

Theory and History of Ontology (www.ontology.co) by Raul Corazzon | e-mail: rc@ontology.co

Annotated bibliography of Nino Cocchiarella 1993-2019

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Essays 1993-2019

1. Cocchiarella, Nino. 1993. "On Classes and Higher-Order Logic: A Critique of W.V.O. Quine." *Philosophy and the History of Science. A Taiwanese Journal* no. 2:23-50.
Abstract: "The problematic features of Quine's set theories NF and ML result from compressing the higher-order predicate logic of type theory into a first-order logic of membership, and can be resolved by turning to a second-order predicate logic with nominalized predicates as abstract singular terms. A modified Fregean position, called conceptual realism, is described in which the concepts (unsaturated cognitive structures) that predicates stand for are distinguished from the extensions (or intensions) that their nominalizations denote as abstract singular terms. Quine's view that conceptualism cannot account for impredicative concept-formation is rejected, and a holistic conceptual realism is compared with Quine's class Platonism."
2. ———. 1995. "Knowledge Representation in Conceptual Realism." *International Journal of Human-Computer Studies* no. 43:697-721.
"Knowledge representation in Artificial Intelligence (AI) involves more than the representation of a large number of facts or beliefs regarding a given domain, i.e. more than a mere listing of those facts or beliefs as data structures. It may involve, for example, an account of the way the properties and relations that are known or believed to hold of the objects in that domain are organized into a theoretical whole - such as the way different branches of mathematics, or of physics and chemistry, or of biology and psychology, etc., are organized, and even the way different parts of our commonsense knowledge or beliefs about the world can be organized. But different theoretical accounts will apply to different domains, and one of the questions that arises here is whether or not there are categorial principles of

representation and organization that apply across all domains regardless of the specific nature of the objects in those domains. If there are such principles, then they can serve as a basis for a general framework of knowledge representation independently of its application to particular domains. In what follows I will give a brief outline of some of the categorial structures of conceptual realism as a formal ontology. It is this system that I propose we adopt as the basis of a categorial framework for knowledge representation." (p. 697)

(...)

"Concluding remarks. We have given here only an overview or sketch of conceptual realism as a formal ontology, i.e. as a theory of logical form having both conceptual and ontological categories - but in which the latter are represented in terms of the former. The categories of natural kinds and of natural properties and relations, for example, are represented in terms of the categories of sortals and predicable concepts, respectively, and the category of abstract objects is represented in terms of the process of conceptual nominalization (reification) as a subcategory of objects. Not all of these categories or parts of this formal ontology will be relevant in every domain of knowledge representation, but each is relevant at least to some domains and is needed in a comprehensive framework for knowledge representation. In those domains where certain categorial distinctions are not needed - such as that between predicative and impredicative concepts, or that between predicable concepts and natural properties and relations, or between sortal concepts and natural kinds, etc. - we can simply ignore or delete the logical forms in question. What must remain as the core of the system is the intensional logic around which all of the other categories are built - namely, the second-order predicate logic with nominalized predicates as abstract singular terms that we call HST*-lambda. It is this core, I believe, that can serve as a universal standard by which to evaluate other representational systems." (p. 721)

3. ———. 1996. "Conceptual Realism as a Formal Ontology." In *Formal Ontology*, edited by Poli, Roberto and Simons, Peter, 27-60. Dordrecht: Kluwer.
Contents: 1. Introduction; 2. Substitutional versus Ontological Interpretations of Quantifiers; 3. The Importance of the Notion of Unsaturatedness in Formal Ontology; 4. Referential and Predicable Concepts Versus Immanent Objects of Reference; 5. Conceptual Natural Realism and the Analogy of Being Between Natural and Intelligible Universals; 6. Conceptual Natural Realism and Aristotelian Essentialism; 7. Conceptual Intensional Realism versus Conceptual Platonism and the Logic of Nominalized Predicates
8. Concluding Remarks.
Abstract: "Conceptualism *simpliciter*, wheter constructive or holistic, provides an account of predication only in thought and language, and represents in that regard only a truncated formal ontology. But conceptualism can be extended to an Aristotelian conceptual natural realism in which natural properties and relations (and natural kinds as well) can be analogically posited corresponding to some of Our concepts, thereby providing an account of predication in the space-time causal Order as well. In addition, through a pattern of reflexive abstraction corresponding to the process of nominalization in language (and in which abstract objects are hypostatized corresponding to our concepts as unsaturated cognitive structures), conceptualism can also be extended to a conceptual Platonism or intensional realism that can provide an account of both the intensional objects of fiction and the extensional objects of mathematics. Conceptual realism is thus shown to be a paradigm formal ontology in which the distinctions between abstract reality, natural reality, and thought and language are properly represented, and in which the traditional opposition between Platonism and Aristotelianism is finally overcome by properly locating their different functions, and the way each should be represented, in formal ontology."
"Concluding Remarks. As this informal sketch indicates, conceptual realism, by which we mean conceptual natural realism and conceptual intensional realism together, provides the basis of a general conceptual-ontological framework, within

which, beginning with thought and language, a comprehensive formal ontology can be developed. Not only does conceptual realism explain how, in naturalistic terms, predication in thought and language is possible, but, in addition, it provides a theory of the nature of predication in reality through an analogical theory of properties and relations. In this way, conceptual realism can be developed into a reconstructed version of Aristotelian realism, including a version of Aristotelian essentialism. In addition, through the process of nominalization, which corresponds to a reflexive abstraction in which we attempt to represent our concepts as if they were objects, conceptualism can be developed into a conceptual intensional realism that can provide an account not only of the abstract reality of numbers and other mathematical objects, but of the intensional objects of fiction and stories of all kinds, both true and false, and including those stories that we systematically develop into theories about the world. In this way, conceptual realism provides a framework not only for the conceptual and natural order, but for the mathematical and intensional order as well. Also, in this way, conceptual realism is able to reconcile and provide a unified account both of Platonism and Aristotelian realism, including Aristotelian essentialism - and it does so by showing how the ontological categories, or modes of being, of each of these ontologies can be explained in terms a conceptualist theory of predication and its analogical extensions." (p. 60)

