Theory and History of Ontology

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Bibliography on the Logical Work of Stanislaw Lesniewski

THE WORKS OF LESNIEWSKI IN ENGLISH TRANSLATION


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Originally published in German as: *Die syntaktische Konnexität*, Studia Philosophica, 1, 1935, pp. 1-27.


Tesi di laurea inedita (Relatore: Ettore Casari).


"This paper is a contribution to the reconstruction of Tarski's semantic background in the light of the..."
ideas of his master, Stanislaw Lesniewski. Although in his 1933 monograph Tarski credits Lesniewski with crucial negative results on the semantics of natural language, the conceptual relationship between the two logicians has never been investigated in a thorough manner. This paper shows that it was not Tarski, but Lesniewski who first avowed the impossibility of giving a satisfactory theory of truth for ordinary language, and the necessity of sanitation of the latter for scientific purposes. In an early article (1913) Lesniewski gave an interesting solution to the Liar Paradox, which, although different from Tarski’s in detail, is nevertheless important to Tarski’s semantic background. To illustrate this I give an analysis of Lesniewski’s solution and of some related aspects of Lesniewski’s later thought.”


"The terminological concepts for the system of Ontology extended by the axiom of infinity are shown to be definable within that system. in 1929 Lesniewski first published terminological explanations for his system of logic, where he used certain concepts from his system of Mereology along with others such as equiformity. In this paper the terminological concepts are given entirely within the system of Ontology extended by the axiom of infinity. Since the definitions given are recursive, the incompleteness of this extension of Ontology is readily established."


"A first-order formulation of Lesniewski’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 Lesniewski’s Ontology is decidable."


"In the issue of this journal dated October 1966 (Vol. VII, No. 4, pp. 361-364) Professor John Trentman suggested limitations on my claim that Lesniewski's Ontology is of use in furnishing formal analyses of medieval logical theories, his grounds being that certain medieval theories deny what is called the "two-name theory of predication" allegedly common to Ockham and Ontology. Hence while the work of Ockhamists would be analyzable with reference to Ontology, that of those "Thomists" who deny the two-name theory would not. Professor Trentman then goes on to suggest that for such "Thomist" analyses to take place, "something like Frege's functional analysis of predication", is needed to show the "disparity of semantic category that holds between the subject and the predicate", thereby implying that no such form is available in Ontology, and that the allegations about the inadequacy of the two-name theory could have escaped my notice. Neither of these implications is tenable. Ignoring the second of them, I can deal with the first by exemplifying the manner in which the Ontology in question deals with the relations between names and verbs (i.e. function which when completed with nominal arguments form propositions)."


"The paper deals with the axiomatic Calculus of Names (S sub 2) which is an extension of the system S sub 1 presented in my paper "Remarks about syllogistic with negative terms" (Studia logica, vol. XXIV). The primitive terms of S sub 2 are the function of a categorical universal-affirmative proposition, the complement of a set, and the empty set. In S sub 2 one is given the definitions of addition and multiplication of sets, the universal set and the relation epsilon (... is ...) which corresponds semantically to the primitive term of Lesniewski's Ontology. It is proved that the elementary ontology and the elementary algebra of classes are fragments of s sub 2."


"The article presents a system S of syllogistic based on three axioms. The functor "a" / every...is.../ and the sign of nominal negation are primitive terms of system S. The known axiomatic systems of syllogistic with negative terms constructed by I. Thomas, A. Wedberg and C. A. Meredith are fragments of system S. It seems that the axioms of system S better characterize the categorical propositions containing negative terms since this characterization excludes some non-intuitive interpretations of such propositions, admissible in the above mentioned systems. It is also mentioned that there exists an extension of system S containing the elementary algebra of classes and the elementary Ontology of Lesniewski."


"An argument against multiply instantiable universals is considered in neglected essays by Stanislaw Lesniewski and I.M. Bochenski. Bochenski further applies Lesniewski's refutation of universals by
maintaining that identity principles for individuals must be different than property identity principles. Lesniewski’s argument is formalized for purposes of exact criticism, and shown to involve both a hidden vicious circularity in the form of impredicative definitions and explicit self-defeating consequences. Syntactical restrictions on Leibnizian indiscernibility of identicals are recommended to forestall Lesniewski’s paradox.


