modal considerations, if it is allowed that the same natural property or relation need have no instantiations at all during an interval of time between two or more of its instantiations. This argument, however, depends on temporal considerations (where moments, of time play the role of possible worlds) which we shall not go into here (since it requires a formulation of relativity theory as well); and for this reason we shall leave open the question whether all variants of natural realism are committed to natural properties and relations being only causally determinate unsaturated structures; i.e., whether in some variants of natural realism natural properties and relations have an individual as well as a predicable nature.

Finally, it should be noted that there are variants of both natural and logical realism which are committed to the thesis of extensionality as well as those which are committed to its denial and which we shall refer to here as modal natural and modal logical realism, respectively." (pp. 105-107)

From: Nino Cocchiarella, *Logical Investigations of Predication Theory and the Problem of Universals*, Napoli: Bibliopolis 1986.

### Pages in PDF format

I am grateful to Professor Nino Cocchiarella, Dr. Woosuk Park (editor of the Korean Journal of Logic) and to Professor Inkyo Chung, President of Korean Association of Logic for the permission to publish the essay *Logical necessity based on Carnap's criterion of adequacy*.

The following papers are posted with the kind permission of Professor Nino Cocchiarella:

- **"Conceptual Realism as Formal Ontology"**, in: Roberto Poli, Peter Simons (eds.), *Formal Ontology*, Dordrecht/Boston/London, Kluwer 1996, pp. 27-60, Nijhoff International Philosophy Series, vol. 53. (256 KB). This essay is reproduced with the kind authorization of Kluwer Academic Publishers.
- **"Logic and Ontology"**, in: *Axiomathes* vol. 12, (2001) pp. 117-150 (Italian translation by Flavia Marcacci, revised by Gianfranco Basti: **"Logica e ontologia"**, *Aquinas.Rivista Internazionale di Filosofia* 52: 7-50 (2009).
- **"Logical Necessity Based on Carnap's Criterion of Adequacy"**, *Korean Journal of Logic*, vol. 5 n. 2 (2002), pp. 1-21.
- **"Conceptual Realism and the Nexus of Predication"**, *Metalogicon* vol. 16, 2 (2003), pp. 45-70.
- **"Denoting Concepts, Reference, and the Logic of Names, Classes as Many, Groups and Plurals"**, *Linguistics and Philosophy* vol. 28 n. 2 (2005), pp. 135-179.
- **"Russell's Logical Atomism 1914-1918: Epistemological Ontology and Logical Form"**, unpublished essay (will be removed after publication).
- **Deontic Logic**, unpublished notes based on a course given on modal logic in the late 1960s at the State University of California at San Francisco.
- **Gustav Bergmann on Ideal Languages**, unpublished lecture presented at Indiana University at the *Gustav Bergmann Memorial Conference (October 30-21, 1992)*.
- **A Modal-Ontological Argument and Leibniz's View of Possible Worlds**, unpublished paper (2018)
- *Some Remarks on Stoic Logic*
- *Diodorus's Master Argument*

The last two papers were written at request of Professor **Giuseppe Addona**, of the Liceo ginnasio of Benevento (Italy) for his Italian students and can also be found (with an Italian translation) on his Website.

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