4. ———. 1997. "Formally Oriented Work in the Philosophy of Language." In *Routledge History of Philosophy. Vol. X - The Philosophy of Meaning, Knowledge and Value in the 20th Century*, edited by Canfield, John, 39-75. New York: Routledge.
Contents: 1. The notion of a *Characteristica Universalis* as a philosophical language; 2. The notion a a logically perfect language as a regulating ideal; 3. The theory of logical types; 4. Radical empiricism and the logical construction of the world; 5. The logical empiricist theory of meaning; 6. Semiotic and the trinity of syntax, semantics and pragmatics; 7. Pragmatics from a logical point of view; 8. Intensional logic; 9. Universal Montague grammar; 10. Speech-act theory and the return to pragmatics.
Abstract: "One of the perennial issues in philosophy is the nature of the various relationships between language and reality, language and thought, and language and knowledge. Part of this issue is the question of the kind of methodology that is to be brought to bear on the study of these relationships. The methodology that we shall discuss here is based on a formally oriented approach to the philosophy of language, and specifically on the notion of a logically ideal language as the basis of a theory of meaning and a theory of knowledge."
5. ———. 1997. "Conceptual Realism as a Theory of Logical Form." *Revue Internationale de Philosophie*:175-199.
"The central notion in the philosophy of logic is the notion of a logical form, and the central issue is which theory of logical form best represents our scientific (including our mathematical) and commonsense understanding of the world. Here, by a theory of logical form, we mean not only a logical grammar in the sense of a system of formation rules characterizing the well-formed expressions of the theory, but also a logical calculus characterizing what is valid (i.e., provable or derivable) in the theory. The representational role of the logical forms of such a theory consists in the fact that they are perspicuous in the way they specify the truth conditions, and thereby the validity, of formulas in terms of the recursive operations of logical syntax. In conceptualism we also require that logical forms be perspicuous in the way they represent the cognitive structure of our speech and mental acts, including in particular the referential and predicable concepts underlying those acts. The purpose of a theory of logical form, accordingly, is that it is to serve as a general semantical framework by which we can represent in a logically perspicuous way our commonsense and scientific understanding of the world, including our understanding of ourselves

and the cognitive structure of our speech and mental acts. So understood, the logical forms of such a theory are taken to be semantic structures in their own right, relative to which the words, phrases, and (declarative) sentences of a (fragment of) natural language, or of a scientific or mathematical theory, are to be represented and interpreted. The process by which the expressions of a natural language or scientific theory are represented and interpreted in such a theory — relative to the aims, purposes and pragmatic considerations regarding a given context or domain of discourse — amounts to a logical analysis of those expressions. (A different group of aims, purposes, etc., might give a finer- or a coarser-grained analysis of the domain.)

Ideally, where the syntax of a target language or theory has been recursively characterized, such an analysis can be given in terms of a precisely characterized theory of translation (1). Usually, however, the analysis is given informally. In what follows I will briefly describe and attempt to motivate some (but not all) aspects of a theory of logical form that I associate with the philosophical system I call conceptual realism. The realism involved here is really of two types, one a natural realism (amounting to a modern form of Aristotelian essentialism) and the other an intensional realism (amounting to a modern, but also mitigated, form of Platonism). The core of the theory is a second-order logic in which predicate expressions (both simple and complex) can be nominalized and treated as abstract singular terms (in the sense of being substituends of individual variables). In this respect the core is really a form of conceptual intensional realism, which is the only part of the system we will discuss here (2)." (pp. 175-176)

(1) See Montague (1969) for a description of such a theory of translation (for Montague's type-theoretical intensional logic).

(2) See Cocchiarella (1996), §§ 5-6, for a description of conceptual natural realism as a modern form of Aristotelian Essentialism.

References

Cocchiarella, N.B. (1996), "Conceptual Realism as a Formal Ontology", in *Formal Ontology*, R. Poli and P. Simons, eds., Kluwer Academic press, Dordrecht, pp. 27-60.

Montague, R.M. (1969), "Universal Grammar", in *Formal Philosophy, Selected papers of Richard Montague*, edited by R.H. Thomason, Yale University Press, New Haven, 1974.

6. ———. 1998. "Property Theory." In *Routledge Encyclopedia of Philosophy - Vol. 7*, edited by Craig, Edward, 761-767. New York: Routledge.

Abstract: "Traditionally, a property theory is a theory of abstract entities that can be predicated of things. A theory of properties in this sense is a theory of predication - just as a theory of classes or sets is a theory of membership. In a formal theory of predication, properties are taken to correspond to some (or all) one-place predicate expressions. In addition to properties, it is usually assumed that there are n-ary relations that correspond to some (or all) n-place predicate expressions (for $n > 2$). A theory of properties is then also a theory of relations.

In this entry we shall use the traditional labels 'realism' and 'conceptualism' as a convenient way to classify theories. In natural realism, where properties and relations are the physical, or natural, causal structures involved in the laws of nature, properties and relations correspond to only some predicate expressions, whereas in logical realism properties and relations are generally assumed to correspond to all predicate expressions.

Not all theories of predication take properties and relations to be the universals that predicates stand for in their role as predicates. The universals of conceptualism, for example, are unsaturated concepts in the sense of cognitive capacities that are exercised (saturated) in thought and speech. Properties and relations in the sense of intensional Platonic objects may still correspond to predicate expressions, as they do in conceptual intensional realism, but only indirectly as the intensional contents of the concepts that predicates stand for in their role as predicates. In that case, instead of properties and relations being what predicates stand for directly, they are what

nominalized predicates denote as abstract singular terms. It is in this way that concepts - such as those that the predicate phrases 'is wise', 'is triangular' and 'is identical with' stand for - are distinguished from the properties and relations that are their intensional contents - such as those that are denoted by the abstract singular terms 'wisdom', 'triangularity' and 'identity, respectively. Once properties are represented by abstract singular terms, concepts can be predicated of them, and, in particular, a concept can be predicated of the property that is its intensional content. For example, the concept represented by 'is a property' can be predicated of the property denoted by the abstract noun phrase 'being a property', so that 'being a property is a property' (or, 'The property of being a property is a property') becomes well-formed. In this way, however, we are confronted with Russell's paradox of (the property of) being a non-self-predicable property, which is the intensional content of the concept represented by 'is a non-self-predicable property'. That is, the property of being a non-self-predicable property both falls and does not fall under the concept of being a non-self-predicable property (and therefore both falls and does not fall under the concept of being self-predicable)." (p. 761)