"This paper argues that there are two fundamental ways to regard variables in formalized languages. One way, associated with Russell and Quine, regards variables as autonomous referential expressions. On this view, quantification is the fundamental device for indicating ontological commitments. The second way to regard variables is linked to Frege and Lesniewski; variables are regarded as replacements for constant expressions. Such a view leads to an understanding of quantifiers in terms of substitution instances of the quantified expressions. It is argued that the second way of regarding variables is preferable to the first way, and that no logical results need be given up if this way is adopted."


"Heinrich Scholz and J. M. Bochenski have claimed that the laws of formal logic are the most general laws about things, properties, relations, states-of-affairs, etc. Others have mixed up logic and set theory. But Lesniewski's interpretation of the quantifiers shows that properly speaking logic belongs neither to ontology nor to mathematics."


"I wish to conclude with a brief summary of the results. The aim of the paper was to analyse rather than criticize. I started by examining two inferences which appeared to disprove the validity of the rules of universal instantiation and existential generalization in application to reasoning with empty noun-expressions. Then I distinguished two different interpretations of the quantifiers and argued that under what I called the unrestricted interpretation the two inferences were correct. Further arguments in favour of the unrestricted interpretation of the quantifiers were brought in, and in particular it was found that by adopting the unrestricted interpretation it was possible to separate the notion of existence from the idea of quantification. With the aid of the functor of inclusion two functors were defined of which one expressed the notion of existence as underlying the theory of restricted quantification while the other approximated the term exist(s) as used in ordinary language.

It may be useful to supplement this summary by indicating some aspects of the problem of existence which have not been included in the discussion. I analyzed the theory of quantification so far as it was applied in connection with variables for which noun-expressions could be substituted and my enquiry into the meaning of exist (s) ' was limited to cases where this functor was used with noun-expressions designating concrete objects or with noun-expressions that were empty. It remains to explore, among other things, in what sense the quantifiers can be used to bind predicate variables and what we mean when we say that colours exist or that numbers exist. These are far more difficult problems, which may call for a separate paper or rather for a number of separate papers." (p. 119)

Lesniewski's Mereology presupposes his Ontology, which in turn presupposes his Protothetic. A proof is outlined to show that if we interpret name-variables as proposition-variables and if at the same time we interpret the ontological 'epsilon' as the functor of conjunction and the mereological 'el' as the functor of assertion then the axioms and directives of Ontology and Mereology become respectively theses and directives of Protothetic.

Interpreted distributively the sentence 'Indiana is a member of the class of American federal states' means the same as 'Indiana is an American federal state'. In accordance with the collective sense of class expressions the sentence can be understood as implying that Indiana is a part of the country whose capital city is Washington. Neither interpretation appears to accommodate all the intuitions connected with the informal notion of class. A closer accommodation can be achieved, it seems, if class expressions are interpreted as verb-like expressions of a certain kind as available within the framework of Lesniewski's Ontology.

An attempt is made in the present essay to accommodate various senses of the notion of existence and of that of non-existence within the framework of logic. With this aim in view a system of Lesniewski's Ontology, referred to as System S, is outlined. Equipped with appropriate definitions and illustrated with a selection of theses it offers a logical theory of existence and non-existence. The usefulness of the theory is then tested by interpreting in its terms some of the principal notions and assertions of Meinong's ontology. A few brief comments on the notion of 'possible object' and on 'semantics' of fiction conclude the essay.
Edited by Massimo Libardi


"The most difficult problem that Lesniewski came across in constructing his system of the foundations of mathematics was the problem of 'defining definitions', as he used to put it. He solved it to his satisfaction only when he had completed the formalization of his protothetic and ontology. By formalization of a deductive system one ought to understand in this context the statement, as precise and unambiguous as possible, of the conditions an expression has to satisfy if it is added to the system as a new thesis. Now, some protothetical theses, and some ontological ones, included in the respective systems, happen to be definitions. In the present essay I employ Lesniewski's method of terminological explanations for the purpose of formalizing Lukasiewicz's system of implicational calculus of propositions, which system, without having recourse to quantification, I first extended some time ago into a functionally complete system. This I achieved by allowing for a rule of 'implicational definition', which enabled me to define any proposition forming functor for any finite number of propositional arguments."