7. ———. 1998. "The Theory of Types (Simple and Ramified)." In *Routledge Encyclopedia of Philosophy - Vol. 9*, edited by Craig, Edward, 359-362. New York: Routledge.
 Abstract: "The theory of types was first described by Bertrand Russell in 1908. He was seeking a logical theory that could serve as a framework for mathematics and, in particular, a theory that would avoid the so-called 'vicious-circle' antinomies, such as his own paradox of the property of those properties that are not properties of themselves - or, similarly, of the class of those classes that are not members of themselves. Such paradoxes can be thought of as resulting when logical distinctions are not made between different types of entities and, in particular, between different types of properties and relations that might be predicated of entities, such as the distinction between concrete objects and their properties, and the properties of those properties, and so on. In 'ramified' type theory, the hierarchy of properties and relations is, as it were, two-dimensional, where properties and relations are distinguished first by their order, and the by their level within each order. In 'simple' type theory properties and relations are distinguished only by their orders." (p. 359)
8. ———. 1998. "Reference in Conceptual Realism." *Synthese* no. 114:169-202.
 Contents: 1. The core of Conceptual Intensional Realism; 2. Referential concepts, simple and complex; 3. Geach's negation and complex predicate arguments; 4. Active versus deactivated referential concepts; 5. Deactivation and Geach's arguments; 6. Relative pronouns and referential concepts; 7. Relative pronouns as referential expressions; 8. Concluding remarks.
 Abstract: "A conceptual theory of the referential and predicable concepts used in basic speech and mental acts is described in which singular and general, complex and simple, and pronominal and non-pronominal, referential concepts are given a uniform account. The theory includes an intensional realism in which the intensional contents of predicable and referential concepts are represented through nominalized forms of the predicate and quantifier phrases that stand for those concepts. A central part of the theory distinguishes between active and deactivated referential concepts, where the latter are represented by nominalized quantifier phrases that occur as parts of complex predicates. Peter Geach's arguments against theories of general reference in "Reference and Generality" are used as a foil to test the adequacy of the theory. Geach's arguments are shown to either beg the question of general as opposed to singular reference or to be inapplicable because of the distinction between active and deactivated referential concepts."
 "Concluding Remarks. We do not claim that the theory of relative pronouns as referential expressions proposed in Section 7 is unproblematic, it should be noted. If it should turn out that it cannot be sustained, then we still have the theory proposed in Section 6, where relative pronouns are taken as anaphoric proxies for non-pronominal referential expressions. In other words, whether the proposal of Section 7 is sustained or not, we maintain that Geach's arguments against complex names

and general reference do not work against the kind of conceptualist theory we have presented here.

We also do not claim to have proved that our conceptualist theory of reference resolves all problems about reference, but only that it has passed an initial test of adequacy as far as Geach's arguments in (Geach *Reference and Generality* third edition, 1980) are concerned. It is our view that a conceptualist theory is what is needed to account for reference and predication in our speech and mental acts, and that only a theory of the referential and predicable concepts that underlie the basic forms of such acts will suffice. Such a theory, we maintain, must provide a uniform account of general as well as singular reference, and, in terms of the referential and predicable concepts involved in a speech or mental act, it must distinguish the logical forms that represent the cognitive structure of that act from the logical forms that only represent its truth conditions. That, in any case, is the kind of conceptualist theory we have attempted to describe and defend here." (p. 198)

9. ———. 2000. *Lógica Como Lenguaje y Lógica Como Cálculo: su Papel en la Teoría de la Atribución*. Heredia, Costa Rica: Departamento de Filosofía, Universidad Nacional. Colección Prometeo n. 20.
10. ———. 2000. "Russell's Paradox of the Totality of Propositions." *Nordic Journal of Philosophical Logic* no. 5:25-37.
 Abstract: "Russell's "new contradiction" about "the totality of propositions" has been connected with a number of modal paradoxes. M. Oksanen has recently shown how these modal paradoxes are resolved in the set theory NFU. Russell's paradox of the totality of propositions was left unexplained, however. We reconstruct Russell's argument and explain how it is resolved in two intensional logics that are equiconsistent with NFU. We also show how different notions of possible worlds are represented in these intensional logics."
 "In Appendix B of his 1903 *Principles of Mathematics* (PoM), Russell described a "new contradiction" about "the totality of propositions" that his "doctrine of types" (as described in Appendix B) was unable to avoid. (1)
 In recent years this "new contradiction" has been connected with a number of modal paradoxes, some purporting to show that there cannot be a totality of true propositions, (2) or that even the idea of quantifying over the totality of propositions leads to contradiction. (3) A number of these claims have been discussed recently by Mika Oksanen and shown to be spurious relative to the set theory known as NFU. (4) In other words, if NFU is used instead of ZF as the semantical metalanguage for modal logic, the various "paradoxes" about the totality of propositions (usually construed as the totality of sets of possible worlds) can be seen to fail (generally because of the existence of a universal set and the failure of the general form of Cantor's power-set theorem in NFU). It is not clear, however, how Russell's own paradox about the totality of propositions is resolved on this analysis, and although Oksanen quoted Russell's description of the paradox in detail, he did not show how it is explained in NFU after his resolution of the other related modal paradoxes; in fact, it is not at all clear how this might be done in NFU.
 One reason why Russell's argument is difficult to reconstruct in NFU is that it is based on the logic of propositions, and implicitly in that regard on a theory of predication rather than a theory of membership. A more appropriate medium for the resolution of these paradoxes, in other words, would be a formal theory of predication that is a counterpart to NFU.
 Fortunately, there are two such theories, λ HST* and HST* λ , that are equiconsistent with NFU and that share with it many of the features that make it a useful framework within which to resolve a number of paradoxes, modal or otherwise. (5)"
 (pp. 25-26)
 (1) PoM, p. 527.
 (2) See, e.g., Grim 1991, pp. 92f.
 (3) See, e.g., Grim 1991, p. 119 and Jubien 1988, p. 307.

(4) See Oksanen 1999. NFU is a modified version of Quine's system NF. It was first described in Jensen 1968 and recently has been extensively developed in Holmes 1999.

(5) See Cocchiarella 1986, chapters IV and VI for proofs of the connection of NFU with these systems. Also, see Cocchiarella 1985 for how these systems are related to Quine's systems NF and ML. For a discussion of the refutation of Cantor's power-set theorem in

these systems, see Cocchiarella 1992.

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Russell, B. 1937. *The Principles of Mathematics, 2nd edition*. W. W. Norton & Co., N.Y.

11. ———. 2001. "A Logical Reconstruction of Medieval Terminist Logic in Conceptual Realism." *Logical Analysis and History of Philosophy* no. 4:35-72. Abstract: "The framework of conceptual realism provides a logically ideal language within which to reconstruct the medieval terminist logic of the 14th century. The terminist notion of a concept, which shifted from Ockham's early view of a concept as an intentional object (the *fitcum* theory) to his later view of a concept as a mental act (the *intellectio* theory), is reconstructed in this framework in terms of the idea of concepts as unsaturated cognitive structures. Intentional objects (*ficta*) are not rejected but are reconstructed as the objectified intensional contents of concepts. Their reconstruction as intensional objects is an essential part of the theory of predication of conceptual realism. It is by means of this theory that we are able to explain how the identity theory of the copula, which was basic to terminist logic, applies to categorical propositions. Reference in conceptual realism is not the same as supposition in terminist logic. Nevertheless, the various "modes" of personal supposition of terminist logic can be explained and justified in terms of this conceptualist theory of reference." "Conclusion. The framework of conceptual realism provides a logically ideal language within which to reconstruct the medieval terminist logic of the 14th century. The terminist notion of a concept, which shifted from Ockham's early view of a concept as an intentional object (the *fictum* theory) to his later view of a concept as a mental act (the *intellectio* theory), is reconstructed in this framework in terms of the notion of a concept as an unsaturated cognitive structure. Referential and predicable concepts in particular are unsaturated cognitive structures that mutually saturate each other in mental acts, analogous to the way that quantifier phrases and predicate expressions mutually saturate each other in language. Intentional objects (*ficta*) are not rejected but are reconstructed as the objectified intensional contents of concepts, i.e., as intentional objects obtained through the process of nominalization — and in that sense as products of the evolution of language and thought. Their reconstruction as intensional objects is an essential part of the theory of predication of conceptual realism. In particular, the truth conditions determined by predicable concepts based on relations — including the relation the copula stands for — are characterized in part in terms of these objectified intensional contents. It is by means of this conceptualist theory of predication that

we are able to explain how the identity theory of the copula, which was basic to terminist logic, applies to categorical propositions.

Reference in conceptual realism, based on the exercise and mutual saturation of referential and predicable concepts, is not the same as supposition in terminist logic. Nevertheless, the various "modes" or types of personal supposition are accounted for in a natural and intuitive way in terms of the theory of reference of conceptual realism. Ockham's application of merely confused supposition to common names occurring within the scope of an intensional verb is rejected, as it should be, but its rejection is grounded on the notion of a deactivated referential concept—a deactivation that, because of the intensionality of the context in question, cannot be "activated," the way it can be in extensional contexts." (p. 71)

12. ———. 2001. "Logic and Ontology." *Axiomathes. An International Journal in Ontology and Cognitive Systems* no. 12:127-150.
 Contents: 1. Logic as Language versus Logic as Calculus; 2. Predication versus Membership; 3. The vagaries of Nominalism; 4. The Vindication (Almost) of Logical Realism; 5. Conceptualism Without a Transcendental Subject; 6. Conceptual Natural realism and the Analogy of being Between Natural and Conceptual Universals; 7. Conceptual Intensional Realism; 8. Concluding Remarks.
 Abstract: "A brief review of the historical relation between logic and ontology and of the opposition between the views of logic as language and logic as calculus is given. We argue that predication is more fundamental than membership and that different theories of predication are based on different theories of universals, the three most important being nominalism, conceptualism, and realism. These theories can be formulated as formal ontologies, each with its own logic, and compared with one another in terms of their respective explanatory powers. After a brief survey of such a comparison, we argue that an extended form of conceptual realism provides the most coherent formal ontology and, as such, can be used to defend the view of logic as language."
 "Concluding Remarks: Despite our extended discussion and defense of conceptual realism, the fact remains that this is a formal ontology that can be described and compared with other formal ontologies in the set-theoretic framework of comparative formal ontology. Set theory, as we have said, provides a convenient mathematical medium in which both the syntax and an extrinsic semantics of different formal ontologies can be formulated, which then can be compared and contrasted with one another in their logical and descriptive powers. This is the real insight behind the view of logic as calculus. But membership is at best a pale shadow of predication, which underlies thought, language and the different categories of reality. Set theory is not itself an adequate framework for general ontology, in other words, unless based on a theory of predication (as in Quine's nominalist-platonism). Only a formal theory of predication based on a theory of universals can be the basis of a general ontology. This is the real insight behind the view of logic as language. But there are alternative theories of universals, and therefore alternative formal theories of predication, each with its own logic and theory of logical form. A rational choice can be made only by formulating and comparing these alternatives in comparative formal ontology, a program that can best be carried out in set theory. Among the various alternatives that have been formulated and investigated over the years, the choice we have made here, for the reasons given, is what we have briefly described above as conceptual realism, which includes both a conceptual natural realism and a conceptual intensional realism. Others may make a different choice. As Rudolf Carnap once said: "Everyone is at liberty to build up his own logic, i.e. his own form of language, as he wishes." But then, at least in the construction of a formal ontology, we all have an obligation to defend our choice and to give reasons why we think one system is better than another. In this regard, we do not accept Carnap's additional injunction that in logic, there are no morals." (pp. 145-146)
 Translated in Italian by Flavia Marcacci with revision by Gianfranco Basti, as: *Logica e Ontologia* in *Aquinas. Rivista Internazionale di Filosofia*, 52, 2009.

13. ———. 2001. "A Conceptualist Interpretation of Leśniewski's Ontology." *History and Philosophy of Logic* no. 22:29-43.
 Contents: 1. Introduction 29; 2. Leśniewski's Ontology as a First-Order Theory 29; 3. The Logic of Names in Conceptual Realism 31; 4. A Conceptualist Interpretation of Leśniewski's System 35; 5. Reduction of Leśniewski's Theory of Definitions 39; 6. Consistency and Decidability 40; References 43.
 Abstract: "A first-order formulation of Leśniewski's ontology is formulated and shown to be interpretable within a free first-order logic of identity extended to include nominal quantification over proper and common-name concepts. The latter theory is then shown to be interpretable in monadic second-order predicate logic, which shows that the first-order part of Leśniewski's ontology is decidable."
 "Introduction. One of the important applications of Leśniewski's system of ontology, sometimes also called *the logic of (proper and common) names*, (1) has been as a logistic framework that can be used in the reconstruction of medieval terminist logic. (2) This is especially so because the basic relation of Leśniewski's system, singular inclusion, amounts to a version of the two-name theory of the copula. (3) An alternative reconstruction of medieval terminist logic can also be given within the logistic framework of conceptual realism, however. (4) This system is preferable in part because, unlike Leśniewski's ontology, it is not committed to an extensional framework, which is important in the logical analysis of the tensed and modal modification (ampliation) of the terms (names) of medieval logic. (5) It is also possible, as we show below, to reduce or reconstruct Leśniewski's ontology within the logistic framework of conceptual realism."
 (1) See, e.g. Lejewski 1958, p. 152, Slupecki 1955 and Iwanuś 1973.
 (2) See, e.g. Henry 1972.
 (3) Singular inclusion, as represented by e in the formula ' $a e b$ ', read as ' a is b ', was the only undefined constant of Leśniewski's original system of ontology. The system could also be based either on partial, weak or strong inclusion as the only primitive as well. See Lejewski 1958, pp. 154-156.
 (4) See Cocchiarella 2001. For an account of conceptual realism as a formal ontology see Cocchiarella 1996.
 (5) One might, of course, add tense and modal operators to Leśniewski's ontology, even though he himself was against such a move.
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 Cocchiarella, N. B. 1996. 'Conceptual Realism as a Formal Ontology', in R. Poli and P. Simons, eds. *Formal Ontology Dordrecht*: Kluwer Academic pp. 27-60.
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 [LS = *Leśniewski's Systems. Ontology and Mereology*, edited by Jan T. J. Srzednicki and V. F. Rickey; Assistant Editor: J. Czelakowski, The Hague: Martinus Nijhoff 1984.]
14. ———. 2002. "On the Logic of Classes as Many." *Studia Logica* no. 70:303-338.
 Abstract: "The notion of a "class as many" was central to Bertrand Russell's early form of logicism in his 1903 *Foundations of Mathematics*. There is no empty class in this sense, and the singleton of an urelement (or atom in our reconstruction) is identical with that urelement. Also, classes with more than one member are merely pluralities— or what are sometimes called "plural objects"— and cannot as such be themselves members of classes. Russell did not formally develop this notion of a

class but used it only informally. In what follows, we give a formal, logical reconstruction of the logic of classes as many as pluralities (or plural objects) within a fragment of the framework of conceptual realism. We also take groups to be classes as many with two or more members and show how groups provide a semantics for plural quantifier phrases."