"This paper has four parts. In the first part, I present Lesniewski's protothetics and the complete system provided for that logic by Henkin. The second part presents a generalized notion of partial functions in propositional type theory. In the third part, these partial functions are used to define partial interpretations for protothetics. Finally, I present in the fourth part a complete system for partial protothetics. Completeness is proved by Henkin's method using saturated sets instead of maximally saturated sets. This technique provides a canonical representation of a partial semantic space and it is suggested that this space can be interpreted as an epistemic state of a non-omniscient agent."


"This article provides an introduction to the deductive theories, which are so little known, of S. Lesniewski. The reasons that led this Polish logician to develop a theory of collective classes as well as the logical theories that underlie it are set forth here, and the main characteristics of Lesniewski's three systems -- mereology, protothetics and ontology -- are presented. Some epistemological considerations are included in this study."


"The logical theories of Stanislaw Leśniewski differ profoundly form classical formal systems. Unlike the latter, they do not have an entirely predetermined vocabulary. Nor do they have a determined list of functors of syntactical-semantic categories. Due to formalized directives for definitions, the logics of Leśniewski are constructed progressively, making new theses and consequently functors of new syntactical-semantic categories accessible. In this article we present the genetic aspect associated with these theses-definitions. We also show that the property of creativity makes it possible to bridge some of the fundamental gaps in contemporary classical logics."


"Due to the current availability of the English translation of almost all of Lesniewski's works it is now possible to give a clear and detailed picture of his ideas. Lesniewski's system of the foundation of mathematics is discussed. In a brief outline of his three systems Mereology, Ontology and Protothetics his positions concerning the problems of the forms of expression, proper names, synonymity, analytic and synthetic propositions, existential propositions, the concept of logic, and his views of theory of science and metaphysics are sketched. The influence of Mill, Lukasiewicz, Austrian philosophy and especially Petrazycki on his thinking is evaluated and an interpretation is suggested setting him squarely in a tradition of classical Aristotelian logic."


"This article proposes to clarity the problem of interpreting Lesniewski's ontology. A distinction is made between two kinds of interpretation: substitutional and "natural". Substitutional interpretation is shown to involve difficulties and limitations. A "natural" ontology, the major principles of which are presented here, is shown to be of considerable interest."


"In the paper we build up the ontology of Leśniewski's type for formalizing synthetic propositions. We claim that for these propositions an unconventional square of opposition holds, where a, i are contrary, a, o (resp. e, i) are contradictory, and e, o are subcontrary, a, e (resp. i, o) are said to stand in the subalternation. Further, we construct a non-Archimedean extension of Boolean algebra and show that in this algebra just two squares of opposition are formalized: conventional and the square that we invented. As a result, we can claim that there are only two basic squares of opposition. All basic constructions of the paper (the new square of opposition, the formalization of synthetic propositions within ontology of Leśniewski's type, the non-Archimedean explanation of square of opposition) are introduced for the first time."


"This paper assesses those features of Lesniewski's ontology which make it difficult to understand for
logicians accustomed to more orthodox systems of logic. It is seen that certain general features of presentation and content can, by selective acceptance or modification, be accommodated with a fairly orthodox viewpoint. The chief difficulty lies in the interpretation of Lesniewski’s names, and the constant “?”.

Four interpretations are suggested in turn: Lesniewski’s names as monadic predicates; as class terms; as common nouns; and as empty singular or plural terms. This last and least orthodox interpretation is argued to be the most suitable, but it is shown how it can be made to live in harmony with either the common noun or the class interpretation.”


"This article proposes to clarify the problem of interpreting Lesniewski’s Ontology. A distinction is made between the two kinds of interpretation: substitutional and "natural". Substitutional interpretation is shown to involve difficulties and limitations. A "natural" Ontology, the major principles of which are presented here, is shown to be of considerable interest."