"There is a notion of a class that has been ignored by most, but not all, philosophers.

(4) This is the notion of a "class as many," as described, e.g., by Bertrand Russell in his 1903 *Principles of Mathematics*. (5) A class in this sense is the extension of a common count noun, i.e., the extension of what traditionally has been called a common name. (6) The three important features of this notion are, first, that a vacuous common name, i.e., a common name that names nothing, has no extension, which is not the same as having an empty class as its extension. Thus, according to Russell, "there is no such thing as the null class, though there are null class-concepts," i.e., commonname concepts that have no extension. (7) Secondly, the extension of a common name that names just one thing (in the sense of an urelement) is just that one thing. In other words, unlike the singleton sets of set theory, which are not identical with their single member, the class that is the extension of a common name that names just one thing (urelement) is none other than that one thing."

(...)

"We believe that this notion of a class, or of a group, can be usefully developed as part of the broader framework of conceptual realism that we have described elsewhere. (11)" (pp. 304-305)

(4) See, e.g., Simons 1982 for one proposed formulation of this notion. Simons's formulation is different from the one we give here. Simons doubts that there can be "an exact logic for the quantificatory uses" of common names, which is what the present system is

based on. Also, whereas the present system relies on only one type of "objectual" variable (having both "atoms" and classes as many as values), Simons has three: one for "individuals," another for "pluralities," and a third for "neutrals." There are a number of other differences as well, but we will not go into them here.

(5) See Russell 1903, chapter VI. Russell's view in this book precedes his later no-classes doctrine.

(6) Strictly speaking, Russell distinguishes between a common name, e.g., 'man', and its plural form, 'men', and then takes the latter to denote the class as many of men (§67). We do not distinguish common names from their plural forms here, and we describe the class as many simply as the extension of the common name (and the concept it stands for).

(7) Russell 1903, §69

(11) See, e.g., Cocchiarella 1996 for a description of conceptual realism as a formal ontology.

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15. ———. 2002. "Logical Necessity Based on Carnap's Criterion of Adequacy." *Korean Journal of Logic* no. 5:1-21.

Abstract: "A semantics for logical necessity, based on Carnap's criterion of adequacy, is given with respect to the ontology of logical atomism. A calculus for sentential (propositional) modal logic is described and shown to be complete with respect to this semantics. The semantics is then modified in terms of a restricted

notion of 'all possible worlds' in the interpretation of necessity and shown to yield a completeness theorem for the modal logic S5. Such a restricted notion introduces material content into the meaning of necessity so that, in addition to atomic facts, there are "modal facts" that distinguish one world from another."

"...in what follows we will construct a semantics for logical necessity based on Rudolf Carnap's criterion of adequacy and the metaphysical framework of logical atomism, a semantics, we maintain, that provides a clear and precise account of the connection between logical truth and logical necessity— at least with respect to this kind of metaphysical framework. (4)" (p. 2)

(4) There are reasons to think that no other sort of metaphysical framework can succeed in adequately explaining the connection between logical truth and logical necessity. This is not to say, however, that other frameworks cannot account for notions of necessity other than logical necessity.

16. ———. 2003. "Conceptual Realism and the Nexus of Predication." *Metalogicon* no. 16:45-70.

Abstract: "The nexus of predication is accounted for in different ways in different theories of universals. We briefly review the account given in nominalism, logical realism (modern Platonism), and natural realism. Our main goal is to describe the account given in a modern form of conceptualism extended to include a theory of intensional objects as the contents of our predicable and referential concepts."

"Introduction. A universal, according to Aristotle, is what can be predicated of things. (1) But what exactly do we mean in saying that a universal can be predicated of things? How, or in what way, do universals function in the nexus of predication?

In the history of philosophy, there are three major types of theories that deal with the problem of universals and that purport to answer these questions: (2)

(1) Nominalism: According to this theory there are no universals, and there is predication only in language; that is, only predicates can be predicated of things, and the only nexus of predication is the linguistic nexus between subject and predicate expressions.

(2) Realism: There are real universals, i.e., universals in reality, that are predicated of things, and the function of predication in language is to represent predication in reality. Different versions of realism explain the nexus of predication in reality in different ways.

(3) Conceptualism: There are conceptual universals, e.g., predicable concepts, that underlie predication in thought, and the nexus of predication in thought underlies the nexus of predication in language.

All three theories agree that there is predication in language though each has a different account of how that kind of predication is possible and what it represents. The theory we will describe here in some detail is a modern form of conceptualism. Unlike traditional conceptualism (e.g., British empiricism), the conceptualism we describe here is not based on a theory of "ideas" (*Vorstellungen*), and it includes an intensional realism based on an evolutionary account of concept-formation. In this paper, our main

purpose is to describe the conceptualist account of the nexus of predication.

Before turning to conceptualism, we will make some brief observations about nominalism and realism and our methodology." (pp. 45-46)

(1) *De Interpretatione*, 17 a 39.

2 These three theories were first described by Porphyry in his [*Isagoge* or] *Introduction to Aristotle's Categories*.

17. ———. 2005. "Denoting Concepts, Reference, and the Logic of Names, Classes as Many, Groups and Plurals." *Linguistics and Philosophy* no. 28:135-179.

Abstract: "Bertrand Russell introduced several novel ideas in his 1903 *Principles of Mathematics* that he later gave up and never went back to in his subsequent work. Two of these are the related notions of denoting concepts and classes as many. In this paper we reconstruct each of these notions in the framework of conceptual realism and connect them through a logic of names that encompasses both proper and common names, and among the latter complex as well as simple common

names. Names, proper or common, and simple or complex, occur as parts of quantifier phrases, which in conceptual realism stand for referential concepts, i.e., cognitive capacities that inform our speech and mental acts with a referential nature and account for the intentionality, or directedness, of those acts. In Russell's theory, quantifier phrases express denoting concepts (which do not include proper names). In conceptual realism, names, as well as predicates, can be nominalized and allowed to occur as "singular terms", i.e., as arguments of predicates. Occurring as a singular term, a name denotes, if it denotes at all, a class as many, where, as in Russell's theory, a class as many of one object is identical with that one object, and a class as many of more than one object is a plurality, i.e., a plural object that we call a group. Also, as in Russell's theory, there is no empty class as many. When nominalized, proper names function as "singular terms" just the way they do in so-called free logic. Leśniewski's ontology, which is also called a logic of names can be completely interpreted within this conceptualist framework, and the well-known oddities of Leśniewski's system are shown not to be odd at all when his system is so interpreted. Finally, we show how the pluralities, or groups, of the logic of classes as many can be used as the semantic basis of plural reference and predication. We explain in this way Russell's "fundamental doctrine upon which all rests," i.e., "the doctrine that the subject of a proposition may be plural, and that such plural subjects are what is meant by classes [as many] which have more than one term" ([*Principles of Mathematics*], p. 517)."

"Bertrand Russell introduced several novel ideas in his 1903 *Principles of Mathematics* [PoM] that he later gave up and never went back to in his subsequent work. Two of these are the related notions of denoting concepts and classes as many. Russell explicitly rejected denoting concepts in his 1905 paper, "On Denoting". Although his reasons for doing so are still a matter of some debate, they depend in part on his assumption that all concepts, including denoting concepts, are objects and can be denoted as such. (1) Classes of any kind were later eliminated as part of Russell's "no-classes" doctrine, according to which all mention of classes was to be contextually analyzed in terms of reference to either propositions, as in Russell's 1905 substitution theory, or propositional functions as in *Principia Mathematica* [PM]. The problem with classes, as Russell and Whitehead described it in [PM], is that "if there is such an object as a class, it must be in some sense one object. Yet it is only of classes that many can be predicated. Hence, if we admit classes as objects, we must suppose that the same object can be both one and many, which seems impossible" (p. 72).

Both notions are worthy of reconsideration, however, even if only in a somewhat different, alternative form in a conceptualist framework that Russell did not himself adopt. In such a framework, which we will briefly describe here, Russell's assumption that all concepts are objects will be rejected in favor of a conceptualist counterpart to Frege's notion of unsaturatedness, and we will reconsider the idea of a class as many somehow being both one and many." (pp. 135-136)

18. ———. 2008. "Infinity in Ontology and Mind." *Axiomathes. An International Journal in Ontology and Cognitive Systems* no. 18:1-24.
 Abstract: "Two fundamental categories of any ontology are the category of objects and the category of universals. We discuss the question whether either of these categories can be infinite or not. In the category of objects, the subcategory of physical objects is examined within the context of different cosmological theories regarding the different kinds of fundamental objects in the universe. objects are discussed in terms of sets and the intensional objects of conceptual realism. The category of universals is discussed in terms of the three major theories of universals: nominalism, realism, and conceptualism. The finitude of mind pertains only to conceptualism. We consider the question of whether or not this finitude precludes impredicative concept formation. An explication of potential infinity, especially as applied to concepts and expressions, is given. We also briefly discuss a logic of plural objects, or groups of single objects (individuals), which is based on Bertrand Russell's (1903, *The Principles of Mathematics*, 2nd edn. (1938).

Norton & Co, NY) notion of a class as many. The universal class as many does not exist in this logic if there are two or more single objects; but the issue is undecided if there is just one individual. We note that adding plural objects (groups) to an ontology with a countable infinity of individuals (single objects) does not generate an uncountable infinity of classes as many."

"Introduction.

Ontology, as originally described by Aristotle, is the study of being qua being, where being is not univocal but is divided into different categories. The two most fundamental categories are those of universals and objects respectively. Here, by a universal, and again we follow Aristotle, we mean that which can be predicated of things.¹ Predication, of course, is what connects universals with objects. One important aspect of the role, or significance, of infinity in ontology, accordingly, is whether or not either of these categories, i.e., the category of objects or the category of universals, is, or can be, infinite. How infinity applies to mind in this regard is the question of whether or not there are, or can be, infinitely many concepts as intelligible universals, and whether or not the finitude of the human mind places limitations on the concepts that can be constructed.

The methodology of ontology, which, as we have said, is divided into different categories, is the analysis of those categories and the laws connecting them with one another, including in particular the nature of predication. The clearest and most precise way to analyze these categories is through the development of what is known as formal ontology, where the logico-grammatical forms and principles of a logistic system are formulated for the purpose of representing the different categories and the laws connecting them.² A formal ontology in which ontological and logical categories are combined in a unified framework will then amount to a comprehensive deductive framework that is prior to all others in both logical and ontological structure. By proving the consistency of such a logistic system we can thereby show that the intuitive ontological framework associated with it is consistent as well.

One important role of infinity in ontology, accordingly, can be understood as the determination of whether or not any of the categories of being, and in particular the categories of objects and universals, are, or can be, infinite as part of such a formal framework. In what follows we will consider some possible answers to this question." (p. 2)

References

(1) Aristotle, *De Interpretatione* 17a39.

(2) For a more detailed account of formal ontology, see Cocchiarella (2007, Chap. 1).

19. ———. 2009. "Mass Nouns in a Logic of Classes as Many." *Journal of Philosophical Logic* no. 38:343-361.

Abstract: "A semantic analysis of mass nouns is given in terms of a logic of classes as many. In previous work it was shown that plural reference and predication for count nouns can be interpreted within this logic of classes as many in terms of the subclasses of the classes that are the extensions of those count nouns. A brief review of that account of plurals is given here and it is then shown how the same kind of interpretation can also be given for mass nouns."

"Why is the semantics of mass nouns so problematic? One reason, apparently, is that unlike count nouns, which have determinate extensions, mass nouns have extensions that in some cases are said to be indeterminate. The objects in the extension of a count noun are unproblematic because those objects are generally discrete and well-delineated, and hence can be individuated. The objects in the extension of a mass noun, especially mass nouns for different kinds of stuff, are said to be "diffuse" and indeterminate, on the other hand, because there are often an indefinite number of ways to refer them separately as well as together as wholes. (1) A number of proposals have been made and criticized about the extensions of mass nouns. (2) We will not review those proposals and criticisms here but instead will present a proposal of our own based on what has been called "the simplest plan" of

all. (3) We will defend this "plan" in terms of a logical framework designed to represent a form of conceptualism in which the logical forms that represent the cognitive structure of our speech and mental acts are distinguished from the logical forms that represent the truth conditions and deductive relations of those acts." (pp. 343-344)

(1) Cp. Bunt [1], p. 53.

(2) See Pelletier [8] for a review and discussion of some of these proposals.

(3) Pelletier 74, p. 94 f.

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20. ———. 2009. "Reply to Gregory Landini's Review of *Formal Ontology and Conceptual Realism*." *Axiomathes. An International Journal in Ontology and Cognitive Systems*:143-153.

"1. Some Initial Ontological Distinctions.