"Students of traditional logic, by which I mean the central core of categorical syllogistic with whatever further forms were studied at the time, were drilled in putting the sentences occurring in arguments into «correct logical form», and present-day students do no different when replacing their natural language sentences by the formulas or semiformalus of predicate logic. Both procedures involve doing some violence to natural modes of expression. A sentence like Whoever flies saves time must be replaced by something like Every flier is a time-saver by traditional logicians and by For all x: if x flies then x saves time by modern logicians. As this makes clear, different logical systems may compete in offering prepared forms proximate to a natural specimen, so there may be a real choice as to which system is preferable for a given purpose. This is familiar to observers of modern logic since there are competing logics of definite descriptions, modality, and so on. Of course, if we confine attention just to the opposition between categorical syllogistic and predicate logic, there seems to be no contest. Predicate logic is expressively much the more powerful system, and as these two are the only two logical systems to have enjoyed widespread acceptance as tools for analysing validity of natural arguments, it might seem that only predicate logic remains as a general vehicle for workaday argument assessment. But the large number of introductory logic textbooks which still contain material on categorical syllogistic bears witness to the fact that, within its more limited sphere, the traditional logic of terms is widely felt to be a more natural and useful alternative to monadic predicate logic. Historical interest alone could not compensate for the inconveniences of introducing two quite different systems, with their different sentential analyses, laws, and terminology, to cover the same ground.

It is apparent that one disadvantage of predicate logic for these purposes is its use of bound individual variables, which natural languages do not have, and which they can simulate and match only by rather tortuous use of pronouns and pronominal phases. Of course this helps to account for the greater perspicuity of predicate logic once we leave the simplest sentences behind, but at the most elementary level it is a hindrance. The singular term/predicate analysis of simple predications compels common noun phrases and adjectives used attributively to appear as syntactically inseparable parts of predicates, which correspond most closely to verb phrases in natural language. Again, this is not a huge sacrifice, but it is
pervasive, is felt to be unnatural, and contributes to beginners' difficulties in learning logic. So it is worth considering from a practical and pedagogical point of view whether, in order to gain the considerable benefits conferred by predicate logic - quantification, multiple generality, relational predicates - it is necessary to put up with the disagreeable features of standard predicate logic. I shall argue that it is not, and that a more natural and flexible medium for which to prepare natural language sentences and arguments is provided by the term logic invented around 1920 by Stanislaw Lesniewski (1886-1939) and usually known as Ontology. (*)

(*) The possible confusion of the system of logic with the branch of metaphysics of the same name is not a danger in this context, and in any case I will write the name of the system with a capital letter. Sometimes Ontology is called the Calculus of Names, but this is misleading, since much more than names are involved. It would be nice to have a better name for Ontology.


"This discussion review examines the English edition of Lesniewski's collected works. Points emphasized include: the early (pre-symbolic) period, the quality of translation and typesettings, and the scandalously outdated bibliography."


"Edwin Allaire, Gustav Bergmann and Reinhardt Grossmann have objected to the nominalistic analysis of "this is red and that is red" which treats "red" as a common name. Such an analysis, they argued, must assimilate the copula in this sentence to the "is" of identity. Sinisi claims that this objection is mistaken. Using a logical system developed by Stanislaw Lesniewski, he shows that it is possible to construe "red" as a common name without taking the copula as the "is" of identity."


"Between 1927 and 1931 Lesniewski published a series of articles on the foundations of mathematics in the Polish journal Przegląd Filozoficzny. 65% of the work is devoted to various axiomatizations of Lesniewski's mereology (a theory of collective classes) while the remainder takes up various related issues. In the third part of this series Lesniewski informally sets forth his notion of a collective class, criticizes certain descriptions of distributive classes, and argues that there is no justification in Frege's statement that the conception of a class as consisting of individuals, so that the individual thing coincides with the unit class, cannot in any case be supported. Lesniewski's refutation of Frege's statement appears to be unknown to western logicians and philosophers. None of the recent books on Frege (e.g., Angelelli, Egidi, Sternfeld, Thiel, Walker) mentions it. Luschei, in his The Logical Systems of Lesniewski, mentions it but does not present it. My purpose here is to state and explain Lesniewski's refutation in the hope that it will help stimulate interest in his work."