In our discussion of Greg Landini's review, we should distinguish how the logical systems *IHST** and *HST**l** that I have developed are to be understood in my reconstructions of Gottlob Frege's and Bertrand Russell's *Principles of mathematics* (1903) ontologies as opposed to how *HST**l** is understood as a (proper) part of my ontology of conceptual realism. Both of these systems are type-free second-order predicate logics that allow predicate expressions (complex or simple) and formulas (propositional forms) to be nominalized and occur in formulas as abstract singular terms.(1)

The main logical difference between these systems, as Landini notes, is that whereas *IHST** contains standard first-order logic (with identity) as a proper part, the system *HST**l** is free of existential presuppositions regarding singular terms, including nominalized predicates as abstract singular terms, which is essential to any argument for Russell's paradox of predication. In particular, nominalization of the Russell predicate that is not predicable of itself turns out to be denotationless in *HST**l** as an abstract singular term.

The main ontological difference between Russell's and Frege's ontologies is that one is intensional and the other is extensional. Russell's (1903) ontology is based on predication as the ontological nexus of propositions, whereas Frege's is based on predication as a function from properties and relations to truth values. (2) In conceptual realism, predication is based on the mutual saturation of referential and predicable concepts as unsaturated complementary cognitive structures, the result being a speech or mental act. (3)

In Russell's ontology, a nominalized predicate denotes, as an abstract singular term, the very same property or relation (in-intension) that the predicate stands for in its role as a predicate. In Frege's ontology, a nominalized predicate denotes the extension (value range, *Wertverläufe*) of the concept or relation (*qua* function from objects to truth values) that the predicate stands for in predicate position; and in conceptual realism, a nominalized predicate denotes the intension of the concept (*qua* cognitive structure) that the predicate stands for in its role as a predicate.

Because what a predicate stands for and what its nominalization denotes are not the same type of entity in either Frege's ontology or my conceptual realism, the fact that a nominalized predicate, on pain of contradiction, might fail to denote as an abstract singular term does not affect the objective reality of what that predicate stands for in its role as a predicate.

That is why the system *HST** can be used in a reconstruction of Frege's ontology as well as in my conceptual realism. The system *IHST** will also suffice for a reconstruction of Frege's ontology, but a free first-order predicate logic is essential to my analysis of plurals and mass nouns in terms of the logic of classes as many developed in my book, which means that only *HST** is appropriate for conceptual realism.

On the other hand, for a reconstruction of Russell's ontology, where nominalized predicates denote the same property or relation they stand for in their role as predicates, only the system *IHST** is appropriate. That is, because it is the same entity involved in both roles in Russell's ontology, we cannot in that framework both affirm the being of what a predicate stands for in its role as a predicate, and also deny that being in the nominalization of the predicate as an abstract singular term." (p. 143)

(1) There is of course a type distinction between object terms and predicates in these systems; but unlike the situation in type theory there is no hierarchy of predicates of different types.

(2) Frege's *Begriffe* are really *Eigenshaften*, and in our present context where we want to distinguish concepts as cognitive capacities from Frege's *Begriffe*, it is better to speak of his *Begriffe* as properties instead.

(3) We assume in this discussion a distinction between predication in language, predication in our speech and mental acts, and predication as the nexus of propositions or of states of affairs, or, in Frege's case, as functional application.

21. ———. 2009. "Reply to Andriy Vasylychenko's Review of *Formal Ontology and Conceptual Realism*." *Axiomathes. An International Journal in Ontology and Cognitive Systems*:167-178.

"Andriy Vasylychenko makes the interesting observation that our references are frequently emotionally charged. A comprehensive theory of reference, Vasylychenko suggests, should include an account of this phenomenon. We agree.

Indeed, as we will see, the theory of reference in conceptual realism can be used to explain an important feature of our emotional states when we read a novel, or watch a play, a movie, or even when viewing a painting. This feature, which in aesthetics is called *psychical distance*, is connected in part with the difference between active and deactivated reference in conceptual realism. We will take up that issue at the end of this reply.

There is, however, an important misunderstanding in Vasylychenko's review of how the notion of existential presupposition applies -- or, as he claims, fails to apply -- to fictional objects and more generally to the abstract intensional objects of conceptual realism. We will discuss this latter issue first, and then turn to the issue of our emotional states and *psychical distance* when reading fiction or watching a play or a film, and perhaps even when having an aesthetic experience in general." (p. 167)

22. ———. 2009. "Logica e Ontologia." *Aquinas. Rivista Internazionale di Filosofia* no. 52:7-50.

Italian translation by Flavia Marcacci, revised by Gianfranco Basti of *Logic and Ontology* (2001).

23. ———. 2010. "Actualism versus Possibilism in Formal Ontology." In *Theory and Applications of Ontology. Vol. 1: Philosophical Perspectives*, edited by Poli, Roberto and Seibt, Johanna, 105-118. Dordrecht: Springer.

"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 \neq 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)

24. ———. 2010. "Predication in Conceptual Realism." *Axiomathes* no. 20:1-21.
Abstract: "Conceptual realism begins with a conceptualist theory of the nexus of predication in our speech and mental acts, a theory that explains the unity of those acts in terms of their referential and predicable aspects. This theory also contains as an integral part an intensional realism based on predicate nominalization and a reflexive abstraction in which the intensional contents of our concepts are "object"-ified, and by which an analysis of predication with intensional verbs can be given. Through a second nominalization of the common names that are part of conceptual realism's theory of reference (*via* quantifier phrases), the theory also accounts for both plural reference and predication and mass noun reference and predication. Finally, a separate nexus of predication based on natural kinds and the natural properties and relations nomologically related to those natural kinds, is also an integral part of the framework of conceptual realism."
25. ———. 2013. "Representing Intentional Objects in Conceptual Realism." *Humana.Mente* no. 25:1-24.

Special number edited by Laura Mari (Scuola Normale Superiore di Pisa) and Michele Paolini Paoletti (University of Macerata): *Meinong Strikes Again. Return to Impossible Objects 100 Years Later*.

Abstract: "In this paper we explain how the intentional objects of our mental states can be represented by the intensional objects of conceptual realism. We first briefly examine and show how Brentano's actualist theory of judgment and his notion of an immanent object have a clear and natural representation in our conceptualist logic of names. We then briefly critically examine Meinong's theory of objects before turning finally to our own representation of intentional objects in terms of the intensional objects of conceptual realism. We conclude by explaining why existence-entailing concepts are so basic to our commonsense framework and how these concepts and their intensions can be used to model Meinong's ontology."

26. ———. 2015. "Two Views of the Logic of Plurals and a Reduction of One to the Other." *Studia Logica* no. 103:757-780.

Abstract: "There are different views of the logic of plurals that are now in circulation, two of which we will compare in this paper. One of these is based on a two-place relation of *being among*, as in 'Peter is among the juveniles arrested'. This approach seems to be the one that is discussed the most in philosophical journals today. The other is based on Bertrand Russell's early notion of a class as many, by which is meant not a class as one, i.e., as a single entity, but merely a plurality of things. It was this notion that Russell used to explain plurals in his 1903 *Principles of Mathematics*; and it was this notion that I was able to develop as a consistent system that contains not only a logic of plurals but also a logic of mass nouns as well.

We compare these two logics here and then show that the logic of the *Among* relation is reducible to the logic of classes as many."

"There are different views of the logic of plurals that are now in circulation. (1) One of these is based on a two-place relation of being among, as in 'Peter is among the juveniles arrested'. This approach seems to be the one that is discussed the most in philosophical journals today. The other is based on Bertrand Russell's early notion of a class as many, by which is meant not a class as one, i.e., as a single entity, but a mere plurality of things. It was this notion that I developed in 2002 as a provably consistent system that contains not only a logic of plurals but also a logic of mass nouns as well. (2) It also contains, as we show in this paper, the plural logic based on the *Among* relation. We will first compare these two logics here and then show that the logic of the *Among* relation in Linnebo [2004] is reducible to the logic of classes as many.

We will first briefly discuss the plural logic based on the *Among* relation as described by Linnebo. Then we will briefly explain the basics of the logic of classes as many, and finally we will show how the logic of the *Among* relation is reducible to the logic of classes as many." (p. 757)

(1) See, e.g., Boolos [1984], Schein [1993], Cocchiarella [2002], McKay [2006], and Linnebo [2004].

(2) See Cocchiarella [2002], [2007] chapter 11, and [2009].

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27. ———. 2016. "On Predication, A Conceptualist View." In *Philosophy and Logic of Predication*, edited by Stalmaszczyk, Piotr, 53-92. Bern: Peter Lang.
Abstract: "Predication, as the nexus between a subject and a predicate expression, is the basis of the unity of a speech act, including speech acts in the plural and speech acts that involve mass nouns. A speech act, of course, is an overt expression of a mental act, e.g., a judgment; and therefore the unity of a speech act such as an assertion is really the unity of the judgment that underlies that act. Such a mental act, and therefore the speech act as well, has a unity based on how the referential and predicable roles of the subject and predicate expressions combine and function together respectively. What we propose here is to explain this unity of predication in terms of a conceptualist theory of logical forms that we claim underlies at least some important aspects of thought and natural language. Our conceptualist logic also contains an account of the medieval identity (two-name) theory of the copula, as well as an account of plural and mass noun reference and predication, the truth conditions of which are based on a logic of plurals and mass nouns."
28. ———. 2017. Epistemological Ontology and Logical Form in Russell's Logical Atomism.
Not yet published.
Preprint available on academia.edu.
Abstract: "Logical analysis, according to Bertrand Russell, leads to and ends with logical atomism, an ontology of atomic facts that is epistemologically founded on sense-data, which Russell claimed are mind-independent physical objects. We first explain how Russell's 1914–1918 epistemological version of logical atomism is to be understood, and then, because constructing logical forms is a fundamental part of the process of logical analysis, we briefly look at what has happened to Russell's type theory in this ontology. We then turn to the problem of explaining how the logical forms of Russell's new logic can explain both the forms of atomic facts and yet also the sentences of natural language. The main problem is to explain the logical forms for belief and desire sentences and how those forms correspond to the logical forms of the facts of logical atomism."
29. ———. 2017. Russell's Logical Atomism 1914-1918: Epistemological Ontology and Logical Form.
Unpublished paper, available on this site.
Abstract: "Logical analysis, according to Bertrand Russell, leads to and ends with logical atomism, an ontology of atomic facts that is epistemologically founded on sense-data, which Russell claimed are mind-independent physical objects. We first explain how Russell's 1914-1918 epistemological version of logical atomism is to be understood, and then, because constructing logical forms is a fundamental part of the process of logical analysis, we briefly look at what has happened to Russell's type theory in this ontology. We then turn to the problem of explaining whether or not the logical forms of Russell's new logic can explain both the forms of atomic facts and yet also the sentences of natural language, especially those about beliefs. The main problem is to explain the logical forms for belief and desire sentences and how those forms do not correspond to the logical forms of the facts of logical atomism."
30. ———. 2018. A Modal-Ontological Argument and Leibniz's View of Possible Worlds.
Unpublished paper, available on this site.
Abstract: "We critically discuss an ontological argument that purports to prove not only that God, or a God-like being, exists, but in addition that God's existence is necessary. This requires turning to a modal logic, S5 in particular, in which the argument is presented. We explain why the argument fails. We then attempt a second version in which one of its premises is strengthened. That attempt also fails because of its use of the Carnap-Barcan formula in a context in which that formula

is not valid. A third is presented as well using the proper name 'God' as a singular term, but it too fails for the same reason, though in a later section we show how this last argument can be validated under a re-interpretation of the quantifiers of the background logic. In our later sections, we explain what is wrong with the original first premise as a representation of what Leibniz meant by the consistency of God's existence, specifically as God's existence in a possible world. Possible worlds exist only as ideas in God's mind, and the consistency of God's existence cannot be God's existence in a possible world. Realism regarding possible worlds must be rejected. Only our world is real, the result of an ontological act of creation. We also explain in a related matter why according to Leibniz, Boethius, Aquinas and other medieval philosophers, God's omniscience does not imply fatalism."

31. ———. 2019. Can an AI System Think? Functionalism and the Nature of Mentality. Unpublished paper, available on this site.

Abstract: "In this paper we consider the philosophical question of whether or not an AI system can think and be self-conscious. We note that in order to take this question seriously, we must reject metaphysical dualism. Then, because Functionalism gives an affirmative answer to our question, we turn to an account of Functionalism as a philosophical theory of the mind and the nature of thought. The basic assumption of Functionalism is that mentality consists essentially of functionality, and that as functional states and processes, mental states and processes can be structurally duplicated in the functionality of the electronic hardware of a suitably programmed AI system. According to Functionalism's basic assumption, structural duplication can be achieved if a functional isomorphism can be achieved between such an AI system and the human mind. We also describe three kinds or levels of self-consciousness and discuss the claim that all three levels can in principle be achieved in an AI system. The first kind, which all animals with a central nervous system have, is expressed in an animal's self-regarding behavior. The second is based on self-reference and reflexive abstraction on the content of thought. This is done in language by means of nominalization where a predicate or declarative sentence is transformed into an abstract noun that denotes the content of that predicate or sentence. The third is based on a double reflexive abstraction on the intentional content of the self by means of a double nominalization. The first nominalization is a transformation of the referential use of the personal pronoun 'I' into a second order predicate true of all and only the properties of the self. The second is a nominalization of that second-order predicate into an abstract noun that denotes the intentional content of the self. In Functionalism, the goal is to achieve a functional isomorphism between the mental states and processes of humans and the electronic states of a suitably programmed AI. Given Functionalism's assumption that the essential nature of mentality is its functionality, such a functional isomorphism would suffice, according to Functionalism, for an AI system to be structurally duplicating, and not merely simulating, the mental states and processes that humans have. And hence an AI system can think and be self-conscious, according to Functionalism, in just the way that humans can."