"Sobociński in his paper on Lesniewski's solution to Russell's paradox (L'analyse de l'antinomie russellienne par Lesniewski, 1949) argued that Lesniewski has succeeded in explaining it away. The general strategy of this alleged explanation is presented. The key element of this attempt is the distinction between the collective (mereological) and the distributive (set-theoretic) understanding of the set. The mereological part of the solution, although correct, is likely to fall short of providing foundations of mathematics. I argue that the remaining part of the solution which suggests a specific reading of the distributive interpretation is unacceptable. It follows from it that every individual is an element of every individual. Finally, another Lesniewskian-style approach which uses so-called higher-order epsilon connectives is used and its weakness is indicated."

"The Lvov-Warsaw school of logic and analytic philosophy was one of the most important schools of philosophical thought in the twentieth century. In early 1910s its members already discussed the validity of the principles of excluded middle and contradiction. Among ideas developed in this school one might count Łukasiewicz's view that one can believe a contradiction and that certain sentences can be neither true nor false. This led to the construction of his three-valued logic. Another example is Ajdukiewicz's conventionalism about meaning and his formal work on definitions (it seems that it was Ajdukiewicz and Łukasiewicz who first focused on the consistency, translatability and non-creativity conditions on definitions, at least on the Polish ground). Other examples include Jaśkowski's approach to natural deduction and his work on discourse logics, Lindenbaum's lemma on maximally consistent sets of formulas, Presburger's work on arithmetic, Kotarbiński's semantical reism, and Tarski's work on formal semantics and truth.

One of the representatives of this school was Stanisław Leśniewski (1886–1939) (Alfred Tarski, whose importance in twentieth century logic it is hard to overestimate, was his only PhD student). Leśniewski developed his system of foundations of mathematics as an alternative to the system of Principia Mathematica. He constructed three systems: Protothetic, which is his version of a generalized propositional calculus, his own (higher-order) logic of predication called Ontology, and a theory of parthood called Mereology. This book is devoted to a presentation of Leśniewski’s achievements and their critical evaluation. I discuss his philosophical views, describe his systems and evaluate the role they can play in the foundations of mathematics. It was my purpose to focus on primary sources and present Leśniewski’s own views and results rather than those present in secondary literature. For this reason, later developments are not treated in detail but rather either mentioned in passing, or described in sections devoted to secondary literature included in some chapters. The intended audience of this book includes philosophy majors, graduate students and professional philosophers interested in logic, mathematics and their philosophy and history."


"This paper examines relations between Reism, the metaphysical theory invented by Tadeusz Kotarbinski, and Lesniewski's calculus of names. It is shown that Kotarbinski's interpretation of common nouns as genuine names, i.e., names of things is essentially based on Lesniewski's logical ideas. It is pointed out that Lesniewskian semantics offers better prospects for Nominalism than does semantics of the standard first-order predicate calculus."


This paper applies Lesniewski's logical ideas to an analysis of the concept of being. The analysis follows the classical ontology which is based on a distinction of two concepts of being: being in the distributive sense and being in the collective sense. Now it is argued that Lesniewski's ontology (calculus of names) is a much better device for analyzing being in the distributive sense than the standard first-order predicate logic. Moreover, basic intuition connected with the being in the collective sense are nicely captured by mereology.

On the website "Theory and History of Ontology"

Stanislaw Lesniewski's Logical Systems: Protothetic, Ontology, Mereology
POLISH ONTOLOGISTS

Kazimierz Twardowski on the Content and Object of Presentations

Tadeusz Kotarbinski from Ontological Reism to Semantical Concretism

Roman Suszko and the Non-Fregean Logics

Roman Ingarden: Ontology as a Science on the Possible Ways of Existence

Boguslaw Wolniewicz on the Formal Ontology of Situations

Jerzy Perzanowski: Modal Logics, Ontology and Ontologics